SONOPANT DANDEKAR ARTS, V.S. APTE COMMERCE AND M.H. MEHTA SCIENCE COLLEGE, PALGHAR

Department of Information Technology

PROJECT REPORT

TYBSC-Information Technology

Academic Year 2022-2023

Prepared by
Department of Information Technology
Sonopant Dandekar Arts, V.S. Apte Commerce and M.H. Mehta Science College, Palghar

INDEX

Sonopant Dandekar Shikshan Mandali's
Sonopant Dandekar Arts,
V. S. Apte Commerce &
M. H. Mehta Science College, Palghar
Estb.: 14 August 1968
Dr. Kiran Save, Principal

Kharekuran Road, Palghar (W), Tal. & Dist. Palghar,
Maharashtra - 401 404, INDIA
Tel. : +91 - 2525 - 252163
Principal : +91 - 2525 - 252317
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Web. : www.sdsmcollege.com

Ref No.:

Date : 19/07/2022

Notice

Department of Information Technology

All students of B.Sc. Information Technology are informed that they have to submit their project on dated 05/08/2022 at 10.00 a.m. at BMS, Ground floor, Information Technology Laboratory.

Dr. Ashwin Bhagat
Head of the Department
Information Technology

Academic Council 14/06/2018
Item No: 4.49

UNIVERSITY OF MUMBAI

Syllabus for T.Y.B.Sc.

Programme: B.Sc.

Subject: Information Technology

with effect from the academic year

2018 – 2019

Semester – 5			
Course Code	**Course Type**	**Course Title**	**Credits**
USIT501	Skill Enhancement Course	Software Project Management	2
USIT502	Skill Enhancement Course	Internet of Things	2
USIT503	Skill Enhancement Course	Advanced Web Programming	2
USIT504	Discipline Specific Elective (Any One)	Artificial Intelligence	2
USIT505		Linux System Administration	
USIT506	Discipline Specific Elective (Any One)	Enterprise Java	2
USIT507		Next Generation Technologies	
USIT5P1	Skill Enhancement Course Practical	Project Dissertation	2
USIT5P2	Skill Enhancement Course Practical	Internet of Things Practical	2
USIT5P3	Skill Enhancement Course Practical	Advanced Web Programming Practical	2
USIT5P4	Discipline Specific Elective Practical (Any One)*	Artificial Intelligence Practical	2
USIT5P5		Linux Administration Practical	
USIT5P6	Discipline Specific Elective Practical (Any One)*	Enterprise Java Practical	2
USIT5P7		Next Generation Technologies Practical	
		Total Credits	**20**

(All the practical mentioned in the syllabi are compulsory as per the courses chosen)

Semester – 6			
Course Code	**Course Type**	**Course Title**	**Credits**
USIT601	Skill Enhancement Course	Software Quality Assurance	2
USIT602	Skill Enhancement Course	Security in Computing	2
USIT603	Skill Enhancement Course	Business Intelligence	2
USIT604	Discipline Specific Elective (Any One)	Principles of Geographic Information Systems	2
USIT605		Enterprise Networking	
USIT606	Discipline Specific Elective (Any One)	IT Service Management	2
USIT607		Cyber Laws	
USIT6P1	Skill Enhancement Course Practical	Project Implementation	2
USIT6P2	Skill Enhancement Course Practical	Security in Computing Practical	2
USIT6P3	Skill Enhancement Course Practical	Business Intelligence Practical	2
USIT6P4	Discipline Specific Elective Practical (Any One)*	Principles of Geographic Information Systems Practical	2
USIT6P5		Enterprise Networking Practical	
USIT6P6	Skill Enhancement Course Practical	Advanced Mobile Programming	2
		Total Credits	**20**

***The choice of Practical course is based on the theory Course. For Semester V, USIT504, USIT505, USIT506 and USIT507, the practical courses are USIT5P4, USIT5P5 USIT5P6, USIT5P7. For Semester VI, USIT604, USIT605 the practical courses are USIT6P4, USIT6P5 respectively. Practical Course USIT6P6 is compulsory.**

Project Dissertation Semester V and Project Implementation Semester VI

Chapter 1 to 4 should be submitted in Semester V in spiral binding. These chapter have also to be included in Semester VI report. Semester VI report has to be hard bound with golden embossing. Students will be evaluated based on the dissertation in semester V and dissertation and viva voce in Semester VI.

I. OBJECTIVES

- Describe the Systems Development Life Cycle (SDLC).
- Evaluate systems requirements.
- Complete a problem definition.
- Evaluate a problem definition.
- Determine how to collect information to determine requirements.
- Perform and evaluate feasibility studies like cost-benefit analysis, technical feasibility, time feasibility and Operational feasibility for the project.
- Work on data collection methods for fact finding.
- Construct and evaluate data flow diagrams.
- Construct and evaluate data dictionaries.
- Evaluate methods of process description to include structured English, decision tables and decision trees.
- Evaluate alternative tools for the analysis process.
- Create and evaluate such alternative graphical tools as systems flow charts and state transition diagrams.
- Decide the S/W requirement specifications and H/W requirement specifications.
- Plan the systems design phase of the SDLC.
- Distinguish between logical and physical design requirements.
- Design and evaluate system outputs.
- Design and evaluate systems inputs.
- Design and evaluate validity checks for input data.

- Design and evaluate user interfaces for input.
- Design and evaluate file structures to include the use of indexes.
- Estimate storage requirements.
- Explain the various file update processes based on the standard file organizations.
- Decide various data structures.
- Construct and evaluate entity-relationship (ER) diagrams for RDBMS related projects.
- Perform normalization for the unnormalized tables for RDBMS related projects
- Decide the various processing systems to include distributed, client/server, online and others.
- Perform project cost estimates using various techniques.
- Schedule projects using both GANTT and PERT charts.
- Perform coding for the project.
- Documentation requirements and prepare and evaluate systems documentation.
- Perform various systems testing techniques/strategies to include the phases of testing.
- Systems implementation and its key problems.
- Generate various reports.
- Be able to prepare and evaluate a final report.
- Brief the maintenance procedures and the role of configuration management in operations.
- To decide the future scope and further enhancement of the system.
- Plan for several appendices to be placed in support with the project report documentation.
- Decide the various processing systems to include distributed, client/server, online and others.
- Perform project cost estimates using various techniques.
- Schedule projects using both GANTT and PERT charts.
- Perform coding for the project.
- Documentation requirements and prepare and evaluate systems documentation.
- Perform various systems testing techniques/strategies to include the phases of testing.
- Systems implementation and its key problems.
- Generate various reports.
- Be able to prepare and evaluate a final report.
- Brief the maintenance procedures and the role of configuration management in operations.
- To decide the future scope and further enhancement of the system.
- Plan for several appendices to be placed in support with the project report documentation.

- Work effectively as an individual or as a team member to produce correct, efficient, well-organized and documented programs in a reasonable time.
- Recognize problems that are amenable to computer solutions, and knowledge of the tool necessary for solving such problems.
- Develop of the ability to assess the implications of work performed.
- Get good exposure and command in one or more application areas and on the software
- Develop quality software using the software engineering principles
- Develop of the ability to communicate effectively.

II. Type of the Project

The majority of the students are expected to work on a real-life project preferably in some industry/ Research and Development Laboratories/Educational Institution/Software Company. Students are encouraged to work in the areas listedbelow . However, it is ***not mandatory*** for a student to work on a real-life project. The student can formulate a project problem with the help of her/his Guide and submit the project proposal of the same. **Approval of the project proposal is mandatory**. If approved, the student can commence working on it, and complete it. Use the latest versions of the software packages for the development of the project.

III. SOFTWARE AND BROAD AREAS OF APPLICATION

FRONT END / GUI Tools	.Net Technologies,Java
DBMS/BACK END	Oracle, SQL Plus, MY SQL, SQL Server,
LANGUAGES	C, C++, Java, VC++, C#, R,Python
SCRIPTING LANGUAGES	PHP,JSP, SHELL Scripts (Unix), TcL/TK,
.NET Platform	F#,C#. Net, Visual C#. Net, ASP.Net
MIDDLE WARE (COMPONENT) TECHNOLOGIES	COM/DCOM, Active-X, EJB
UNIX INTERNALS	Device Drivers, RPC, Threads, Socket programming
NETWORK/WIRELESS TECHNOLOGIES	-

REALTIME OPERATING SYSTEM/ EMBEDDED SKILLS	LINUX, Raspberry Pi, Arduino, 8051
APPLICATION AREAS	Financial / Insurance / Manufacturing / Multimedia / Computer Graphics / Instructional Design/ Database Management System/ Internet / Intranet / Computer Networking-Communication Software development/ E-Commerce/ ERP/ MRP/ TCP-IP programming / Routing protocols programming/ Socket programming.

IV. Introduction

The project report should be documented with scientific approach to the solution of the problem that the students have sought to address. The project report should be prepared in order to solve the problem in a methodical and professional manner, making due references to appropriate techniques, technologies and professional standards. The student should start the documentation process from the first phase of software development so that one can easily identify the issues to be focused upon in the ultimate project report. The student should also include the details from the project diary, in which they will record the progress of their project throughout the course. The project report should contain enough details to enable examiners to evaluate the work. The important points should be highlighted in the body of the report, with details often referred to appendices.

1.1 PROJECT REPORT:

Title Page

Original Copy of the Approved Proforma of the Project Proposal

Certificate of Authenticated work

Role and Responsibility Form

Abstract

Acknowledgement

Table of Contents

Table of Figures

CHAPTER 1: INTRODUCTION

1.1 Background

1.2 Objectives

1.3 Purpose, Scope, and Applicability

1.3.1 Purpose

1.3.2 Scope

1.3.3 Applicability

1.4 Achievements

1.5 Organisation of Report

CHAPTER 2: SURVEY OF TECHNOLOGIES

CHAPTER 3: REQUIREMENTS AND ANALYSIS

3.1 Problem Definition

3.2 Requirements Specification

3.3 Planning and Scheduling

3.4 Software and Hardware Requirements

3.5 Preliminary Product Description

3.6 Conceptual Models

CHAPTER 4: SYSTEM DESIGN

4.1 Basic Modules

4.2 Data Design

4.2.1 Schema Design

4.2.2 Data Integrity and Constraints

4.3 Procedural Design

4.3.1 Logic Diagrams

4.3.2 Data Structures

4.3.3 Algorithms Design

4.4 User interface design

4.5 Security Issues

4.6 Test Cases Design

The documentation should use tools like star UML, Visuo for windows, Rational Rose for design as part of Software Project Management Practical Course. The documentation should be spiral bound for semester V and the entire documentation should be hard bound during semester VI.

CHAPTER 5: IMPLEMENTATION AND TESTING

5.1 Implementation Approaches

5.2 Coding Details and Code Efficiency

5.2.1 Code Efficiency
5.3 Testing Approach
5.3.1 Unit Testing
5.3.2 Integrated Testing
5.3.3 Beta Testing
5.4 Modifications and Improvements
5.5 Test Cases

CHAPTER 6: RESULTS AND DISCUSSION
6.1 Test Reports
6.2 User Documentation
CHAPTER 7: CONCLUSIONS
7.1 Conclusion
7.1.1 Significance of the System
7.2 Limitations of the System
7.3 Future Scope of the Project
REFERENCES
GLOSSARY

APPENDIX A

APPENDIX B

V. EXPLANATION OF CONTENTS

Title Page
Sample format of Title page is given in Appendix 1 of this block. Students should follow the given format.
Original Copy of the Approved Proforma of the Project Proposal
Sample Proforma of Project Proposal is given in Appendix 2 of this block. Students should follow the given format.

Certificate of Authenticated work

Sample format of Certificate of Authenticated work is given in Appendix 3 of this block. Students should follow the given format.

Role and Responsibility Form

Sample format for Role and Responsibility Form is given in Appendix 4 of this block.
Students should follow the given format.

Abstract

This should be one/two short paragraphs (100-150 words total), summarising the project work. It is important that this is not just a re-statement of the original project outline. A suggested flow is background, project aims and main achievements. From the abstract, a reader should be able to ascertain if the project is of interest to them and, it should present results of which they may wish to know more details.

Acknowledgements

This should express student's gratitude to those who have helped in the preparation of project.

Table of Contents: The table of contents gives the readers a view of the detailed structure of the report. The students would need to provide section and subsection headings with associated pages. The formatting details of these sections and subsections are given below.

Table of Figures: List of all Figures, Tables, Graphs, Charts etc. along with their page numbers in a table of figures.

Chapter 1: Introduction

The introduction has several parts as given below:

Background: A description of the background and context of the project and its relation to work already done in the area. Summarise existing work in the area concerned with the project work.

Objectives: Concise statement of the aims and objectives of the project. Define exactly what is going to be done in the project; the objectives should be about 30 /40 words.
Purpose, Scope and Applicability: The description of Purpose, Scope, and Applicability are given below:

• Purpose: Description of the topic of the project that answers questions on why this project is being done. How the project could improve the system its significance and theoretical framework.
• Scope: A brief overview of the methodology, assumptions and limitations. The students should answer the question: What are the main issues being covered in the project? What are the main functions of the project?
• Applicability: The student should explain the direct and indirect applications of their work. Briefly discuss how this project will serve the computer world and people.
Achievements: Explain what knowledge the student achieved after the completion of the work. What contributions has the project made to the chosen area? Goals achieved - describes the degree to which the findings support the original objectives laid out by the project. The goals may be partially or fully achieved, or exceeded.

Organisation of Report: Summarising the remaining chapters of the project report, in effect, giving the reader an overview of what is to come in the project report.

Chapter 2: Survey of Technologies

In this chapter Survey of Technologies should demonstrate the students awareness and understanding of Available Technologies related to the topic of the project. The student should give the detail of all the related technologies that are necessary to complete the project. The should describe the technologies available in the chosen area and present a comparative study of all those Available Technologies. Explain why the student selected the one technology for the completion of the objectives of the project.

Chapter 3: Requirements and Analysis

Problem Definition: Define the problem on which the students are working in the project.

T.Y.BSc.IT Semester VI Practical Examination Project Details (2022-2023)

Date: **Subject : Project Implemetation**

Sr. No.	Roll No.	Seat Number	Student Name as appeared on Statement of Marks	Title of the Project	Brief Description			
					Technology used	Front-End	Back End	Language used
1	69023	4020780	Ahire Dhruvi Santosh	Online twitter hatespeech detection	python	-	python	python
2	69024	4020929	Zorawal khushi Mukesh	online twitter hatespeech detection	python	-	python	python
3	69025	4020896	Shaikh Irfan Abdul Rauf	Position Detecting System	IOT	-	C++	C++
4	69026	4020789	Chaudhary Sudhakar Fathu	Position Detecting System	IOT	-	C++	C++
5	69009	4020782	Ambelkar Bhagyashri Anant	Ecommerce website for buying and selling old or Scrap items	PHP	Html, CSS, Javascript	SQL	PHP
6	69010	4020799	Goswami Manisha Janardannath	Ecommerce website for buying and selling old or Scrap items	PHP	Html, CSS Javascript	SQL	PHP
7.	69085	4020788	~~Multiclient~~ chaturved Ankur Shailesh	multiclient website offering client services.	web3	Reactjs	Mongoos	Javascript
8.	69078	4020790	Chauhan Jyoti	Whatsapp chat Analyzer	Python	—	Python	Python
9	69003	4020795	Dhadpi Asmita Rama	News blog website with citizen reporting	PHP	Html CSS Javascript	SQL PHP	PHP
10	69053	4020797	Ghorat Krutarth Mahesh	Online agriculture product Sales Website	PHP	Html/css Javascript	SQL	PHP
11	69054	4020884	Raut Dhruvank Manoj	Online agriculture product sales website	PHP	Html/css Javascript	SQL	PHP
12	69062	4020862	Shreyash Rajesh Pakhare	voice Assistant chatbot (ProTon)	~~Python~~ AI	—	Python	Python

Internal Examiner

Shinde

26/04/2023

External Examiner

T.Y.BSc.IT Semester VI Practical Examination Project Details (2022-2023)

Date: **Subject : Project Implemetation**

Sr. No.	Roll No.	Seat Number	Student Name as appeared on Statement of Marks	Title of the Project	Brief Description			
					Technology used	Front-End	Back End	Language used
1	69073	4020785	Tanmay Vinod Bari	Leave Management System	PHP	HTML, CSS	SQL	PHP
2	69074	4020784	Piyush Bhalchandra Bari	Leave Management System	PHP	HTML, CSS	SQL	PHP
3	69004	4020792	Rekha choudhary	Smart car Parking System	IOT	Python		Python
4	69039	4020786	vaishnav bari	Pharmacy management system	PHP	HTML CSS Javascript	MYSQL	PHP.
5	69001	4020794	Rasika Deshpande	Contact Management system	PHP	python	S~	python
6	69018	4020876	vaishnavi pawar	Contact Management system	PHP	python		Python.
7	69057	4020907	Sumit Singh	Cafe Management System	Java	Java	MY SQL	Java
8	69061	4020800	Ajit Gupta	Cafe Managementsystem	Java	Java	MySQL	Java
9	69047	4020801	Amar Gupta	Tourist Management website	PHP	HTML, CSS, Js	MySQL	PHP.
10	69088	4020877	Shaina Poojari	Heart Disease Prediction System	.NET	Visual Studio	SQL	.NET
11	69041	4020810	Satyam Jha	Heart Disease Prediction System	.NET	Visual Studio	SQL	.NET
12	69014	4020807	Anjali Jha	Medo Online for Local chemist and medicals.	ASP.NET	HTML, CSS, bootstrap4.	MS SQL	.NET

Internal Examiner

Ishinde
26/04/2023

External Examiner

T.Y.BSc.IT Semester VI Practical Examination Project Details (2022-2023)

Date: **Subject : Project Implemetation**

Sr. No.	Roll No.	Seat Number	Student Name as appeared on Statement of Marks	Title of the Project	Brief Description			
					Technology used	Front-End	Back End	Language used
1	69002	4020817	SIYA KINI	online Hotel Reservation	PHP	HTML, CSS, Javascript	PHP, SQL	PHP
2	69022	4020870	Patil Parth Narendra	Electricity Billing System	Java	Java Swings	Java SQL	Java
3	69021	4020812	Kanyal Devendrasingh Sanjay	Electricity Billing System	Java	Java Swings	Java SQL	JAVA
4	69042	4020875	Priyanka Sambhaji Pawar	IOT Enabled smart platform for senior citizen and divyangjan	~~IOT~~ C++	—	C++	C++
5	69043	4020818	Dhrutika Bhushan Kothari	IOT Enabled smart platform for senior citizen & divyanjan	~~IOT~~ C++	—	C++	C++
6	69069	4020874	Jay Ananda Pawar	Car Selling Website	PHP	HTML, CSS	SQL	PHP
7	69070	4020805	Prayag Vilas Jadhav	Car Selling Website	PHP	HTML, CSS	SQL	PHP
8	69076	4020804	Ranjana Gupta	Bill splitter	Java	React	node, express	Java
9	69087	4020806	Ansh Anil Jha	Bill Splitter	Java	React	Node Express	Java
10	69016	4020816	Chetan K Khatik	Life Saviour System	IOT	—	C++	C++
11	69063	4020911	Srikanth S. Suri	Voice Assistent Chatbot (Proton)	AI	—	Python	Python
12	69031	4020849	NIKITA M. Mandal	Image encryption decryption using python.	python.	python.	python	python

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T.Y.BSc.IT Semester VI Practical Examination Project Details (2022-2023)

Date: **Subject : Project Implemetation**

Sr. No.	Roll No.	Seat Number	Student Name as appeared on Statement of Marks	Title of the Project	Brief Description			
					Technology used	Front-End	Back End	Language used
13	69032	4020882	~~Image encryption~~ Hemangi. C. Raulji	Image encryption decryption with using python	python	python	python	python
14	69029	4020857	Yadnya. S. More	Housekental zone for students	webapp ~~PHP~~	HTML CSS, JS	PHP, SQL	PHP, SQL
15	69030	4020848	kalyani. H. Mali	House retal zone for stedents	Web applicatio	HTML CSS, JS	PHP SQL	PHP, SQL
16	69007	4020850	Avjali. M. Maurya	Online resume builder	Web. app	JS, Typescript	JS	JS, Typescript
17	69006	4020904	puja. A. Singh	Online resume builder	web app.	JS, Typescript	JS	JS, Typescript
18	69013	4020887	Kajal S. Sahani	Automated Timetable and Defaulter list generator with SMS	Web APP	Bulma framework	MS SQL	ASP.NET
19	69028	4020924	Amit A. Yadav	online crime Reporting system	web Applicat"	HTML, CSS, JS.	MY SQL	PHP
20	69087	4020846	Chetan R. Machhi	online crime Reporting system	web Applicat"	HTML, CSS, JS	MY SQL	PHP
21	69066	4020869	Manish N. Patil	Face identification system	phython	phython	Python	python
22	69038	4020923	Kunal R. Vishwas	Face identification system	Python	python	Python	Python
23	69084	4020854	Suyash Dinesh Mishra	multi-client website offering client services	web app	HTML, CSS, JS	mongodb	as.
24.	69046	4020895	ADNAN R. SHAIKH	Android file Manager Application.	python.	JSP.	SQLyog.	Android

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26/04/2023

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Date: **Subject : Project Implemetation**

Sr. No.	Roll No.	Seat Number	Student Name as appeared on Statement of Marks	Title of the Project	Brief Description			
					Technology used	Front-End	Back End	Language used
25	69083	4020864	Pal. S. Jagdish	whatsapp chat analyzer	Python	-	Python	Python
26	69071	4020872	Shubham P. Patil	Complaint Management System	PHP	HTML, CSS	SQL	PHP
27	69072	4020861	Chinmay D. Pagdhare	Complaint Management System	PHP	HTML CSS	SQL	PHP
28	69017	4020873	Urvashi U. Patil	social problem resolution system	Python	HTML CSS Javascript	Python SQL	Python
29	69040	4020809	Richa S. Jha	Social Problem resolution system	Python	HTML CSS Javascript	Python SQL	Python
30	69077	4020868	Maheswi R. Patil	Barber shop online system	PHP	PHP, HTML CSS	MySQL	PHP
31	69068	4020894	Smit R. Shah	Housing society mang. system	~~Flutter~~	Flutter	Flutter	Java
32	69086	4020847	Shubham Mahapure	Housing societe Managment	Flutter	Flutter	Flutter	Java
33	69080	4020815	Rushpak P. Kewi	Typing Speed Test	Python		Python	Python
34	69033	4020855	Arun. D. more	blood bank management system	~~CSS/JS~~ PHP	CSS/JS	SQL	PHP
35	69005	4020913	Pappu. P. Tumbade	online Book store system	PHP	HTML/CSS	SQL	PHP/Java
36	69035	4020808	Rajesh. S. Jha	online Book Store System	PHP	HTML/CSS	SQL	PHP/Java

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T.Y.BSc.IT Semester VI Practical Examination Project Details (2022-2023)

Date: **Subject : Project Implemetation**

Sr. No.	Roll No.	Seat Number	Student Name as appeared on Statement of Marks	Title of the Project	Brief Description			
					Technology used	Front-End	Back End	Language used
37	69058	4020878	Prasad Pushpa	Soul to Spa	~~Html~~ Bootstrap PHP	Html, CSS Javascript	PHP	PHP
38	69059	4020922	Nikita Vishwakarma	Soul to Spa	PHP	Html, CSS Javascript	PHP	PHP
39	69082	4020881	Sandeep Rajak	Student solution House	React Node.	Javascript	~~React~~ express Node	Javascript
40	69064	4020888	Harpreet Sain	Student Solution House	React Node	Javascript	express Node	Javascript
41	69081	4020915	Swapnali Umtal	Assistant system for Dumb, Deaf, Blind and learning disabled	~~HTML~~ VB studio code	HTML Javascript CSS	Javascript	Javascript
42	69079	4020871	Saloni Patil	Asw tant sys for Dumb deaf blind and Learning disabled	VB code studeo	HTML CSS Javascript	Javascript	Javascript
42	69036	4020892	Ashish Saw	Airline reservation System	Python	Java Html Javascript	PHP Server Framework	Javascript
43	69027	4020883	Darpan Raut	Airline reservation system	Python	Java Html Javascript	PHP Server Framework	Javascript
44	69051	4020916	Anjali. Verma.	Online Salon booking system.	PHP	~~Html, CSS~~ Javascript	PHP	PHP.
45	69052	4020889	Rashmi Saini	online salon booking system	PHP	Html, CSS Javascript	PHP	PHP.
46.	69050	4020926	yadav Laxmi	Virtual mouse using hand gesture	AI Python	python	python	python
47.	69051	4020883	Tabassum Ansari	Virtual Mouse using hand gesture	AI Python	Python	python	python.

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26/04/23

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T.Y.BSc.IT Semester VI Practical Examination Project Details (2022-2023)

Date: **Subject : Project Implemetation**

Sr. No.	Roll No.	Seat Number	Student Name as appeared on Statement of Marks	Title of the Project	Brief Description			
					Technology used	Front-End	Back End	Language used
48.	69045	4020919	Isha Vishwakarma	Smart food Transportation using IOT	IOT	-	-	C++
49.	69044	4020900	Aditi Shrivastav	Smart food Transportation using IOT	IOT	-	-	C++
50	69020	4020927	Pankaj Yadav	Online voting System	.NET	HTML, CSS, C#	MSQL	C#
51	69060	4020925	Ashish. yadav	movie recommendation system	Python	HTML CSS React.js	Python Flask	Python
52	69019	4020906	Shalini Singh	fingerprint unlock door	Python	-	-	Python
53	69056	4020920	Jyoti Vishwakarma	fingerprint unlock door	Python	-	-	Python
54	69012	4020880	Saidhrya purav	Text encryption using various algorithm.	Android	-	-	Java.
55	69011	4020909	Trupti sogale.	Text encryption using various algorithm.	Android	-	-	Java.
56	69067	4020787	Bhushan Bhamare	Online Electronic shopping System	Android	-	-	python
57	69048	4020890	Dhruv. Sankhe	Online Electronic shopping system	Android	-	-	python.
58	69015	4020891	Tanvi Satvi	School bus live tracking with SMS Notification	.Net	Material UI, CSS, JavaScript	MS-SQL	.Net

Internal Examiner

Shinde
26/04/2023

External Examiner

University of Mumbai

M.G.Road, Fort, Mumbai-400032, Maharashtra(India)
https://mumapp.digitaluniversity.ac/

Blank Mark List For
B.Sc. (I.T.)(with Credits) - Regular-Rev16 - T.Y. B.Sc. (I.T.) - Sem VI [1S00256] For Summer
College : Dandekar Arts, V. S. Apte Commerce and M. H. Mehta Science College (225), Kharekuran

Paper Name: **Project Implementation (USIT6P1)**	**Practical UA** (Max Mark: 150 Min Mark: 60)	**Count of Student: 88**

Sr. No.	Seat Number	PRN	Student Name	Roll no	Signature
1	4020780	2020016401092302	AHIRE DHRUVI SANTOSH	69023	Ahire
2	4020781	2019016401217897	AMBAWKAR HIMANSHU SADANAND	–	ABSENT
3	4020782	2020016401073266	AMBELKAR BHAGYASHRI ANANT	69009	Ambelkar
4	4020783	2020016401093665	ANSARI TABASSUM DILDAR	69049	Ansari
5	4020784	2020016401096683	BARI PIYUSH BHALCHANDRA	69074	Bari
6	4020785	2020016401101141	BARI TANMAY VINOD	69073	Bari
7	4020786	2020016401111487	BARI VAISHNAV KRUSHNA	69039	V.K. BARI.
8	4020787	2020016401131453	BHAMARE BHUSHAN ASHOK	69067	Bhamare.
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13	4020794	2020016401101133	DESHPANDE RASIKA SACHIN	69001	Deshpande
14	4020795	2020016401104843	DHADPI ASMITA RAMA	69003	Dhadpi
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17	4020800	2020016401131422	GUPTA AJITKUMAR CHHOTELAL	69061	Ajit
18	4020801	2020016401088737	GUPTA AMAR GUDDU	69047	Amar
19	4020804	2019016401218316	GUPTA RANJANA MAHESH	69076	Ranjana
20	4020805	2020016401096702	JADHAV PRAYAG VILAS	69070	Prayag
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27	4020815	2020016401688825	KENI PUSHPAK PRAKASH	69080	Pushpak
28	4020816	2020016401131341	KHATIK CHETAN KISHAN	69016	Chetan
29	4020817	2020016401073243	KINI SIYA VIKAS	69002	Siya
30	4020818	2020016401111514	KOTHARI DHRUTIKA BHUSHAN	69043	Dhrutika

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66	4020894	2020016401115817	SHAH SURAJ RAMDHARI	69068	Sshah
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70	4020904	2020016401093657	SINGH POOJA ARVIND KUMAR	69006	Psingh

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88	4020929	2020016401104851	ZORAVAL KHUSHI MUKESHBHAI	69024	

Internal Examiner

External Examiner

Date - 26/04/2023

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Life saviour system (L2S)

A Project Report

Submitted in partial fulfilment of the

Requirements for the award of the Degree of

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

By

Chetan kishan Khatik

Under Esteemed Guidance of

MS. CYNTHIA N. SHINDE
Professor

DEPARTMENT OF INFORMATION TECHNOLOGY

SONOPANT DANDEKAR ARTS, V.S. APTE COMMERCE & M.H. MEHTA SCIENCE COLLEGE

(Affiliated to University of Mumbai)

PALGHAR, 401404

MAHARASHTRA

2023

PROFORMA FOR THE APPROVAL PROJECT PROPOSAL

PNR No.: .....

Roll no: 69016

1. Name of the Student

   Chetan Kishan Khatik

2. Title of the Project

   LIFE SAVIOUR SYSTEM (L25)

3. Name of the Guide

   Mrs Sayli Bhosale

4. Teaching experience of the Guide 8 years

5. Is this your first submission? Yes ☑ No ☐

Chetan
Signature of the Student

Date: 05/08/2022

Signature of the Guide

Date: 05/08/2022

Signature of the coordinator

Date: 05/08/2022

SONOPANT DANDEKAR ARTS, V.S. APTE COMMERCE & M.H. MEHTA

SCIENCE COLLEGE

(Affiliated to University of Mumbai)

PALGHAR-MAHARASHTRA-401404

DEPARTMENT OF INFORMATION TECHNOLOGY

CERTIFICATE

This is to certify that the project entitled, **"Life saviour System (L2S)** "is bonafied work of Chetan Kishan Khatik Seat no: (69016) submitted in partial fulfilment of the requirements for the award of degree of BACHELOR OF SCIENCE in INFORMATION TECHNOLOGY from University of Mumbai.

06/04/2023

Internal Guide

06/04/2023

Coordinator

24.4.23

External Examiner

S. D. S. M. COLLEGE Dept. of IT PALGHAR, DIST. PALGHAR

Date: 06/04/23

College Seal

DECLARATION

I here by declare that the project entitled, "**Life saviour System (L2S)**" done at **Sonapant Dandekrar College, Palghar,** has not been in any case duplicated to submit to any other university for the award of any degree. To the best of my knowledge other than me, no one has submitted to any other university.

The project is done in partial fulfilment of the requirements for the award of degree of **BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)** to be submitted as final semester project as part of our curriculum.

Chetan Kishan Khatik

ABSTRACT

Life saviour system (L2S) is replacement of old emergency handling system. Old emergency system work to controlling the system and to save property damage. But L2S will control the situation save property and life. With the concept of Quick Evacuation this system can handle some emergency like fire, earthquake, or some of medical emergencies.

It provides the shortest, nearest, and fastest route to take yourself out from such conditions. It is an IOT based project in which we use network of sensor, controller, and actuator to tackle such condition intelligently and rationally. Its take the quick decision according to the situation and set of rules given to the system. It has taken decision are quick accurate and emotionless. So there are less change of errors and provide better security.

ACKNOWLEDGEMENT

The successful completion of any task would be incomplete without mentioning all those people who made it possible, the constant and encouragement, crowns the effort with success.

I wish many thanks to our Head of Department **Dr. ASHWIN BHAGAT** for providing guidance throughout the course and all those who have indirectly guided and helped us in preparation of this project.

I express my thanks to my project guide **Prof. Mrs. Sayli M. Bhosale** & **Prof. Ms. Cynthia N. Shinde** for the constant motivation and valuable help through the project work.

I am indebted to my well-wishers and friends who encourage me in successful completion of the project.

Chetan.k.Khatik

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Wireless fire detection or handling system is the technology which is commonly used to detect and handle fire emergency.

There is no system which can handle earthquake or disaster handling system. In such conditions system can save loss of properties or handle such conditions at certain level but cannot save life with guarantee.

In this situation there is huge loss of live because people cannot take themselves outside from this situation due to shortage of time or due to some obstacles which occurred in such emergencies. So to save loss of properties and loss of life effectively (L2S) this system can help.

Life Saviours System (L2S) is built to save life at the time of some emergency situations. Which work on the concept of quick evacuation from the structure within couples of minute. It contains 2 modes

1. Manual mode.
2. Automation mode.

This can be used according to the requirement and situation. It helps to evacuate with the concept based on IOT which provides an emergency exit window or tunnel directly from inside of your structure to nearest safest place.

1. In Manual Mode we need to just click one button to trigger the system when we required.
2. In Automation mode it triggers itself according to the situation like fire emergency or Earthquake.

1.2 OBJECTIVE

- Fast Evacuation: Its semi-automated system and its react quickly according to the system which makes its able for quick evacuation.
- Save life: Through quick evacuation it can save life by providing the shortest and fastest route to the nearest safest place.
- Handling critical condition in proper and systematic way.
- System is semi-automated so it takes decision intelligently or rationally.
- To understand the importance of safety in over premises.
- To solve problems using IOT safely and securely.

1.3 PURPOSE & SCOPE

1.3.1 PURPOSE

- To understand the importance of evacuation system.
- Saving the life and property equally.
- Pre alert for certain emergency conditions.
- Making premises more secured.
- Introducing the technology which can handle disaster like earthquake.
- To get fastest and safest route inside your structure.

1.3.2 SCOPE

- There are many registered factories in Maharashtra, Gujarat like that in many other state and countries our project can be implemented in all those factories.
- It can be implemented in School and colleges.
- It can be implemented in malls.
- Life Saviour System can be placed at any 2 to 3 storage structure.

1.3.3 APPLICABILITY

- This system need space which is equal to the space required for one window and power supply which is equal to the power required for a mobile charger.
- It is compact easy to implement and handle system which save life and property both.
- If due to some reason the automation does not work then we can activate system manually.
- It can be implemented at any structure Up to 4 storage including school, colleges, malls, factories, buildings, bungalow, row house etc. We can implement it on group floor also.
- Even 10-year-old child can trigger or active this system because it does not require any professional knowledge related IT or engineering all system are pre integrated and ready to use.

1.4 Achievements

This system is compact, easy to implement and easy to use. So it can be implemented at any structure even if there is shortage of space and it also require less amount of energy it can be run on the power requirement which equals to the power requirement for a mobile charger.

Single system can save the life in different conditions which makes it all in life saviour system.

It is the better system to replace the old emergency systems like emergency stairs, emergency windows and doors.

1.5 ORGANIZATION OF REPORT

After proper integration and implementation the system. System will automatically trigger or activated after detection of fire and sensation/vibration.

User can also active the system and quickly evacuate from there structure on single click of button

CHAPTER 2

SURVEY OF TECHNOLOGIES

Muhammad Salihin Ahmad Azmil, Norsuzila Ya'acob, Khairul Nizam Tahar, Suzi Seroja Sarnin 2015[1], The purpose of the Fire and Rescue Service is to protect human life, our property, and Earth natural resources from fire and other emergencies. With fluctuation in demands, the Fire and Rescue Service must equip with the best techniques, training regime and equipment to meet public expectations. Mitigation, preparedness, and risk management have taken on new benefit with challenges facing the fire service today. Fast response cannot be achieved without good planning and preparedness. As a result, a monitoring system of alarm for fire detection using Arduino microcontroller was design. The circuit are including with a buzzer, smoke sensor and a camera. All the data taken from smoke sensor and camera will be send to data monitoring system and be display on monitoring system wirelessly.

Lin Mingsong , Lin Tugan 2020[2], Aiming at the purpose of rescue, obstacle breaking, escape and refuge, high-power motor drive control technology, video signal acquisition technology, wireless communication technology, wireless video signal transmission and processing technology, sensor data acquisition technology, multi degree of freedom mechanical motion control design, fire source search and firefighting technology are adopted to realize the risk of serious harm to public safety In case of emergency or major disaster, under the wireless remote control and automatic control, instead of the rescue personnel, they will visit the dangerous situation or disaster scene in person, send back the video image of the bad environment in real time, and can put out the fire, and help the rescue personnel to obtain accurate field information, minimize the loss of people's life and property, and reduce the impact on the life and health of the firefighters. The test shows that the design scheme of the system is feasible, which provides a feasible solution for the rescue work in the event of a major disaster. The system will have a broad market prospect after being productized.

Hironori Fujinaka, Tomoyuki Ohta, and Yoshiaki Kakuda 2020[3] , In emergency cases of the building, users need to grasp the disaster situation and evacuation routes for an efficient and rapid evacuation. It is expected that multihop wireless network systems such as a wireless mesh network

are useful to share the disaster information among users. The wireless mesh network is configured by user terminals and base stations which are deployed at the specified area by the administrators of the building. User terminals communicate with the others through the wireless mesh network without the aid of the infrastructure network and the central server. Access points are possible to work by battery power so that the wireless mesh network system is tolerant to the power outage. This paper proposes an evacuation route guidance scheme for building evacuation using wireless mesh network systems. User terminals grasp the up-to date disaster situation in the building through the wireless mesh network, and then provide the evacuation route to the users. The timing of transmitting messages to share the information among users is crucial for the efficient and rapid evacuation. We implement the system into the network simulator and conduct the simulation experiments to confirm the network performance and the users' evacuation time. Finally, we show the effect of the wireless mesh network and the effectiveness of the evacuation route guidance scheme.

Wanjiang Han, Yuanlin Gan and Shuwen Chen , 2020[4], This paper collects data on the damage to the traffic system caused by earthquakes in China in the past two decades, and uses KNN algorithm, SVM algorithm, logistic regression algorithm, naive Bayes algorithm and decision tree algorithm to train the data, then establish earthquake prediction models. The paper introduces the process of pre-processing, modelling, evaluation, and visualization of disaster data. An earthquake disaster inversion model based on traffic data has been established, which can predict the earthquake intensity based on the relevant data provided by the traffic department. The prediction accuracy is relatively accurate, which is very helpful for earthquake prediction and rescue operations.

Govinda Gindodia, Deepali Shrikhande 2020[5], Over the years, the health care system has significantly improved. However, with the technology available it is possible to integrate the medical services with online systems to make the patient's life more convenient. Our application, Life Care, will help a patient to find a specialized doctor as per their needs, availability, distance, and consultancy charges. It is designed especially for an emergency and reduce the patient's time in hunting for a specialized doctor

CHAPTER 3

REQUIREMENTS AND ANALYSIS

3.1 Problem Definition:

The fire problem in India: Most of the State Fire Services do not have specialist firefighting communication facilities and lack of firefighting equipment's. In metropolitan cities, high-rise buildings constitute major fire hazards. The buildings, therefore, can be death traps. Urban fire services suffer deficiencies of 72.75% in fire stations, and 22.43% in firefighting and rescue vehicles. There is huge deficiency of firefighting infrastructure in the towns having population more than 1lakh. There is an urgent need for creation of adequate number of well-equipped fire stations in each State to extend fire cover to all areas within a reasonable time.

If the occupants of the place are alerted to fire quickly, the less risk of death, injury, and less damage to the property as per the fire statistics. Furthermore, the property could be shifted to other places quickly, safely and immediately. But hard-wired interconnection is having disadvantage of cost expensive, long time consuming and disruptive. A hard-wired system is also very difficult and so expensive to reconfigure when circumstances change. If the methods use at the design of the wireless system and the components employ revolve around a compromise between effectiveness, compactness, low power requirements and cost.

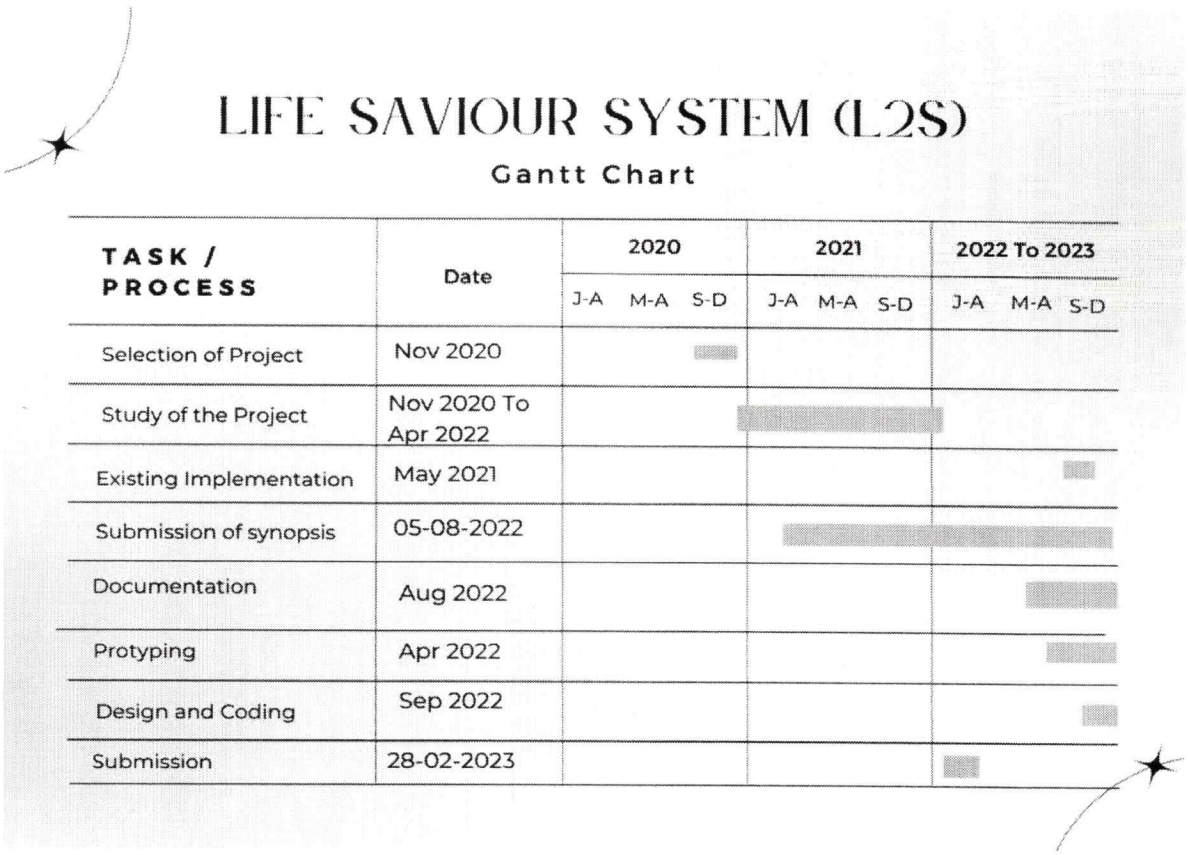
He emergency earthquake alert is real time seismic in-formation provided mainly by the JMA. The system analyses seismic waves from the initial movement (P waves)recorded by the seismometer at an observation point near the seismic centre of an earthquake. It immediately estimates the seismic scale (magnitude) and the location of the seismic centre. It further determines, to the degree possible, the time it will take the main movement (S wave)to reach various locations as well as the seismic intensity of the earthquake based on the information available for early warning. The information is then transmitted through the communication network of news providers to issue alarms at various locations (buildings on site) in advance. The alarms can be used for emergency public address, the deactivation of elevators, and the safe deactivation of other facilities and equipment.

Due to rapid development of mobile technology, location Based emergency medical assistance system can currently. Contribute in helping victims of different accidents occurred across the country. So, few researches have been carried out to provide location-based services for emergency medical assistance on mobile phones. These researches have appeared in several forms. Location-based services for healthcare have become possible with the development of GPS and telecommunication technology since it meets the requirement of healthcare system

3.2 Requirement Specification:

- Audible alarms provide an audible indication of a hazardous situation.
- Fire alarm control panels (FACPs) transmit signals between fire detection devices and alarms, suppression systems, and monitoring center. This device reduces the potential for fatalities and property loss from structure fires.
- Fire sprinkler heads deliver a high-pressure flow of water or dry chemicals to a fire. They are usually are heat-activated and part of a larger fire prevention and safety system.
- Emergency call systems are designated terminals used to call or transmit a need for attention. Emergency call systems may also be known as a panic alarms, man down alarm systems, duress systems, or a personal emergency response systems.
- The system analyses seismic waves from the initial movement (P waves)recorded by the seismometer at an observation point near the seismic center of an earthquake. It immediately estimates the seismic scale (magnitude) and the location of the seismic center.
- Emergency evacuation refers to emergency evacuation from a structure which may take place on the ground, in water, or to nearest safe place. There are standard evacuation procedures and special evacuation equipment.

3.3 Planning and Scheduling:



TASK / PROCESS	Date	2020			2021			2022 To 2023		
		J-A	M-A	S-D	J-A	M-A	S-D	J-A	M-A	S-D
Selection of Project	Nov 2020									
Study of the Project	Nov 2020 To Apr 2022									
Existing Implementation	May 2021									
Submission of synopsis	05-08-2022									
Documentation	Aug 2022									
Protyping	Apr 2022									
Design and Coding	Sep 2022									
Submission	28-02-2023									

3.4 Software and Hardware Requirements:

Hardware Requirements:

1. Arduino Mega 2560
2. Led
3. Buzzer
4. Flame sensor
5. Smoke sensor
6. Vibration shock sensor
7. Push button
8. 16x2 lcd display
9. 5v mini water pump

10. ADXL 335 Accelerometer
11. Dc 5v cooling fan
12. Breadboard
13. Jumper wires
14. Resistor
15. Power relay
16. Buzzer
17. SIM900A GSM GPRS Module

Software Requirements:

1. Arduino IDE.
2. Canva
3. Draw Express Lite

3.5 Preliminary Product Description:

The fire alarm system will be made up of several components, including a control panel, smoke detectors, heat detectors, and manual call points. The control panel will be the central unit that receives signals from the various detectors and call points. It will then activate the alarm to notify people in the area of the fire. The smoke detectors will be placed in strategic locations throughout the building to detect smoke and raise the alarm. The heat detectors will be placed in areas where there is a potential for fire, such as near flammable materials. The manual call points will be placed in locations where people can easily reach them in the event of a fire.

The earthquake emergency system is designed to provide immediate assistance to people who have been affected by an earthquake. It is a comprehensive system that includes a variety of services and resources, such as emergency medical care, shelter, and food. The system is designed to be flexible and adaptable to the needs of each individual situation.

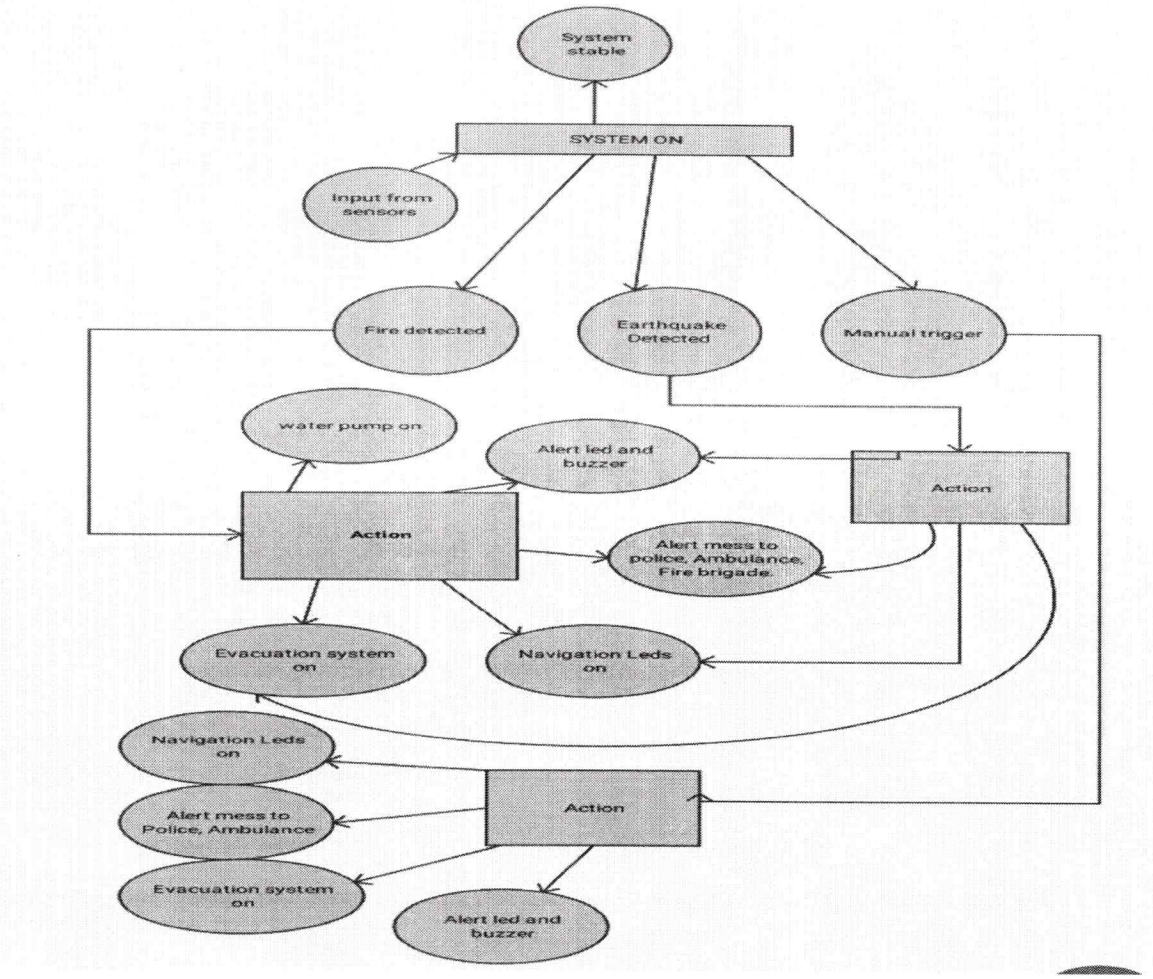
This system is designed to evacuate a people quickly and efficiently in the event of an emergency. The system includes a series of inflatable slides that are deployed and lead down to the ground.

The Path Showing is a system of lights that can be used to guide people along a path. The lights can be set up in a variety of configurations to accommodate different path sizes and shapes. The light intensity can also be adjusted to provide light, depending on the needs of the user.

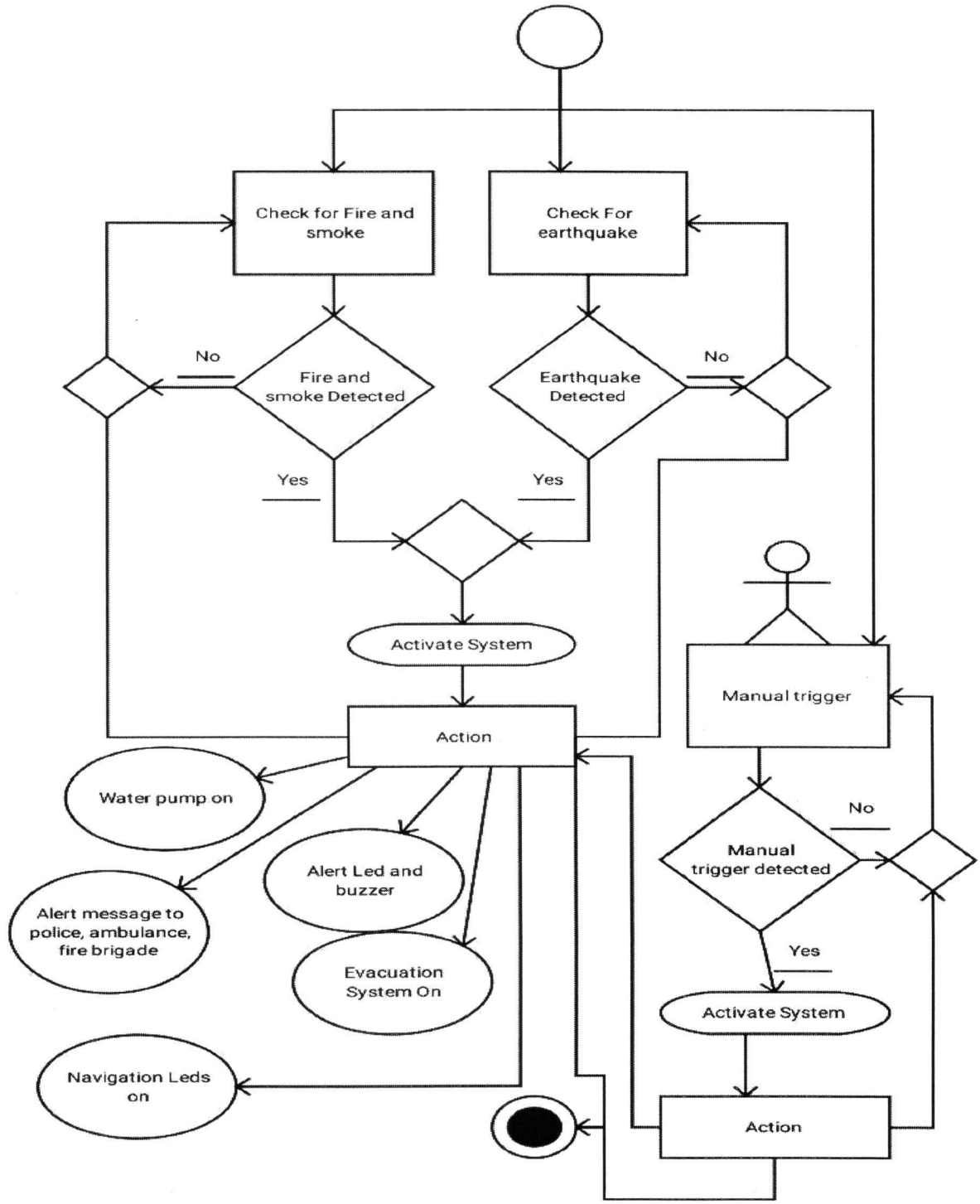
The automatic call and message alert system is designed to provide a convenient and reliable way for people to receive notifications about important events. The system can be used to send notifications about appointments, reminders, and other important information. The system can also be used to send emergency alerts to people in the event of a natural disaster or other emergency.

3.7 Conceptual Models

❖ Data Flow Diagram



Activity Diagram:



CHAPTER 4

SYSTEM DESIGN

4.1 Basic Modules:

- ✓ Fire alarm system: This is the most basic module of a fire emergency system. It is designed to detect fires and notify the authorities.
- ✓ Suppression system: This module is designed to extinguish fires.
- ✓ Emergency evacuation system: This module is designed to help people evacuate the premises in the event of a fire.
- ✓ Fire safety system: This module is designed to help prevent fires from occurring in the first place.
- ✓ Communications: A communications system is necessary to coordinate response efforts and provide information to the public.
- ✓ Transportation: A transportation system is necessary to move people and supplies to and from the affected area.
- ✓ Shelter: A shelter system is necessary to protect people from the elements and provide a safe place to stay.
- ✓ Medical: A medical system is necessary to provide care to the injured and sick.
- ✓ The medical emergency system is composed of four basic modules:

  1. The medical control center, which is responsible for receiving and dispatching emergency calls, and coordinating the activities of the other three modules.

  2. The medical response team, which consists of paramedics and other medical personnel who respond to emergency calls and provide medical care to patients.
- ✓ The basic modules of an automatic alert system using call and message are:

  1. A telephone or mobile device with the ability to make and receive calls and send and receive text messages.

  2. A computer with internet access and an installed software application that can send text messages.

  3. A list of telephone numbers or email addresses of people who should receive the alert.

4. A message to be sent to the people on the list.

4.2 Data Design:

4.2 .1 Schema Design:

The schema design of a fire, earthquake, medical emergency system should include a table for each type of emergency, a table for emergency contacts, and a table for emergency response teams. The tables should be linked so that information can be quickly and easily accessed in the event of an emergency.

The fire alert and handling system should be designed to minimize the risk of false alarms and to facilitate effective fire response. The system should be designed to detect fires early and to provide information to fire responders that will allow them to respond to fires quickly and effectively.

The system should include:

-A network of fire detectors that are interconnected and can rapidly detect fires.

-A central control panel that receives information from the fire detectors and coordinates the response of the fire response team.

-An alarm that is sounded when a fire is detected.

-A system that automatically notifies the fire department when a fire is detected.

-A system that allows the fire department to remotely control the fire response team.

An earthquake alert and handling IOT system can be designed using a schema that includes a sensor network, a central processing unit, and a user interface. The sensor network can be used to detect earthquakes and send alerts to the central processing unit. The central processing unit can then use the information from the sensor network to determine the severity of the earthquake and send alerts to the user interface. The user interface can then display the information from the central processing unit and allow the user to take action.

The medical emergency alert and handling IOT system should be able to track the location of patients and provide real-time alerts to emergency responders.

The navigation system for an IOT system can be designed as follows:

-The system should be able to track the location of devices and provide directions to them.

-The system should be able to automatically update its maps based on the locations of devices.

-The system should be able to provide real-time traffic information to devices.

-The system should be able to provide alternate routes to devices based on traffic conditions.

4.2.2 Data Integrity and Constraints:

The fire alert and handling system must be designed to ensure data integrity and consistency. The system must be able to handle data from multiple sources, including fire sensors, CCTV cameras, and manual input from fire personnel. The system must be able to store and retrieve data quickly and accurately in order to provide timely information to fire personnel. The system must also be able to generate reports that accurately reflect the data in the system.

The fire alert and handling system must ensure that data is accurate and complete. It must also ensure that data is consistent across the system. Constraints on the system include:

-The system must be able to identify all fires accurately and completely in the area of interest.

-The system must be able to identify the location of all fires accurately and completely.

-The system must be able to identify the cause of all fires accurately and completely.

-The system must be able to identify the type of fire accurately and completely.

-The system must be able to accurately and completely identify the resources required to extinguish the fire.

-The system must be able to identify the fire danger level accurately and completely.

-The system must be able to identify the evacuation status of the area accurately and completely

-The quick evacuation slide system must be able to support the weight of the occupants to be evacuated.

-The quick evacuation slide system must be able to provide a safe and swift evacuation from the aircraft.

-The quick evacuation slide system must be able to provide a means of egress for occupants with disabilities.

-The quick evacuation slide system must be able to be deployed quickly and easily.

-The quick evacuation slide system must be able to be stowed quickly and easily.

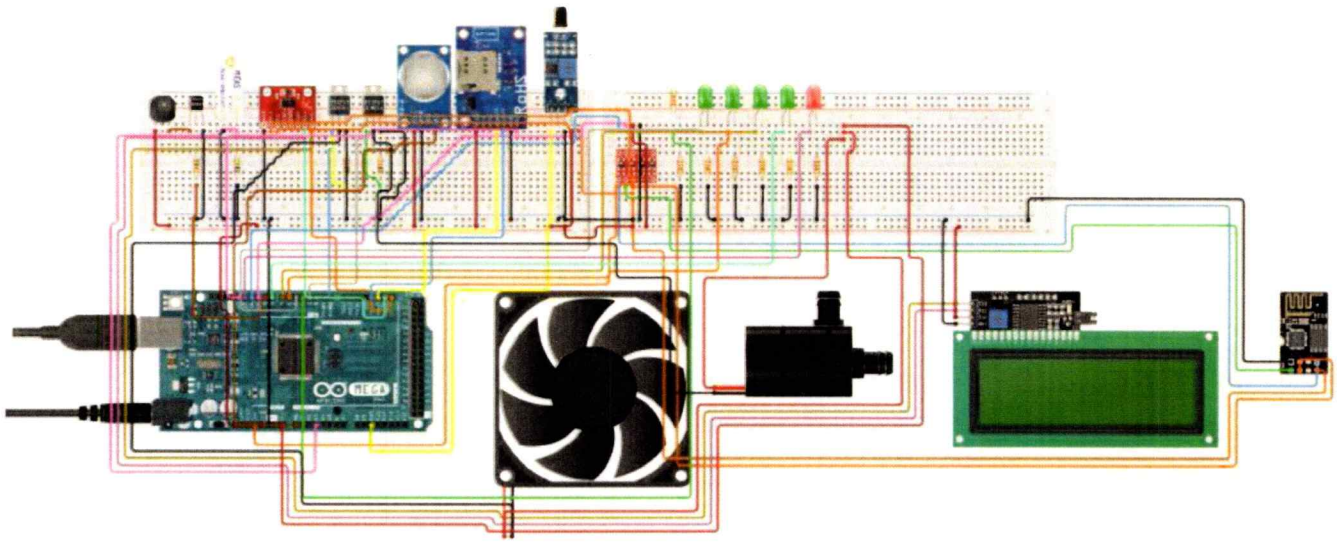
-The quick evacuation slide system must be able to be operated by a single person.

-The quick evacuation slide system must be durable and reliable.

The data integrity of a manual trigger system is dependent on the person operating the system. If the operator is not careful, data can be lost or corrupted. The data integrity of an automatic trigger system is much higher because the system is automated and does not rely on human input.

4.3 Procedural Design

4.3.1 Logic Diagrams:



4.3.2 Data Structure:

Tree Data Structure: A tree data structure can be used in an IOT project to store data in a hierarchical structure. For example, a tree data structure can be used to store data about the nodes in a sensor network. A tree data structure can be used in an IOT project to store data about the physical layout of a network of sensors and devices. The tree data structure can be used to represent the relationship between different sensors and devices in the network, and can be used to store information about the location of each sensor and device in the network.

The tree data structure can be used in a fire alert system to help track the spread of a fire. The tree can be used to store information about the location of the fire, the direction it is moving, and the speed at which it is spreading. This information can be used to help firefighters plan their response to the fire. A tree data structure can be used in evacuation to represent the paths that people can take to evacuate a building. The root node of the tree represents the starting point, and the child nodes represent the possible paths that people can take. The leaves of the tree represent the exits.

4.3.3 Algorithm design:

1. Automation(Fire)

Step1: System on, system stable.

Step2: Check for Fire and smoke.

Step3: Fire and smoke not find. Repeat step 2 again.

Step4: Fire and smoke Detected.

Step5: Activate

{

Turn on water pump;

Alert led and buzzer;

Navigation Leds;

Evacuation System;

Alert message to police, ambulance, fire brigade;

}

2.Automation(Earthquake)

Step1: System on, system stable.

Step2: Check for earthquake.

Step3: Earthquake not find. Repeat step 2 again.

Step4: Earthquake Detected.

Step5: Activate

{

Alert led and buzzer;

Navigation Leds;

Evacuation System;

Alert message to police, ambulance, fire brigade;

}

3. **Manual (push button)**

Step1: System on, system stable.

Step2: Check for push button (button1, button2, button3)

Step3: No manual trigger found. Repeat step 2 again.

Step4: Manual trigger found.

Step5: Activate

{

Turn on water pump; //**Optional**//

Alert led and buzzer; //**Optional**//

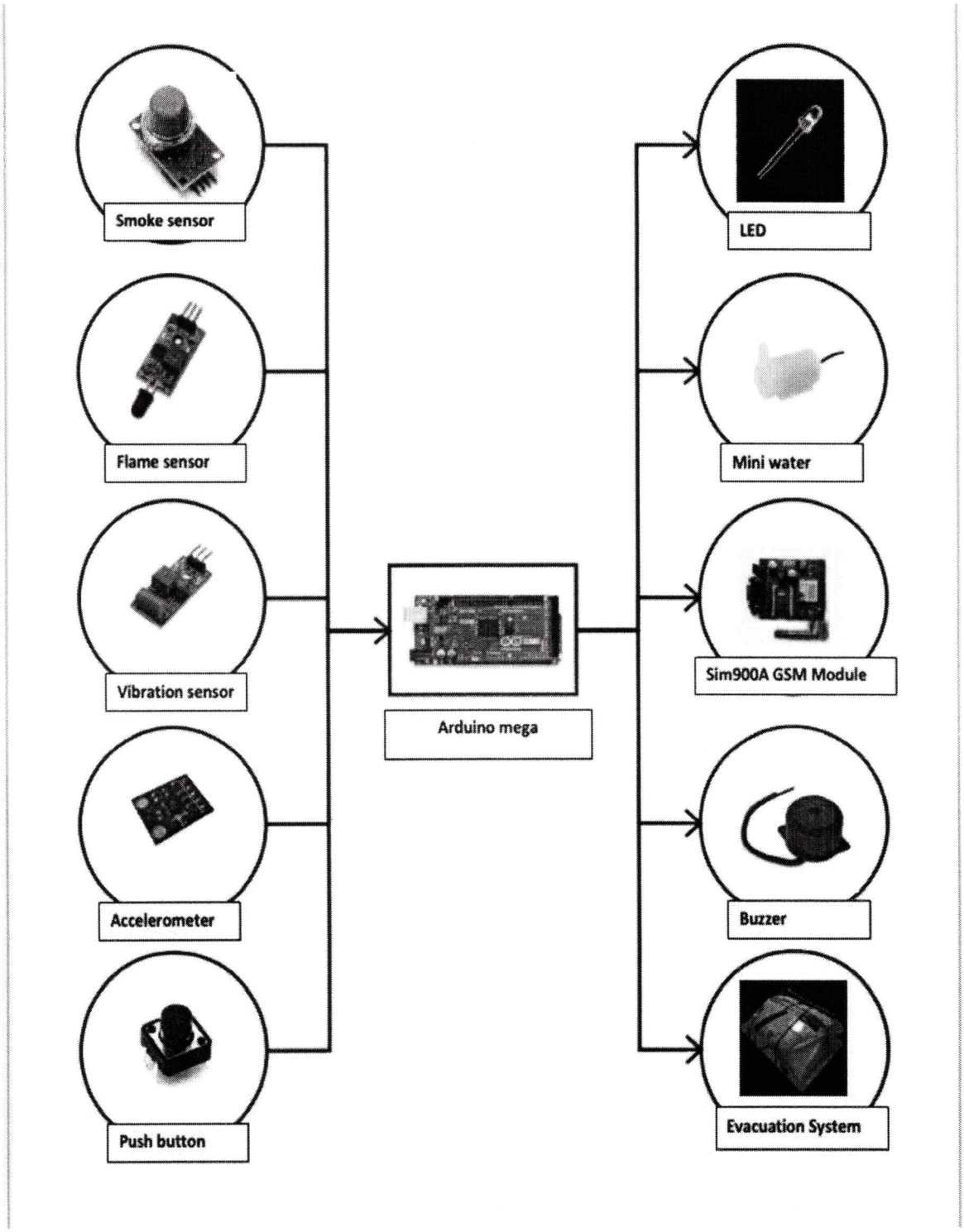
Navigation Leds;. //**Optional**//

Evacuation System;. //**Optional**//

Alert message to police, ambulance, fire brigade;//**Optional**//

}

4.4 User Interface Design



The interface for the fire alert and handling system should be designed to be user-friendly and easy to navigate. It should allow users to easily view fire alerts and information on fire hazards in their area, and provide options for handling fire emergencies. The user interface should also be designed in a way that it is easy to use in case of an emergency. It should be easy to find the right buttons and options, and the user should be able to send a fire alert quickly and easily. The user interface for an earthquake alert system would need to be very simple and easy to use, as it would need to be accessible to everyone in the event of an emergency. The interface would need to be able to show the location of the earthquake and the intensity of the quake, as well as any alerts that have been issued by the system. The user interface for a led navigation system should be designed to be simple and easy to use. The user should be able to see all the options available and be able to easily select the one they want. The interface should be intuitive and easy to navigate. The evacuation system should be designed to be user friendly so that people can easily evacuate a building in the event of an emergency. The system should be designed so that it is easy to see where the exits are and how to get to them. The system should also be designed so that people with disabilities can easily evacuate the building.

4.5 Security Issues

Some of the most common security issues with IoT systems include:

1. Lack of security features: Many IoT devices are not equipped with basic security features, such as password protection and data encryption. This makes them easy targets for hackers and cyber criminals.
2. Insecure communications: Most IoT devices communicate with each other and with other devices and systems using insecure protocols, such as Bluetooth and Wi-Fi. This makes it easy for hackers to intercept and manipulate data.
3. Lack of security updates: Many IoT manufacturers do not provide regular security updates for their devices. This leaves them vulnerable to new security threats.
4. Unsecured data storage: Many IoT devices store data in unencrypted format. This makes it easy for hackers to access and misuse this data.

5. Poor authentication and authorization: Lack of proper authentication and authorization mechanisms make it easy for unauthorized users to access and control IoT devices.

There are a few potential security issues with fire alert and handling systems:

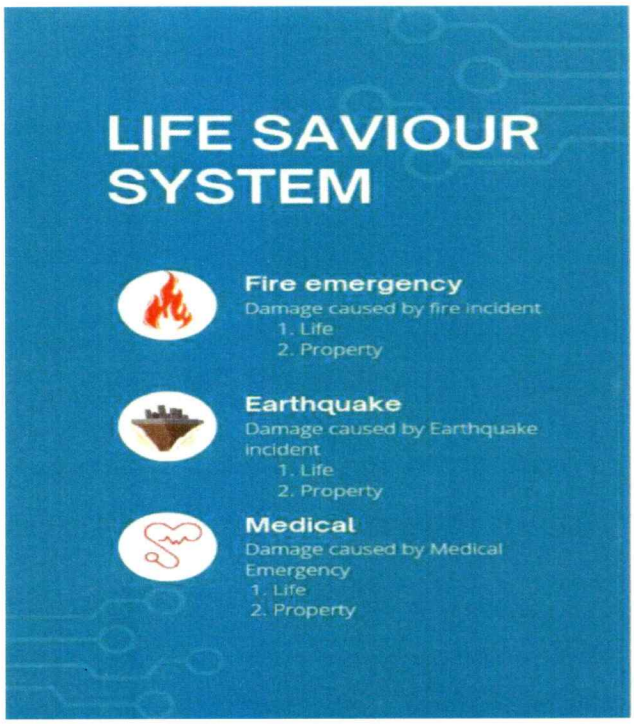
1. False alarms: If the system is not properly calibrated, it may send out false alarms, which can cause panic and disruption.
2. Hackers: If the system is connected to the internet, it may be vulnerable to hacking. Hackers could potentially disable the system or change the settings to cause false alarms.
3. Tampering: If the system is not properly secured, someone could tamper with it, which could disable the system or cause it to send out false alarms.
4. Fires: If the system is not properly maintained, it may not work properly in the event of a fire, which could put people at risk.

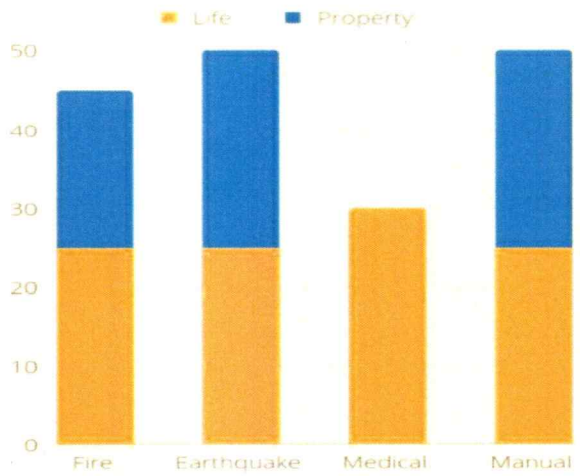
There are a few potential security issues with quick evacuation systems:

1) If the system is not properly maintained, it could fail when it is needed, resulting in people being trapped in a building or other structure.
2) If the system is not properly used, people could be injured or killed. For example, if people use the system to evacuate a building while it is still on fire, they could be burned.
3) If the system is not properly secured, it could be used by criminals to quickly escape from a building after committing a crime.

One potential security issue with using LEDs to show a path is that it may be easy for someone to tamper with the LEDs. If the LEDs are not properly secured, someone could change the path that they are supposed to be indicating, which could lead to people becoming lost. Additionally, if the LEDs are not bright enough, it may be difficult for people to see the path, which could also lead to people becoming lost.

4.6 Test Case Design





Test cases:

1. Test that the fire emergency system is triggered when the fire detection sensor is activated.
2. Test that the alarm is sounded when the fire emergency system is triggered.
3. Test that the authorities are notified when the fire emergency system is triggered.
4. The system should be able to detect earthquakes.
5. The system should be able to warn people in the affected area.
6. The system should be able to provide information about the earthquake.
7. The system should be able to help people in the affected area.
8. The system should be able to aid emergency services.
9. Verify that the system can correctly identify the location of a fire.
10. Verify that the system can correctly calculate the best evacuation route.
11. Verify that the system can correctly provide instructions to evacuate the building.

CHAPTER 5 IMPLEMENTATION AND TESTING

5.1 Coding Details & Efficiency

5.1.1 Coding Details

To develop an algorithm for an IoT project, you can follow these general steps:

Describe the issue: Clearly state the issue that your IoT endeavour is meant to address. You can use this to determine the needs and limitations for the programme.

Select the sensors and actuators: Choose the sensors and actuators you will be using to gather information and carry out tasks. You will gain a better understanding of the type and format of the data you will be dealing with as a result.

Data gathering and pre-processing: Gather data from the sensors and, if required, pre-process it. Filtering, scaling, or levelling may be used in this.

Creating the code Apply the right method to the data analysis and decision-making processes. This might entail rule-based systems, statistical analysis, or machine learning.

Implement the algorithm: Implement the algorithm on a microcontroller or a cloud-based platform, depending on the requirements of your project.

1. **Algorithm Code (Automation)**

1. Automation(Fire)

Step1: System on, system stable.

Step2: Check for Fire and smoke.

Step3: Fire and smoke not find. Repeat step 2 again.

Step4: Fire and smoke Detected.

Step5: Activate

{

Turn on water pump;

Alert led and buzzer;

Navigation Leds;

Evacuation System;

Alert message to police, ambulance, fire brigade;

}

```
//codes
if  (fireSensorValue==LOW && smokeSensorValue >100)
{
 Serial.println("Flame detected...! take action immediately.");
 fireSensorValue==LOW;
  // send a message to the first number
 gsm.print("AT+CMGS=\"" + phone_number1 + "\"\r\n");
 delay(1000);
 gsm.print(fmessage1);
 delay(100);
 gsm.write(26);
 delay(5000);
 Serial.println("Message sent to police department");
  // send a message to the Secound number
  gsm.print("AT+CMGS=\"" + phone_number2 + "\"\r\n");
 delay(1000);
 gsm.print(fmessage2);
 delay(100);
 gsm.write(26);
 delay(5000);
Serial.println("Message sent to Ambulance Service");
```

```
// send a message to the Third number
gsm.print("AT+CMGS=\"" + phone_number3 + "\"\r\n");
delay(1000);
gsm.print(fmessage3);
delay(100);
gsm.write(26);
delay(5000);
Serial.println("Message sent to Fire-Brigade");

// Check for a response
while (gsm.available()) {
  Serial.write(gsm.read());
}
```

2.Automation(Earthquake)

Step1: System on, system stable.

Step2: Check for earthquake.

Step3: Earthquake not find. Repeat step 2 again.

Step4: Earthquake Detected.

Step5: Activate

{

Alert led and buzzer;

Navigation Leds;

Evacuation System;

Alert message to police, ambulance, fire brigade;

}

```
//codes
if (vibration==1 && event.acceleration.x!=threshold && event.acceleration.y!=threshold
&& event.acceleration.z!=threshold)
{
  Serial.println("EarthQuake...! take action immediately.");

  // send a message to the first number
 gsm.print("AT+CMGS=\"" + phone_number1 + "\"\r\n");
 delay(1000);
 gsm.print(emessage1);
 delay(100);
 gsm.write(26);
 delay(5000);
 Serial.println("Message sent to police department");

  // send a message to the Secound number
  gsm.print("AT+CMGS=\"" + phone_number2 + "\"\r\n");
 delay(1000);
 gsm.print(emessage2);
```

```
delay(100);
gsm.write(26);
delay(5000);
Serial.println("Message sent to Ambulance Service");

 // send a message to the Third number
 gsm.print("AT+CMGS=\"" + phone_number3 + "\"\r\n");
delay(1000);
gsm.print(emessage3);
delay(100);
gsm.write(26);
delay(5000);
Serial.println("Message sent to Fire-Brigade");

 // Check for a response
while (gsm.available()) {
  Serial.write(gsm.read());
}
```

3. **Manual (push button)**

Step1: System on, system stable.

Step2: Check for push button (button1, button2, button3)

Step3: No manual trigger found. Repeat step 2 again.

Step4: Manual trigger found.

Step5: Activate

{

Turn on water pump; //**Optional**//

Alert led and buzzer; //**Optional**//

Navigation Leds;. //**Optional**//

Evacuation System;. //**Optional**//

Alert message to police, ambulance, fire brigade;//**Optional**//

}

//Codes

```
if (buttonState == HIGH)
{ Serial.println("Emergency...! take action immediately.");
 // send a message to the first number
  gsm.print("AT+CMGS=\"" + phone_number1 + "\"\r\n");
  delay(1000);
  gsm.print(bmessage1);
  delay(100);
  gsm.write(26);
  delay(5000);
  Serial.println("Message sent to police department");
   // send a message to the Secound number
   gsm.print("AT+CMGS=\"" + phone_number2 + "\"\r\n");
  delay(1000);
  gsm.print(bmessage2);
```

```
delay(100);
gsm.write(26);
delay(5000);
Serial.println("Message sent to Ambulance Service");
 // send a message to the Third number
 gsm.print("AT+CMGS=\"" + phone_number3 + "\"\r\n");
delay(1000);
gsm.print(bmessage3);
delay(100);
gsm.write(26);
delay(5000);
Serial.println("Message sent to Fire-Brigade");

 // Check for a response
while (gsm.available()) {
  Serial.write(gsm.read());
}
```

5.1.2 Code Efficiency

Limited resources: The processing speed, memory, and storage space of IoT devices are usually constrained. As a result, the device must operate efficiently to avoid crashing or running out of resources while performing its tasks.

Battery life: Many Internet of Things (IoT) gadgets use batteries, which have a finite shelf life. The battery might be rapidly depleted by inefficient code, lowering the device's uptime.

Network capacity: IoT devices may use constrained network bandwidth to connect to other IoT devices or cloud services. The amount of data transmitted could rise due to inefficient code, which would slow down the network and raise costs.

5.2 Testing Approach

A testing approach is a systematic and organised way to test software to make sure that a piece of software or application satisfies the intended specifications and quality standards. In order to test the software application for flaws, bugs, errors, and other problems that could affect its functionality, usability, performance, and security, several procedures, techniques, and tools are used.

Testing an IoT project requires a comprehensive approach that considers the different layers of the IoT system, including hardware, software, connectivity, and data management. Here are some key testing approaches for IoT projects

Since IoT initiatives involve intricate hardware and software components, testing is a crucial component. An approach for testing an IoT project is as follows:

Testing each individual system component, such as the sensors, actuators, and microcontrollers, in turn, is the first step in unit testing. This can assist in locating any flaws or issues with the individual parts. Integration testing: Following the evaluation of each component separately, you can examine the system. This can aid in locating any problems that may occur during the integration of various components. Test the system's functionality in accordance with the given requirements. Testing sensor readings, actuator response, and data transmission can all fall under this category.

Performance evaluation: Evaluate how well the system performs under various circumstances, such as high data traffic or short battery life. This can assist in locating any problems or bottlenecks that might appear in the actual world.

Test the system's security against possible threats, such as unauthorised entry or hacking attempts, by conducting security testing. This can assist in locating any system weaknesses.

5.3 Unit Testing

Depending on the technology stack and the character of the project, different approaches can be used when unit testing an IoT project. There are, however, a few standard best practises that can be used. The following advice is for unit testing an IoT project:

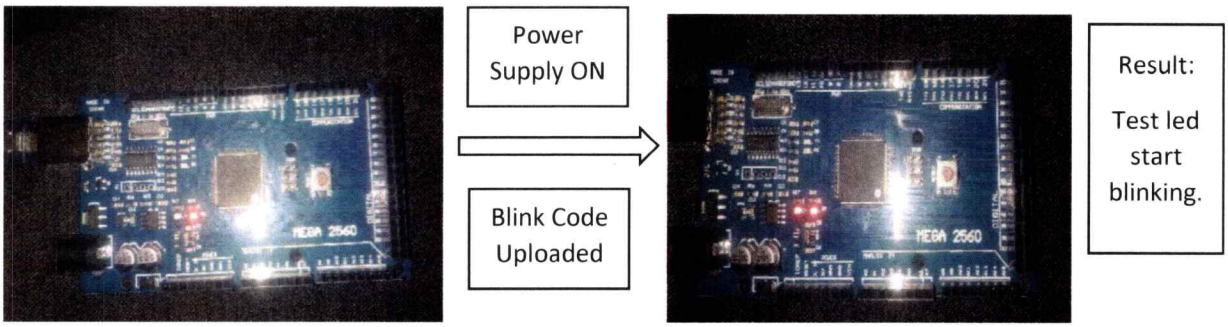
Determine the parts that require testing: Many different parts, such as sensors, microcontrollers, communication protocols, and cloud services, are likely to be used in an IoT endeavour. Based on their importance and effect on the system, determine the components that need to be tested.

Keep an eye on the system while it is being tested because IoT projects are frequently created to function in harsh and remote settings where unexpected failures can happen. Observe the system while it is being tested to look for any unusual activity and make sure it is operating as it should.

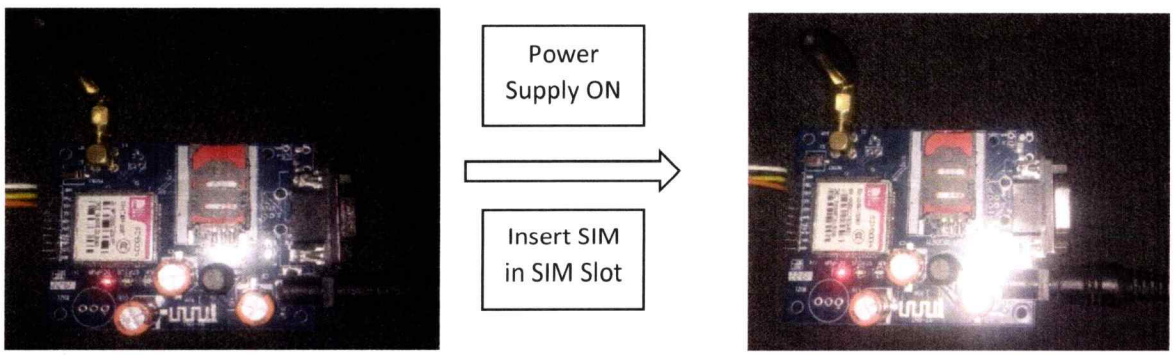
Utilize continuous integration and deployment: By ensuring that the system is tested immediately whenever changes are made to the code, continuous integration and deployment can help to lower the risk of introducing bugs.

IoT (Internet of Things) project unit testing refers to the process of testing individual units or components of an IoT system to ensure that they meet the specified requirements and function as intended. Here are some advantages and disadvantages of IoT project unit testing:

1.Arduino Board.

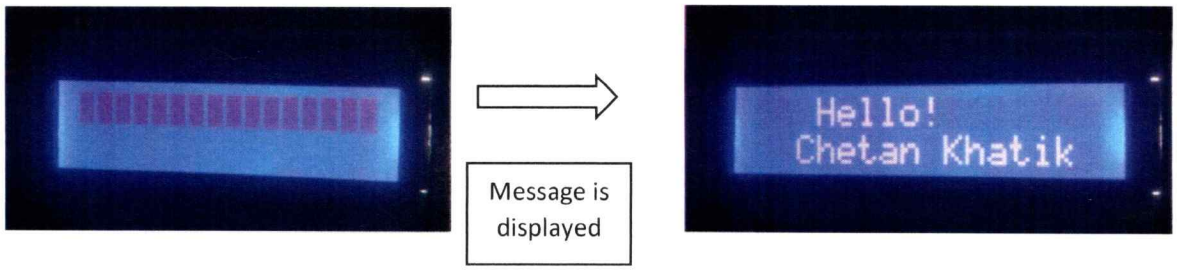


2. GSM 900A Module

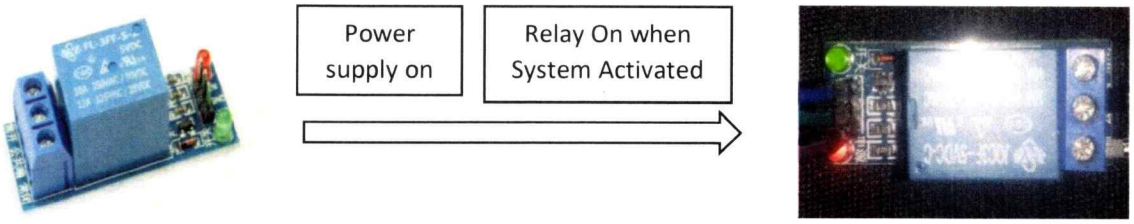


Result: After connecting to power supply network led will start blinking in every 1 second than after some time it will connect to network and start blinking in every 3 seconds.

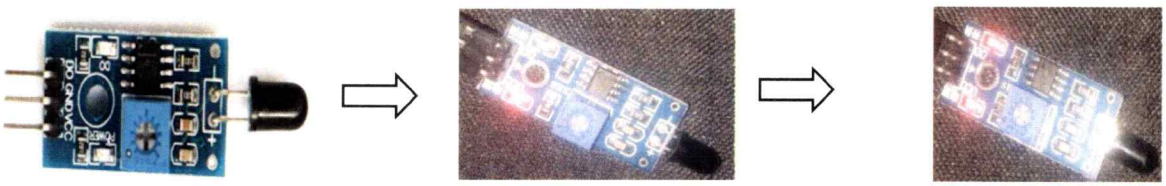
3. LCD I2C Display.



4. Power Relay

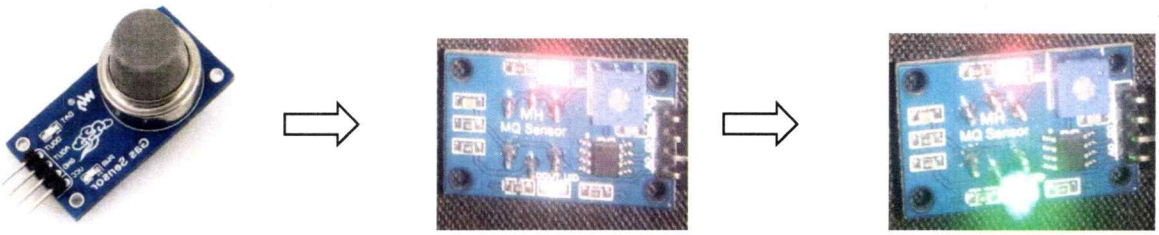


5. Fire Sensor.



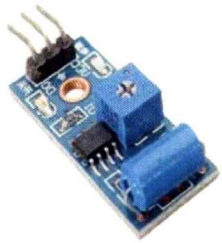
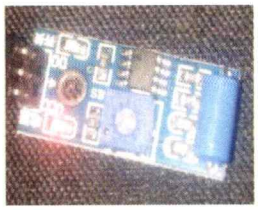
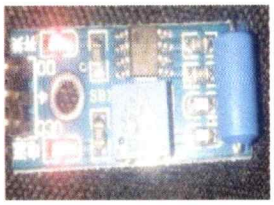
Result: when power supply on power led turn on and on flame detection pin led turn on.

6. Smoke Sensor.



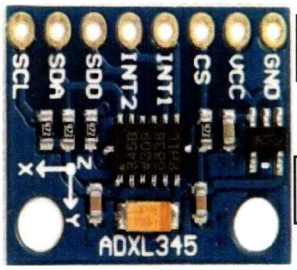
Result: when power supply on power led turn on and on Smoke detection pin led turn on.

7. Vibration Sensor.

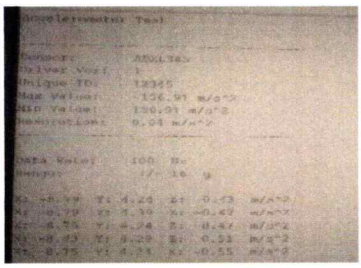
Result: when power supply on power led turn on and on Vibration detection pin led turn on.

8. ADXL345

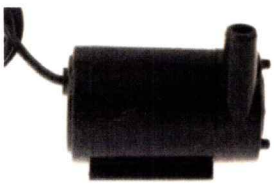


Power supply on & test code running

Successfully getting X, Y Z



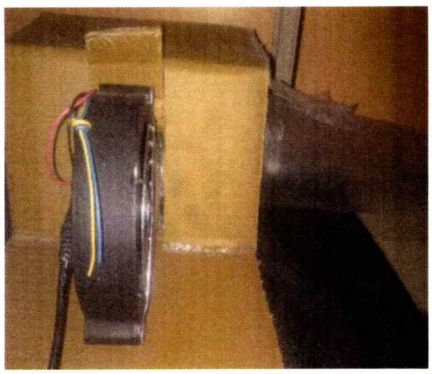
9. Water Pump.



Water pump is on through power relay when system is activated.

10 Evacuation System.

Evacuation system on through power relay when system is activated.



5.4 Integrated Testing

A system's interfaces, communication methods, and interactions with its various components are all tested during integration testing of an IoT system. To conduct integration testing on an IoT system, follow these steps:

Recognize the different parts of the IoT system, such as the devices, sensors, gateways, cloud services, and other programme elements.

Define the interfaces: Specify the protocols for contact between the components' interfaces. Data formats, communication architectures, and network protocols fall under this category.

Test connectivity: To make sure that the devices, sensors, and gateways are communicating correctly, test the connectivity between them.

Test data transmission: To make sure that data is being transferred properly and reaching its intended recipient, test data transmission between the devices, sensors, gateways, and cloud services.

To make sure the system can manage the load, test the system's scalability by simulating many devices and sensors.

Test for fault tolerance: To make sure the system can recover from failures like network outages, device malfunctions, and power outages, test the system's fault tolerance by simulating different failure situations.

Advantages:

Early defect detection: Integrity testing can aid in the early discovery of flaws during the development process, which lowers the cost of resolving the problems later.

Enhanced system performance: Prior to the final release, developers can correct performance issues in the IoT system, such as latency or network connectivity issues, thanks to integration testing.

Verification of system compatibility: Integration testing makes sure that all IoT system components are compatible with one another and operate as a cohesive whole.

Integration testing makes sure that the IoT system's components and subsystems are properly integrated, which lowers the risk of system failure and increases system reliability.

Disadvantages:

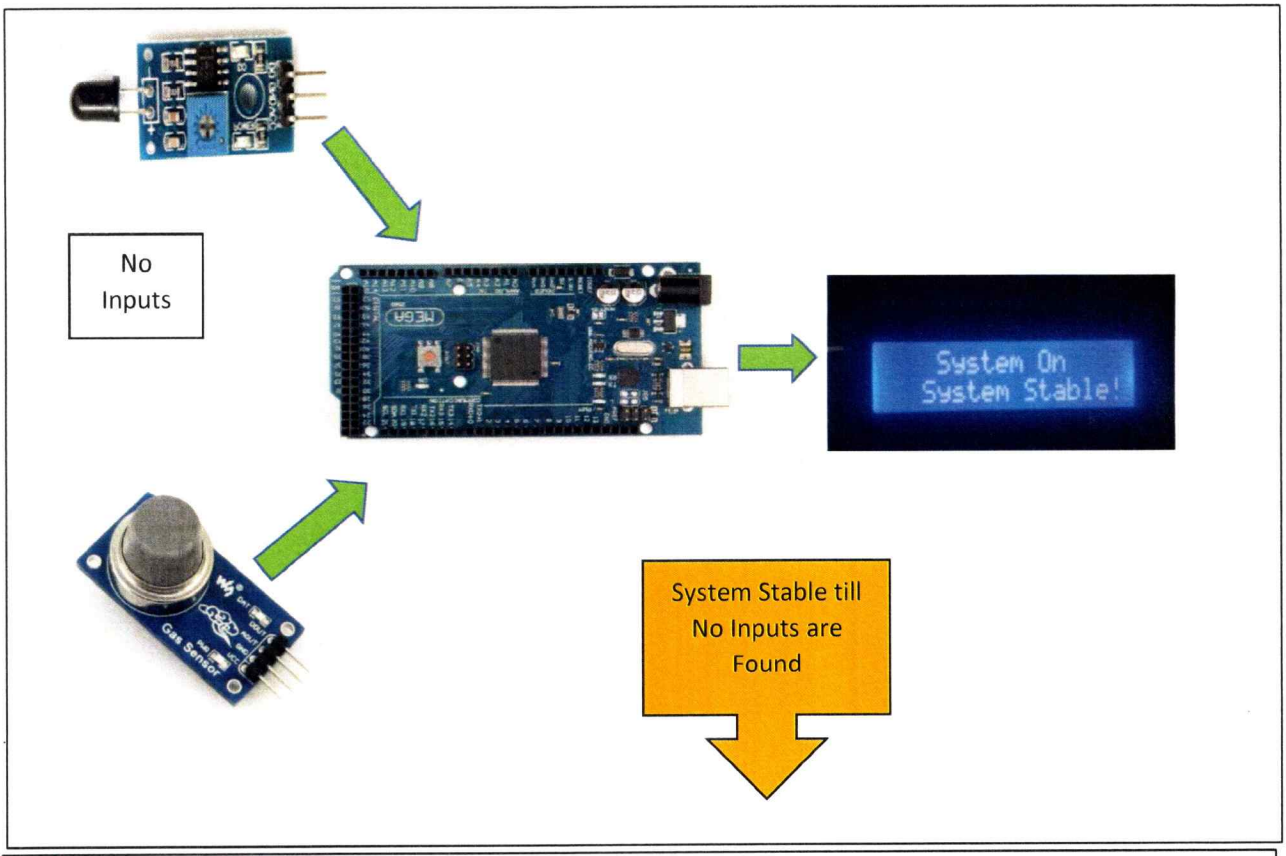
Complicated testing environment: Integration testing for IoT systems can be challenging and calls for a testing setting that mimics the conditions under which the system will function.

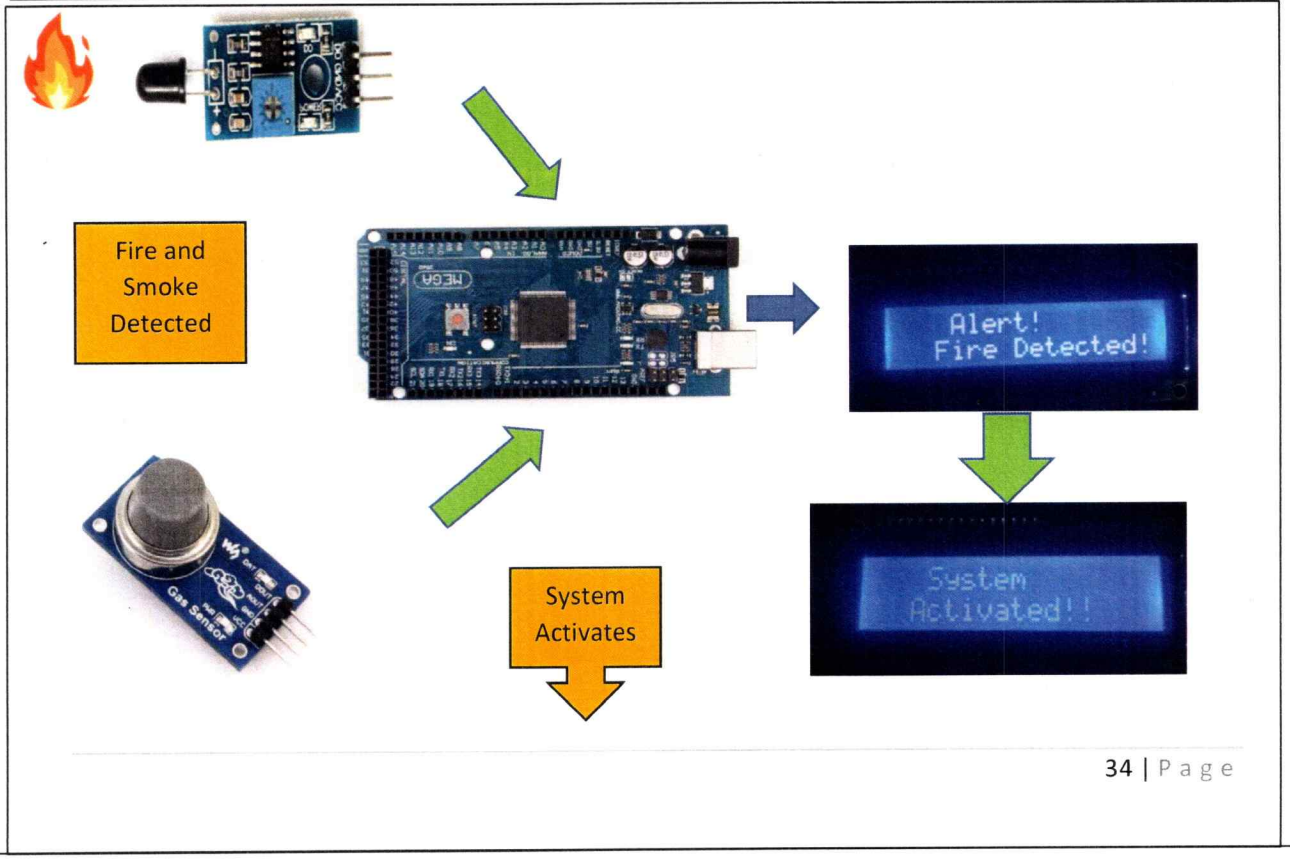
Testing that uses a lot of resources: Integration testing uses a lot of resources, including infrastructure, infrastructure costs, and labour.

Distributed IoT systems frequently span several different locations, making it challenging to evaluate every component in a single environment.

Note: All unit Component are integrated to form complete Life saviour system(L2S).

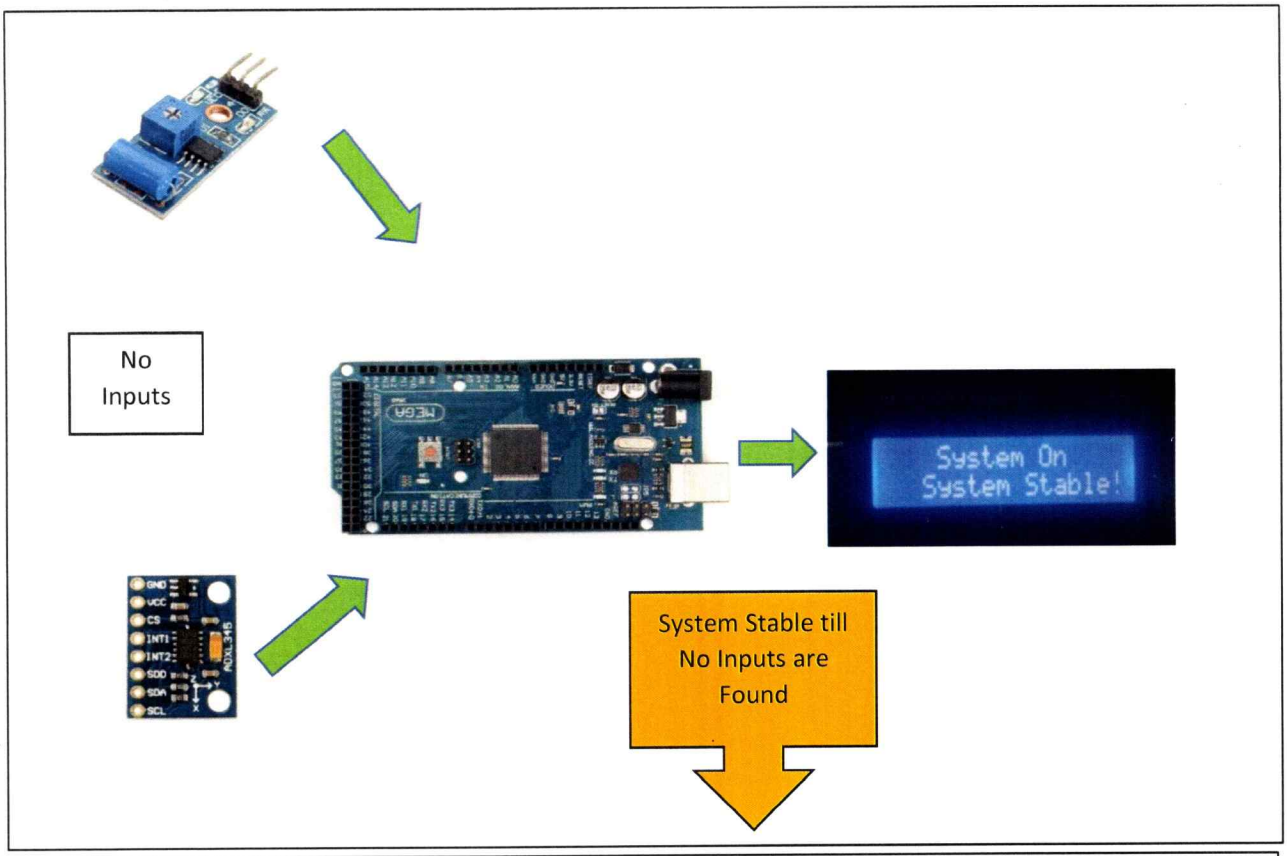
1. **Fire Emergency System.**

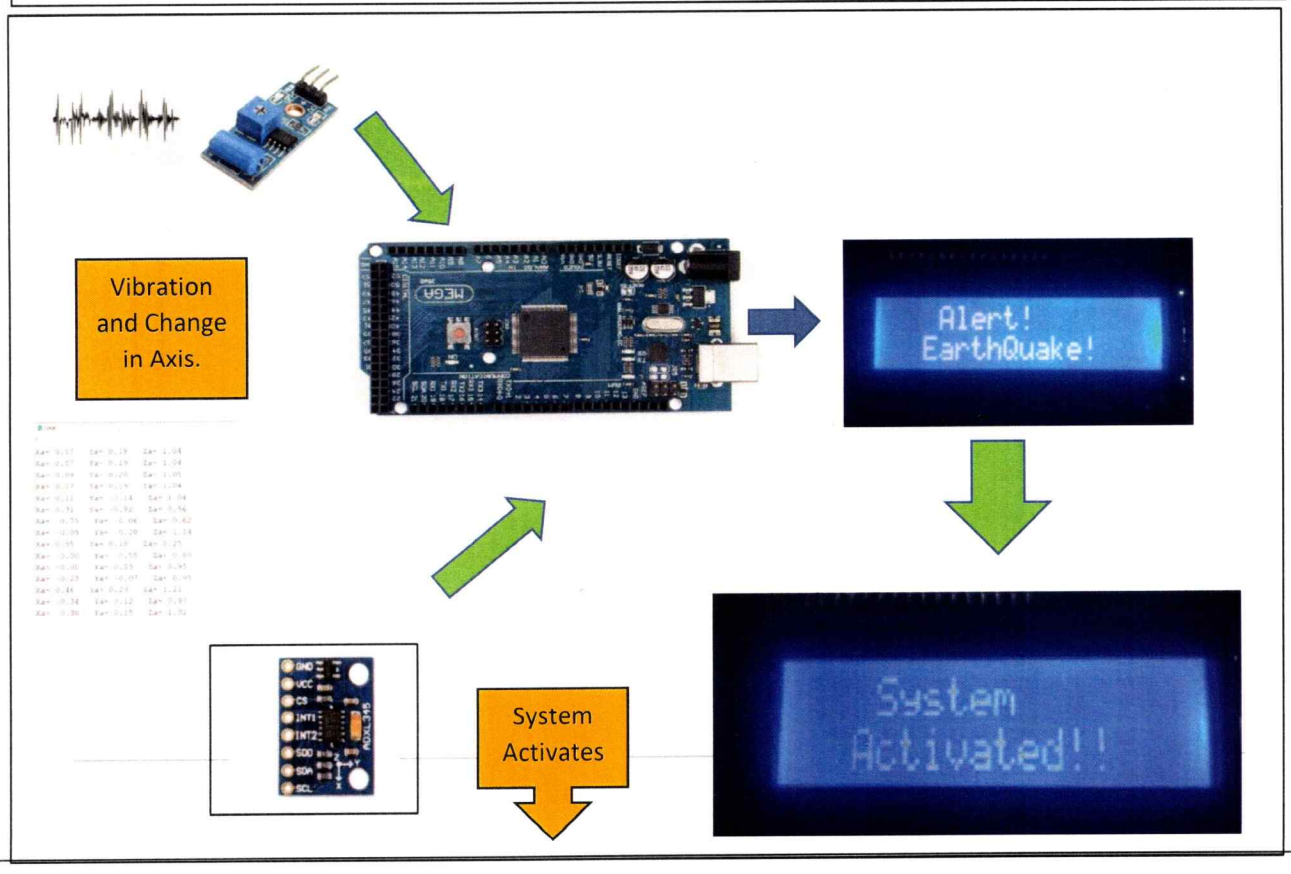





1. Automatic Alert
2.Alert Led
Police Department
Fire Emergency situation
href:https://goo.gl/maps
/tNNvbyDcQXjJ8QKL6
Address: SDSM collage Palghar
3.Evacuation Slide
Ambulence service
Fire Emergency situation
href:https://goo.gl/maps
/tNNvbyDcQXjJ8QKL6
Address: SDSM College Palghar
4.Navigation Leds
Fire-Brigade Station
Fire Emergency situation
href:https://goo.gl/maps
/tNNvbyDcQXjJ8QKL6
Address: SDSM College Palghar
5.Buzzer
6.Water Pump

2. Earthquake Emergency System.





1. Automatic Alert

police Department
Alert Earthquake Detected
href:https://goo.gl/maps
/tNNvbyDcQXjJ8QKL6
Address: Sonopant Dandakar
Shikshan Mandali Palghar

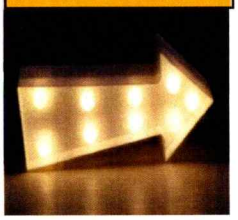
Ambulence service Alert
Earthquake Detected
href:https://goo.gl/maps
/tNNvbyDcQXjJ8QKL6
Address: Sonopant Dandakar
Shikshan Mandali Palghar

Fire-Brigade Station
Alert Earthquake Detected
href:https://goo.gl/maps
/tNNvbyDcQXjJ8QKL6
Address: Sonopant Dandakar
Shikshan Mandali Palghar

2.Alert Led

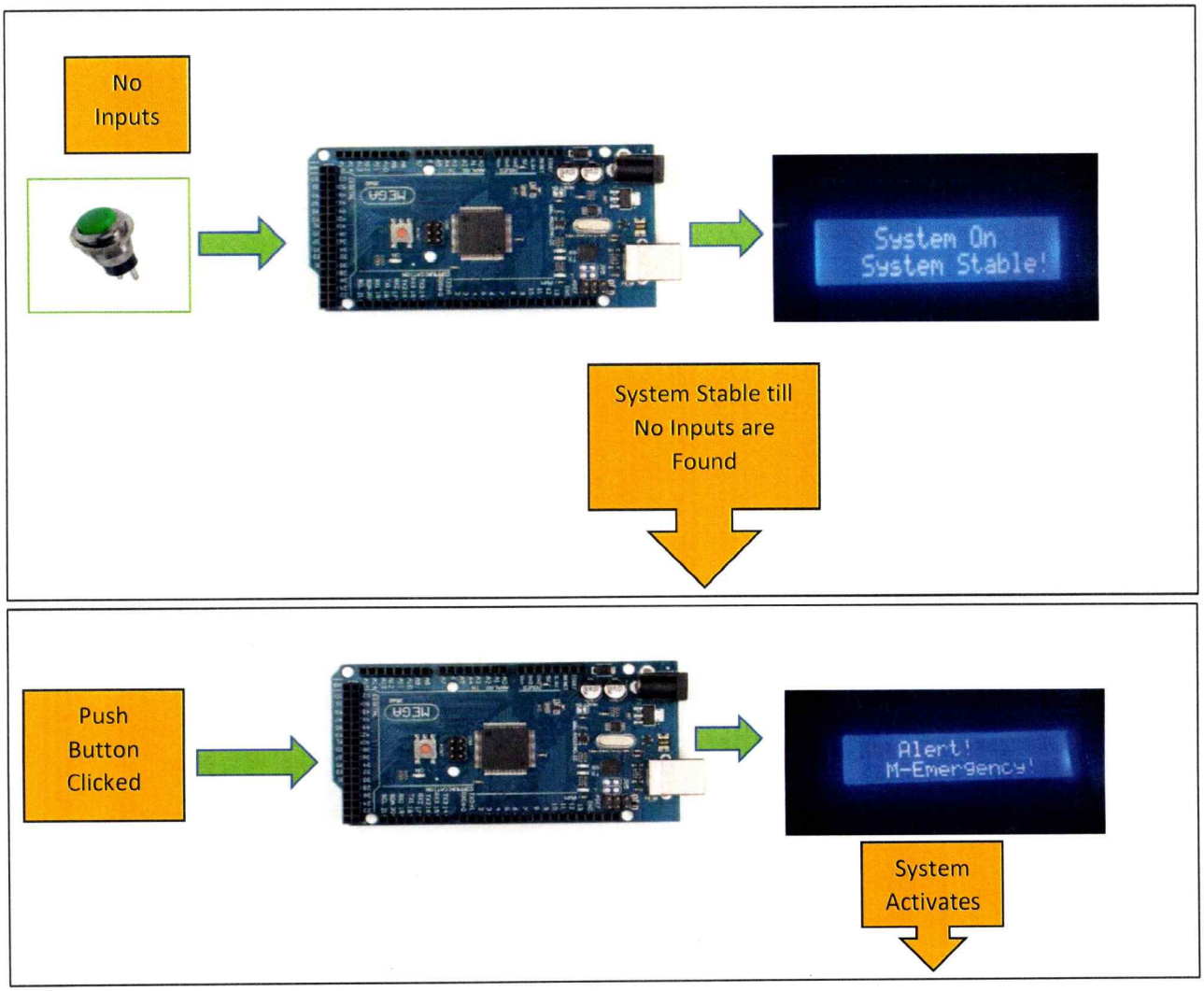
3.Evacuation Slide

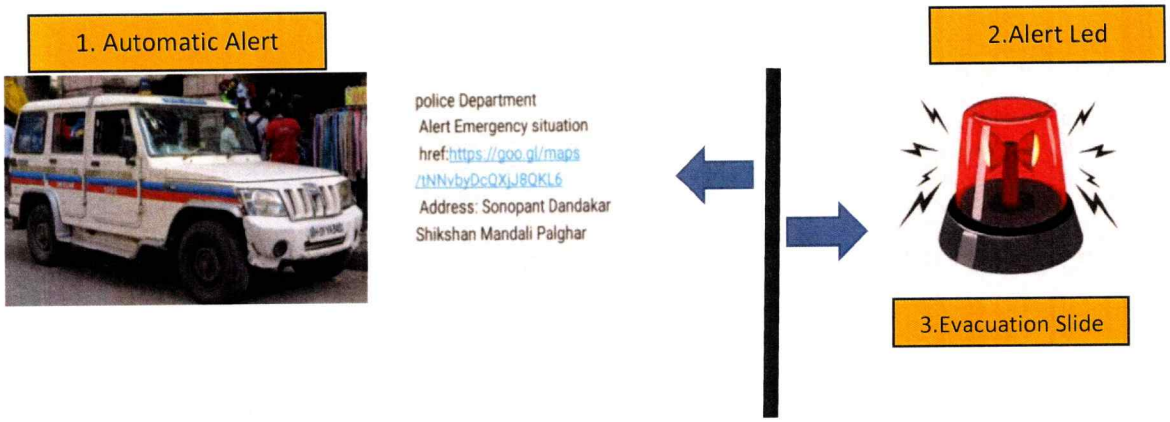
4.Navigation Leds



5.Buzzer

3.Manual Activation System.

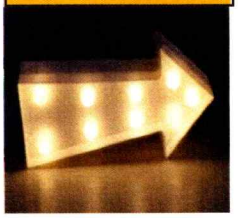




Ambulence service
Alert Emergency situation
href:https://goo.gl/maps
/tNNvbyDcQXjJ8QKL6
Address: Sonopant Dandakar
Shikshan Mandali Palghar

4.Navigation Leds

Fire-Brigade Station
Alert Emergency situation
href:https://goo.gl/maps
/tNNvbyDcQXjJ8QKL6
Address: Sonopant Dandakar
Shikshan Mandali Palghar



5.Buzzer

5.5 Test Cases

UNIT TEST REPORT

This are the following test case for testing each component of the L2S Project

Test Case Name:	Component Testing	Test Case ID:	TCU001
Purpose: To check Working of the component with Arduino board.			

Sr. No.	Test Case Description	Test Steps	Expected Results	Actual Results	Pass/Fail	Efficiency
1	Test For Arduino Board	Connect Power Supply, Upload Blink Code.	L led Should start blinking on Arduino board.	Led start Blinking	Pass	100%

2	Test for GSM 900A Module	Connect Antenna, Connect Power Supply, Insert SIM.	Power led On, Status led On, Network led should blink in every 3 second.	Power led On, Status led On, Network led blink in every 1 second.	Fail	70%; GSM module not connected to network.
3	Test for LCD I2C display	Connect Power Supply, Connect SDA, SCl Pin to Arduino, Upload lcd test code in Arduino.	LCD backlite on, Messages should be displayed on screen.	LCD backlite on, Messages displayed on screen.	Pass	100%
4	Test For Power Relay	Connect Power Supply, Connect Input pin to Arduino, Upload Test code For Relay in Arduino.	Power led should be On, Relay Should on the connected device when System Activated.	Power led On, Relay on the connected device when System Activated.	Pass	100%
5	Test For Fire Sensor.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Power led should be On, Sensor should detect fire.	Power led On, Sensor do not detect fire.	Fail	80% (Sensitivity)
6	Test For Smoke sensor.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Power led should be On, Sensor should detect Smoke.	Power led On, Sensor do not detect Smoke.	Fail	80% (Sensitivity)
7	Test for Vibration Sensor.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Power led should be On, Sensor should detect Vibration.	Power led On, Sensor do not detect Vibration.	Fail	80% (Sensitivity)
8	Test For ADXL345	Connect Power Supply, Connect Input pin to Arduino (SDA, SCL),	ADXL345 should detect X, Y, Z Coordinates.	X, Y, Z Coordinates Detected.	Pass	100%

		Upload test code in Arduino.				
9	Test For Evacuation System.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Slide or Evacuation Route should Open.	Slide or Evacuation Route Opened.	Pass	100%
10	Test for Buzzer.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Buzzer Should Generate Sound when system is activated.	Sound Generated.	Pass	100%
11	Test For Navigation Leds.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Navigation Leds Should Turn ON when system is activated.	Navigation Leds On.	Pass	100%
12	Test for Alert Led.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Alert Leds Should Turn ON when system is activated.	Alert Leds On.	Pass	100%

"Due unstable network and power supply GSM doesn't connect to network " we must adject the sensitivity of the fire smoke and vibration sensors so it can detect the fire, smoke, vibration properly

Note: Among 12 test 4 test was unsuccessful and system achieved 80% Accuracy.

Conclusion OF Unit Test: Unit Testing Fail.

INTEGRATED TEST REPORT

This are the following test case for testing Working of the L2S Project.

Test Case Name:	L2S Testing	Test Case ID:	TCI001
Purpose: To check Working of the component with Arduino board.			

Sr. No.	Test Case Description	Test Steps	Expected Results	Actual Results	Pass/Fail	Efficiency
1	Test For Fire Emergency.	Integrate System, Power Supply On, Upload code in Arduino, Fire Sensor & Smoke Sensor LOW	System Should On 1. Evacuation system. 2. Navigation led. 3. Alert led. 4. Buzzer. 5. Water Pump 6. Send Alert message to (Police, Ambulance, Fire brigade)	System does not On 1. Evacuation system. 2. Navigation led. 3. Alert led. 4. Buzzer. 5. Water Pump 6. Send Alert message to (Police, Ambulance, Fire brigade)	Fail	0% (Conflict Between digital and analog Signals)
2	Test for Earthquake Emergency.	Integrate System, Power Supply On, Upload code in Arduino, Vibration sensor LOW, Change in X, Y, Z Axis Coordinates.	System Should On 1. Evacuation system. 2. Navigation led. 3. Alert led. 4. Buzzer. 5. Send Alert message to (Police, Ambulance, Fire brigade)	System does not On 1. Evacuation system. 2. Navigation led. 3. Alert led. 4. Buzzer. 5. Send Alert message to (Police, Ambulance, Fire brigade)	Fail	0%; (Issues in Operator Used)

3	Test for Manual Activation (Push Button)	Integrate System, Power Supply On, Upload code in Arduino, Push Button LOW.	System Should On 1. Evacuation system. 2. Navigation led. 3. Alert led. 4. Buzzer. 5. Send Alert message to (Police, Ambulance, Fire brigade)	System On 1. Evacuation system. 2. Navigation led. 3. Alert led. 4. Buzzer. 5. Send Alert message to (Police, Ambulance, Fire brigade)	Pass	100%

"Due to Conflict between 2 sensors system was unable to take the action" and the operators used in the codes was not properly used which results the failure of the system.

Note: Among 3 test 2 test was failed. System achieved 20% accuracy.

Conclusion of Integrated Testing: Integration Testing Fail.

5.6 Modifications & Improvements

1. Debugging Code ID:GSM001

Error Code:

```
// send a message to the first number
mySerial.println("AT+CMGS=\"1234567890\"");
delay(1000);
mySerial.println("Emergency situation href:https://goo.gl/maps/
delay(1000);
mySerial.println((char)26);
delay(1000);
 Serial.println("Message sent to police department");
```

Postscript: Convenient way of passing information is to declare a variable and assign value to that variable. After assigning that variable can be used whenever we require to pass those values. Which makes code more structured and organized. Instead of Repeating lines of code we can use these methods which provide code reusability.

Modified Code:

```
Serial.println("Flame detected...! take action immediately.");
fireSensorValue==LOW;
gsm.print("AT+CMGS=\"" + phone_number + "\"\r\n");
delay(1000);
gsm.print(message);
delay(100);
gsm.write(26);
delay(5000);
Serial.println("Message sent to police department");
```

2. Debugging Code ID:FS001

Error Code:

```
if   (fireSensorValue==LOW || smokeSensorValue >100)
{
  Serial.println("Flame detected...! take action immediately.");
  fireSensorValue==LOW;

   // send a message to the first number
  gsm.print("AT+CMGS=\"" + phone_number1 + "\"\r\n");
  delay(1000);
```

Postscript: For detection of fire emergency Value of both sensors should be true there might be possibility of gas leakage in the structure so if smoke sensor will detect the smoke then also it will consider as fire detected. So to detect the fire emergency properly value of both the sensor should be true for that we have to use && Operators which means both conditions should be true.

Modified Code:

```
if   (fireSensorValue==LOW && smokeSensorValue >100)
{
  Serial.println("Flame detected...! take action immediately.");
  fireSensorValue==LOW;

   // send a message to the first number
  gsm.print("AT+CMGS=\"" + phone_number1 + "\"\r\n");
  delay(1000);
```

3. Debugging Code ID:GSM002

Error Code:

```
SoftwareSerial mySerial(7, 8); // RX, TX
LiquidCrystal_I2C lcd(0x3F,16,2);
const int fireSensor = A0;
const int vibrationSensor = A2;
const int smokeSensor = A3;
int buttonstatus=0;
```

Postscript: For communicating with gsm module, we need to connect SDA, SCL pins with Arduino but hers the problem if we connect the SDA, SCL pins of gsm to Arduinos SDA, SCl pins it does not work. So for proper communication we need to cross connect the pins that is why instead of cross connection we pass cross pin numbers in codes so it can work properly.

Modified Code:

```
#define GSM_RX_PIN 14 //TX
#define GSM_TX_PIN 15 //RX
SoftwareSerial gsm(GSM_RX_PIN, GSM_TX_PIN); // RX, TX
LiquidCrystal_I2C lcd(0x3F,16,2);
```

4. Debugging Code ID:SA001

Error Code:

```
digitalWrite(ES, HIGH);
Serial.println("Evacuation system ON");
digitalWrite(waterpump,HIGH );
Serial.println("Water Pump ON");
digitalWrite(Alertled, HIGH);
Serial.println("Alert led ON");
digitalWrite(buzzerPin, HIGH);
Serial.println("Buzzer ON");
```

Postscript: After Detection of any emergency system should activate following things Evacuation system, Alert System, Navigation Leds, Buzzer, Alert led. For caring out this process we need to set this all system On in codes. But in Arduino IDE the Keyword for activating is LOW rather than HIGH which creates a lot of confusion.

Modified Code:

```
digitalWrite(ES, LOW);
Serial.println("Evacuation system ON");
digitalWrite(waterpump,LOW );
Serial.println("Water Pump ON");
digitalWrite(Alertled, LOW);
Serial.println("Alert led ON");
digitalWrite(buzzerPin, LOW);
Serial.println("Buzzer ON");
```

5.Debugging Code ID: AXDL001

Error Code:

```
void loop()
{

  Serial.print("X: "); Serial.print(event.acceleration.x); Serial.print("  ");
  Serial.print("Y: "); Serial.print(event.acceleration.y); Serial.print("  ");
  Serial.print("Z: "); Serial.print(event.acceleration.z); Serial.print("  ");
  Serial.println("m/s^2 ");
  delay(1000);
```

Postscript: For detecting earthquake we need to check change in axis through AXDL345 but before checking the change we should first check the availability of ADXL345 and is there any changes in axis or not which helps in execution of code and smooth running of system.

Modified Code:

```
void loop()
{
  //check for Accelerometer
 Serial.begin(9600);
  if (!accel.begin()) {
    Serial.println("Oops ... unable to initialize the ADXL345. Check your wiring!");
    while (1);
  }
//check for change in Axis.
  sensors_event_t event;
  accel.getEvent(&event);
```

CHAPTER 6

RESULTS AND DISCUSSION

6.1 Final Test Reports

FINAL TEST REPORT 1

Following are the final test repot of all components used in Life Saviour System(L2S). Test includes test cases for Arduino, gsm, sensors, actuators.

Test Case Name:	Final Component Testing	Test Case ID:	FTCU001
Purpose: To check Working of the component with Arduino board.			

Sr. No.	Test Case Description	Test Steps	Expected Results	Actual Results	Pass/Fail	Efficiency
1	Test For Arduino Board	Connect Power Supply, Upload Blink Code.	L led Should start blinking on Arduino board.	Led start Blinking	Pass	100%
2	Test for GSM 900A Module	Connect Antenna, Connect Power Supply, Insert SIM.	Power led On, Status led On, Network led should blink in every 3 second.	Power led On, Status led On, Network led blink in every 3 second.	Pass	100%
3	Test for LCD I2C display	Connect Power Supply, Connect SDA, SCl Pin to Arduino, Upload lcd test code in Arduino.	LCD backlite on, Messages should be displayed on screen.	LCD backlite on, Messages displayed on screen.	Pass	100%
4	Test For Power Relay	Connect Power Supply, Connect Input pin to Arduino, Upload Test code For Relay in Arduino.	Power led should be On, Relay Should on the connected device when System Activated.	Power led On, Relay on the connected device when System Activated.	Pass	100%

5	Test For Fire Sensor.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Power led should be On, Sensor should detect fire.	Power led On, Sensor detects fire.	Pass	100%
6	Test For Smoke sensor.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Power led should be On, Sensor should detect Smoke.	Power led On, Sensor detects Smoke.	Pass	100%
7	Test for Vibration Sensor.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Power led should be On, Sensor should detect Vibration.	Power led On, Sensor detects Vibration.	Pass	100%
8	Test For ADXL345	Connect Power Supply, Connect Input pin to Arduino (SDA, SCL), Upload test code in Arduino.	ADXL345 should detect X, Y, Z Coordinates.	X, Y, Z Coordinates Detected.	Pass	100%
9	Test For Evacuation System.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Slide or Evacuation Route should Open.	Slide or Evacuation Route Opened.	Pass	100%
10	Test for Buzzer.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Buzzer Should Generate Sound when system is activated.	Sound Generated.	Pass	100%

11	Test For Navigation Leds.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Navigation Leds Should Turn ON when system is activated.	Navigation Leds On.	Pass	100%
12	Test for Alert Led.	Connect Power Supply, Connect Input pin to Arduino, Upload test code in Arduino.	Alert Leds Should Turn ON when system is activated.	Alert Leds On.	Pass	100%

"Due unstable network and power supply GSM does not connect to network "So external power supply is given to gsm module and another sim card is used which have strong network. We have adject the sensitivity of the fire smoke and vibration sensors so it can detect the fire, smoke, vibration properly

Note: Among 12 test all 12 test was successful and Test achieved 100% Accuracy.

Conclusion OF Unit Test: Unit Testing Successful.

FINAL TEST REPORT 2

Following are the final test repot of all components used in Life Saviour System(L2S) for detecting Fire emergency. Test includes test cases for Arduino, gsm, sensors, actuators.

Test Case Name:	Fire Emergency System	Test Case ID:	FESI001
Purpose: To check Working of the Fire emergency system.			

Sr. No.	Test Case Description	Test Steps	Expected Results	Actual Results	Pass/Fail	Efficiency
1	Test For Fire Emergency.	Integrate System, Power Supply On,	System Should On 1. Evacuation system. 2. Navigation led. 3. Alert led.	System On 1. Evacuation system. 2. Navigation led. 3. Alert led.	Pass	100% (Conflict Between digital and

		Upload code in Arduino, Fire Sensor & Smoke Sensor LOW	4. Buzzer. 5. Water Pump 6. Send Alert message to (Police, Ambulance, Fire brigade)	4. Buzzer. 5. Water Pump 6. Send Alert message to (Police, Ambulance, Fire brigade)		analog Signals Solved)

"Due to Conflict between 2 sensors system was unable to take the action" After proper declaration of the sensor inputs and combination of digital and analog signals system can detect fire emergency properly.

Note: Fire Emergency System test is Successful system achieved 100% accuracy.

Conclusion of Integrated Testing 1: Fire Detection Successful.

FINAL TEST REPORT 3

Following are the final test repot of all components used in Life Saviour System(L2S) for detecting Earthquake Emergency. Test includes test cases for Arduino, gsm, sensors, actuators.

Test Case Name:	Earthquake Emergency system.	Test Case ID:	EES001
Purpose: To check Working of the Earthquake Emergency System..			

Sr. No.	Test Case Description	Test Steps	Expected Results	Actual Results	Pass/Fail	Efficiency
1	Test for Earthquake Emergency.	Integrate System, Power Supply On, Upload code in Arduino, Vibration sensor LOW,	System Should On 1. Evacuation system. 2. Navigation led. 3. Alert led. 4. Buzzer. 5. Send Alert message to (Police, Ambulance	System On 1. Evacuation system. 2. Navigation led. 3. Alert led. 4. Buzzer. 5. Send Alert message to (Police, Ambulance	Pass	100%; (Issues in Operator Used Solved.)

		Change in X, Y, Z Axis Coordinates .	, Fire brigade)	, Fire brigade)		

Operators used in the codes was not properly used which results the failure of the system. After using proper operators' system can detect fire condition.

Note: Earthquake Emergency System test is successful system achieved 100% accuracy.

Conclusion of Integrated Testing 2: Earthquake Detection Successful.

FINAL TEST REPORT 4

Following are the final test repot of all components used in Life Saviour System(L2S) for detection of Manual Activation. Test includes test cases for Arduino, gsm, sensors, actuators.

Test Case Name:	Manual Activation	Test Case ID:	MA001
Purpose: To check Working of the Manual Activation System.			

Sr. No.	Test Case Description	Test Steps	Expected Results	Actual Results	Pass/Fail	Efficiency
1	Test for Manual Activation (Push Button)	Integrate System, Power Supply On, Upload code in Arduino, Push Button LOW.	System Should On 1. Evacuation system. 2. Navigation led. 3. Alert led. 4. Buzzer. 5. Send Alert message to (Police, Ambulance, Fire brigade)	System On 1. Evacuation system. 2. Navigation led. 3. Alert led. 4. Buzzer. 5. Send Alert message to (Police, Ambulance, Fire brigade)	Pass	100%

Note: Manual Activation System test is successful system achieved 100% accuracy.

Conclusion of Integrated Testing 3: Manual Activation Detected.

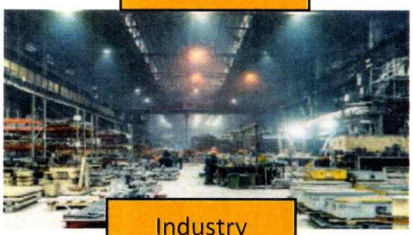
6.2 System User Documentation.

1.Define the target audience:

Early Detection: Fire alarm systems are designed to detect the presence of smoke or fire in the building as early as possible, allowing occupants to evacuate quickly and firefighters to respond promptly.

Malls

College



Industry

Notification: Once a fire is detected, fire alarm systems will sound an audible alarm, flash strobe lights, or send out a text alert to notify people within the building of the emergency. This helps to ensure everyone is aware of the situation and can evacuate the building safely.

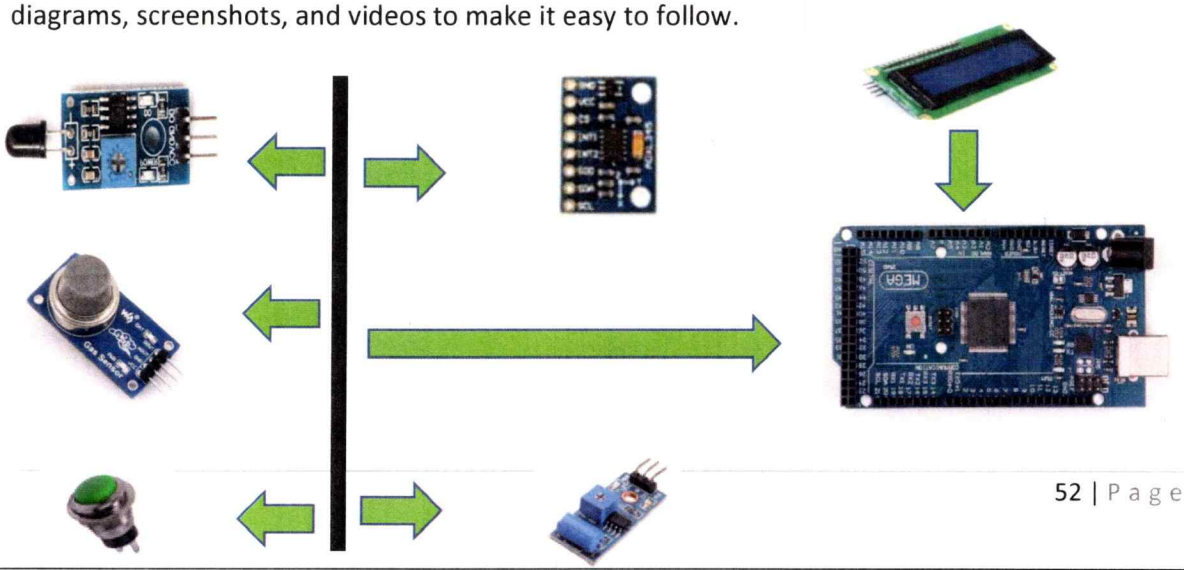
Suppression: Fire suppression systems, such as sprinklers, can help to control or extinguish a fire before it gets out of control. These systems can help to minimize damage and prevent the spread of the fire.

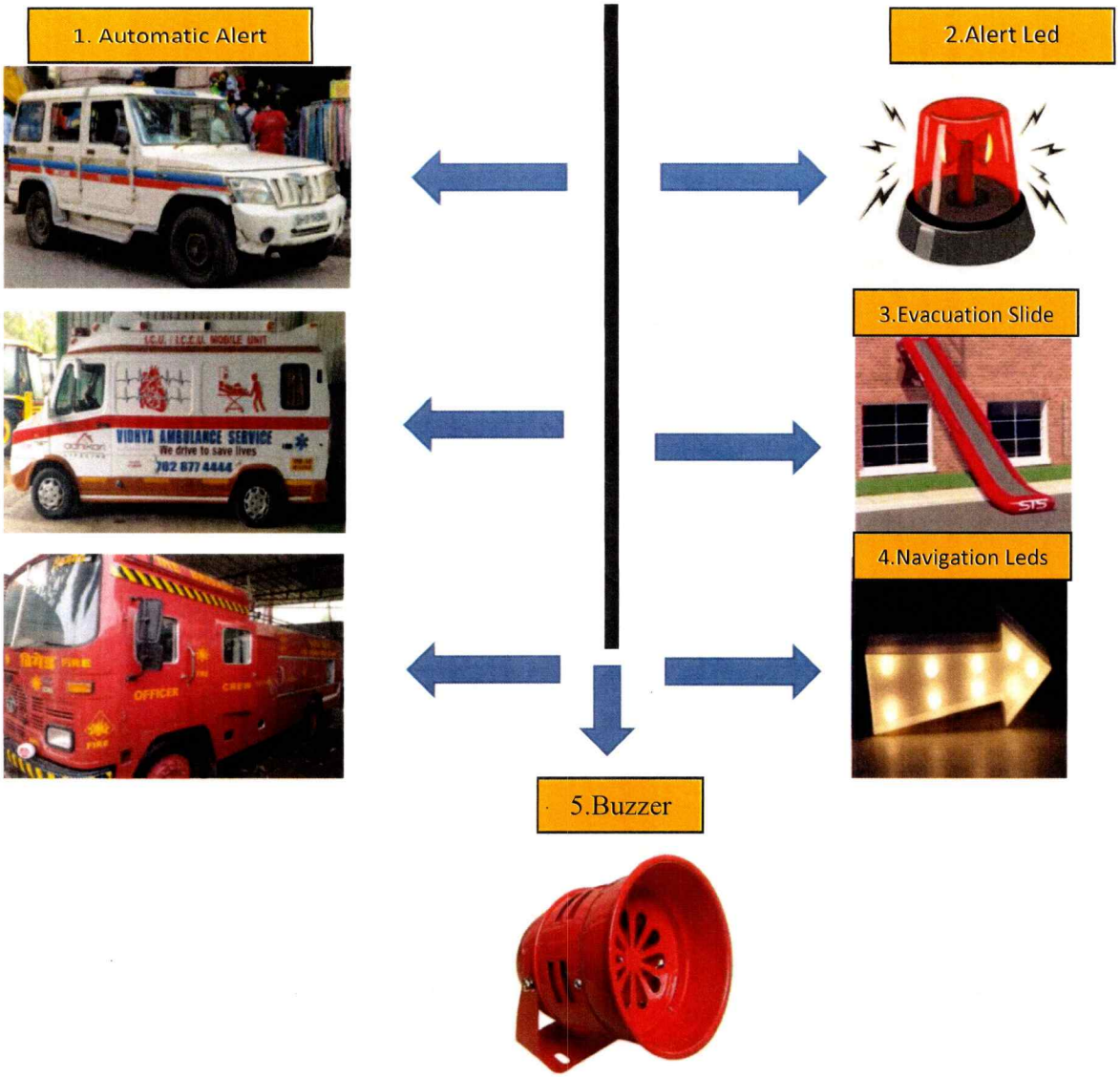
Monitoring: Fire emergency systems can be monitored remotely by emergency responders or building managers. This allows for a faster response time and can help to ensure that the fire is fully extinguished.

Compliance: Many local, state, and national fire codes require fire emergency systems in buildings to ensure that occupants are safe in the event of a fire. Installing a fire emergency system can help ensure compliance with these regulations and avoid costly fines.

2. Document the installation process:

Provide step-by-step instructions on how to install and set up the IoT device or system. Include diagrams, screenshots, and videos to make it easy to follow.




1. Automatic Alert
2.Alert Led
3.Evacuation Slide
4.Navigation Leds
5.Buzzer
VIDHYA AMBULANCE SERVICE
We drive to save lives
FIRE
OFFICER

CHAPTER 7
CONCLUSIONS

7.1 Conclusion

The system involves the use of sensors and other IoT devices to detect fire, smoke, earthquake, and other emergency situations, as well as to monitor and alert people in the vicinity to evacuate safely. An IoT project for fire, Earthquake, other emergency and evacuation, and alert system is a crucial application of IoT technology that can significantly improve safety and security. By leveraging IoT devices and technologies, the system can detect and respond to emergency situations quickly and efficiently, reducing the risk of injury or loss and saving lives.

The project has several benefits, including:

- Early detection and warning of fire emergencies, allowing for prompt response and mitigation.
- Improved safety and security of people and property, reducing the risk of injury or loss.
- Automated emergency response and evacuation procedures, reducing the likelihood of human error or delay.
- Enhanced monitoring and control capabilities, allowing for real-time updates and status reports.

7.2 Significance of the System

1. Fire emergency system is triggered when the fire detection sensor is activated.
2. Alarm is sounded when the fire emergency system is triggered.
3. Authorities are notified when the fire emergency system is triggered.
4. The system can detect earthquakes.
5. The system can warn people in the affected area.
6. The system can provide information about the earthquake.
7. The system can to help people in the affected area.
8. The system can aid emergency services.
9. The system can correctly identify the location of a fire.
10. The system can correctly calculate the best evacuation route.
11. The system can correctly provide instructions to evacuate the building.

L2S will bring evolution by introducing a new system which will able to detect earthquake and give a smart and useful response. And it will be a replacement of old fire emergency system which have some loop holes like manual work, human errors etc

L2S will help to handle critical emergency intelligently and rationally and remove all the manual work which can lead the error and any delay. L2S will be user friendly system so a small child can also use it and save life. L2S use the concept of abstraction and encapsulation implementation details are running in background and only simple interface is interacting with the user so anyone can use it without having any technical knowledge.

Using emergency stair in emergency can lead a lot of rush and can lead loss of life so L2S will provide the proper and safe way of escape through evacuation system and help to navigate to nearest evacuation system. Evacuation time will be reduced drastically through this system because it will provide multiple way or path to escape which will avoid rush and delay.

L2S will have huge implementation field of area like malls, schools, colleges, Factories, and buildings. This will be one time investment, install plug and use system and it will help to get fire NOC for the structure easily which makes people feel safe inside structure.

7.3 Limitations & Future Works

7.2.1 Limitations of the System

- Reliability: IoT devices rely on communication channels, which can be unreliable or congested. This can lead to delayed or lost data, affecting the performance of IoT systems.
- Power consumption: IoT devices are typically powered by batteries or low-power sources, which can limit their functionality and require frequent replacements.
- Privacy: IoT devices collect and transmit data, which can raise privacy concerns. Users may not be aware of what data is being collected or how it is being used, leading to potential privacy violations.
- Compatibility: IoT devices come from different manufacturers and use different communication protocols, which can create compatibility issues. Integration with existing systems and software can be challenging and may require additional resources.
- Cost: IoT devices and systems can be expensive, particularly for businesses that need to deploy them on a large scale. The cost of implementing and maintaining IoT systems may not be justified by the benefits they provide.

- Maintenance Requirements: Like any other technology, IoT fire systems require regular maintenance to function optimally. Failure to carry out routine maintenance tasks may result in system failures or false alarms.
- Hardware failure: IoT systems involve many devices and sensors, and any of them can malfunction due to manufacturing defects, wear and tear, or environmental factors. The solution is to use high-quality components, perform regular maintenance, and have a backup plan in case of hardware failure.
- Limited access for emergency responders: In the event of a fire, emergency responders may have difficulty accessing higher floors of a building quickly. This can make it more challenging to put out the fire and rescue people who are trapped.

7.2.2 Future Works

1. Remote monitoring

Remote monitoring is an important tool in earthquake emergency response. Earthquakes can occur unexpectedly and without warning, and can cause significant damage to infrastructure and property, as well as put lives at risk. Remote monitoring can help emergency responders quickly assess the damage and determine the most effective response.

One-way remote monitoring can be used in earthquake emergencies is using seismic sensors. These sensors can detect earthquakes and transmit data to a central monitoring station. This data can be used to determine the location, magnitude, and duration of the earthquake, as well as the direction and intensity of the seismic waves. This information can help emergency responders determine the areas that are most likely to have been affected and prioritize their response efforts accordingly.

Another way remote monitoring can be used in earthquake emergencies is using satellite imagery. Satellite images can provide real-time information about the extent of the damage, allowing emergency responders to quickly assess the situation and make informed decisions about where to focus their efforts.

Remote monitoring enables the early detection of potential fire hazards. With sensors placed throughout the building and connected to a remote monitoring system, any potential fire hazards can be detected immediately, allowing for quick response times and the prevention of major damage. Remote monitoring also allows for remote control of the system. The system can be adjusted or turned off from a remote location if needed, allowing for a quick response to any potential problems.

2. Remote access

Users can remotely control and monitor IoT devices such sensors, Evacuation system, Alert System from anywhere in the world. This provides greater convenience and peace of mind,

especially for people who travel frequently or are away from home for extended periods. Remote access of IoT systems can enable greater automation of tasks, such as activating system.

GSM modules can be integrated into a wide range of IoT devices, such as smart meters, sensors, and security systems, to enable remote monitoring and control. With a GSM module, an IoT system can be accessed remotely from anywhere in the world, if there is cellular network coverage. This remote access allows for real-time monitoring, control, and management of the IoT system, without the need for physical presence or local network connectivity.

3. **Turn Off Power supply OF structure automatically.**

Electrical spark prevention: Electrical sparks can start flammable materials and hasten the spread of a fire. Electrical sparks are considerably less likely to occur when the power supply is turned off.

preventing the spread of a fire: In some instances, a fire may begin in wiring or an electrical device. The danger of the fire becoming out of control is diminished by cutting off the power supply, which also limits the fire's ability to spread.

Access for Emergency Services: By cutting off the power source, the area can be more easily and safely accessed by emergency services, allowing them to put out the fire. Firefighters and other emergency workers can experience less of a risk of electrocution by turning off the power.

4. **Turn off Gas Supply automatically.**

Gas can fuel the flames of a fire when it starts and speed up the fire's spread, both of which can be very hazardous. The risk of a gas explosion or the fire spreading due to gas is significantly decreased by automatically shutting off the gas supply when a fire is discovered.

Automatically shutting off the gas supply can decrease the danger of fire while also preventing gas leaks. Due to the possibility of gas explosions, fires, and even carbon monoxide poisoning, gas leakage can be extremely dangerous. By automatically shutting off the gas supply when a fire is discovered, any gas leaks can be swiftly stopped, preventing further danger to people and property.

Overall, the automatic shutoff of gas supply when fire is discovered is an extremely significant safety feature that can reduce property damage, prevent accidents, and save lives.

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ELECTRICITY BILLING SYSTEM

A Project Report
Submitted in partial fulfillment of the
Requirements for the award of the Degree of
BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

By

Devendrasingh S Kanyal

Seat. No: 4020812

&

Parth N Patil

Seat. No: 4020870

Under the esteemed guidance of

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Assistant Professor

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MAHARASHTRA

2022-2023

PROFORMA FOR THE APPROVAL PROJECT PROPOSAL

PNR No.: ..... Roll no: 69021

1. Name of the Student

   Devendra Singh . Sanjay Nayal

2. Title of the Project

   Electricity Billing System

3. Name of the Guide

   Mrs Sayli Bhosale

4. Teaching experience of the Guide 8 years

5. Is this your first submission? Yes ☑ No ☐

Signature of the Student

Date: 05/08/2022

Signature of the Guide

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Signature of the coordinator

Date: 11/08/2022

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ABSTRACT

Electricity consumers are often faced with the problem of inaccuracy and delay in monthly billing due to some drawbacks. Thus, it is essential to have an efficient system for such purposes via electronic platform with consideration to proximity. The proposed system automates the conventional process of paying electricity bill by visiting the Electricity Board which is tiresome and time consuming. It is also designed to automate the electricity bill calculation and payment for user convenience. The system is developed with Java swings as the base programming language which can be used to develop websites, web applications and web services.

The Microsoft Structured Query Language (SQL) server is also used for creating back-end database. The system would be having two logins: the administrative and user login. The administrator can view the user's account details and can add the customer's information of consuming units of energy of the current month in their account. The Admin must feed the system with the electricity usage data into respective user's account. The system then calculates the electricity bill for every user and updates the information into their account every month. Users can then view their electricity bill and pay before the month end.

ACKNOWLEDGEMENT

The successful completion of any task would be incomplete without mentioning all those people who made it possible, the constant and encouragement, crowns the effort with success.

I wish many thanks to our Head of Department **Dr. ASHWIN BHAGAT** for providing guidance throughout the course and all those who have indirectly guided and helped us in preparation of this project.

I express my thanks to my project guide **Mrs. SAYLI BHOSALE & Miss. CYNTHIA SHINDE** for the constant motivation and valuable help through the project work.

I am indebted to my well-wishers and friends who encourage me in successful completion of the project.

DECLARATION

I hereby declare that the project entitled, **Electricity Billing System** done at **SDSM College,** has not been in any case duplicated to submit to any other university for the award of any degree. To the best of my knowledge other than me, no one has submitted to any other university.

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Parth N Patil

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The conventional system of electricity billing is not so effective; one staff must visit each customer's house to note the meter readings and collect the data. Then, another staff must compute the consumed units and calculate the money to be paid. Again, the bills prepared are to be delivered to customers. Finally, individual customer must go to electricity office to pay their dues.

Hence, the conventional electricity billing system is uneconomical, requires many staffs to do simple jobs and is a lengthy process overall. In order to solve this lengthy process of billing, a web based computerized system is essential. This proposed electricity billing system project overcomes all these drawbacks with the features. It is beneficial to both consumers and the company which provides electricity.

With the new system, there is reduction in the number of staffs to be employed by the company. The working speed and performance of the software is faster with high performance which saves time. Furthermore, there is very little chance of miscalculation and being corrupted by the staffs.

The software provides facility of data sharing; it does not require any staff as in the conventional system. Once it is installed on the system only the meter readings are to be given by the admin where customer can view all details, it has the provision of security restriction.

The electricity billing software calculates the units consumed by the customer and makes bills; it requires small storage for installation and functioning. There is provision for debugging if any problem is encountered in the system.

The system excludes the need of maintaining paper electricity bill, administrator does not have to keep a manual track of the users, and users can pay the amount without visiting the office. Thus, it saves human efforts and resources.

The main aim of our project is to satisfy customer by saving their time by payment process, maintaining records, and allowing the customer to view his/her records and permitting them to update their details.

1.2 Objectives

The system excludes the need of maintaining paper electricity bill, administrator does not have to keep a manual track of the users, and users can pay the amount without visiting the office. Thus, it saves human efforts and resources.

- To keep the information of Customer calculates the units consumed every month:-
  Helps to maintain information of customer such as login and password details, customer name, id, meter number, successful payments, late payment dues, etc. and other important details.

- To calculate the units consumed every month regularly and generate the bills adding penalty and rent:-
  Helps to calculate the number of units consumed by the customer and generate bill accordingly by adding all rents, taxes and dues etc.

- To save the time by implementing payment process online:-
  Online payment helps in cashless transactions and avoids visiting electricity payment office, also help to save our recourses such as energy, time, and fuels. Able to pay bills through any corner having internet on your fingertips.

1.3 Purpose Scope and Applicability

1.3.1 Purpose

- This project system excludes the need of maintaining paper electricity bill as all the electricity bill records are managed electronically.
- Administrator doesn't have to keep a manual track of the users. The system automatically calculates fine.
- Users don't have to visit to the office for bill payment.
- There is no need of delivery boy for delivery bills to user's place.
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Electricity consumers are often faced with the problem of inaccuracy and delay in monthly billing due to some drawbacks. Thus, it is essential to have an efficient system for such purposes via electronic platform with consideration to proximity. The proposed system automates the conventional process of paying electricity bill by visiting the Electricity Board which is tiresome and time consuming. It is also designed to automate the electricity bill calculation and payment for user convenience. The system is developed with Java swings as the base programming language which can be used to develop websites, web applications and web services.

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With the new system, there is reduction in the number of staffs to be employed by the company. The working speed and performance of the software is faster with high performance which saves time. Furthermore, there is very little chance of miscalculation and being corrupted by the staffs.

The software provides facility of data sharing; it does not require any staff as in the conventional system. Once it is installed on the system only the meter readings are to be given by the admin where customer can view all details, it has the provision of security restriction.

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The system excludes the need of maintaining paper electricity bill, administrator does not have to keep a manual track of the users, and users can pay the amount without visiting the office. Thus, it saves human efforts and resources.

The main aim of our project is to satisfy customer by saving their time by payment process, maintaining records, and allowing the customer to view his/her records and permitting them to update their details.

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- Thus, it saves human efforts and resources.

1.3.2 Scope

- **Extensibility**: This software is extendable in ways that its original developers may not expect. The following principles enhances extensibility like hide data structure, avoid traversing multiple Links or methods avoid case statements on object type and distinguish public and private operations.

- **Reusability**: Reusability is possible as and when require in this application. We can update it next version. Reusable software reduces design, coding and testing cost by amortizing effort over several designs. Reducing the amount of code also simplifies understanding, which increases the likelihood that the code is correct. We follow up both types of reusability. Sharing of newly written code within a project and reuse of previously written code on new projects.

- **Understand ability:** A method is understandable if someone other than the creator of the method can understand the code (as well as the creator after a time lapse). We use the method, which small and coherent helps to accomplish this.

- **Cost-effectiveness:** Its cost is under the budget and make within given time period. It is desirable to aim for a system with a minimum cost subject to the condition that it must satisfy the entire requirement .Scope of this document is to put down the requirements, clearly identifying the information needed by the user, the source of the information and outputs expected from the system.

1.3.3 Applicability

This system can be applicable in the areas where electricity is supplied by the government and have meters installed. The customer must have a little technical knowledge for handling smart application, through which he/she can able to use this system to pay online electricity bills.

1.4 Achievements

This system saves the various resources and energy. It helps to make payment easier and faster. It helps to make less and less usage of papers and allow us to GO PAPERLESS.

With the new system, there is reduction in the number of staffs to be employed by the company. The working speed and performance of the software is faster with high performance which saves time. Furthermore, there is very little chance of miscalculation and being corrupted by the staffs.

1.5 Organization of Report

The main aim of our project is to satisfy customer by saving their time by payment process, maintaining records, and allowing the customer to view his/her records and permitting them to update their details .The firm handles all the work manually, which is very tedious and mismatched.

CHAPTER 2

SURVEY OF TECHNOLOGIES

Zamia Benazir, DivaPrabha.P,2018 [1],Science and technology with all its fascinating advancements has been taking human life standards to the next level. The whole world will be literally jammed without these innovations. This project is an innovation, which makes the way of paying electricity bill simple compared to other existing projects. This project has been implemented using Java Swing as front end and MySQL as back end. The purpose of the project is to build an application program to reduce the manual work for managing the number of units consumed by the customers and generating the electricity bill according to the type of customer – individual or commercial. It displays the details of the customers, units consumed by them and bill history. It enables them pay their bill if not paid. The date of payment will be updated while paying the bill. It maintains error free database and easily incorporates the future developments and changes.

A. Andrew, P.U. Okorie, Nov 2019[2],Electricity consumers are often faced with the problem of inaccuracy and delay in monthly billing due to the drawback in reading pattern and human errors. Thus, it is essential to have an efficient system for such purposes via electronic platform with consideration to proximity. The proposed system automates the conventional process of paying electricity bill by visiting the Electricity Board which is tiresome and time consuming. It is also designed to automate the electricity bill calculation and payment for user convenience. The system is developed with Microsoft Visual Studio using C# as the base programming language which can be used to develop websites, web applications and web services. The Microsoft Structured Query Language (SQL) server is also used for creating back-end database. The system would be having two logins: the administrative and user login. The administrator can view the user's account details and can add or update the customer's information of consuming units of energy of the current month in their account. The Admin has to feed the system with the electricity usage data into respective users account. The system then calculates the electricity bill for every user and updates the information into their account every month. Users can then view their electricity bill and pay before the month end.

M.R.M.S.B. Rathnayaka , I.D.S.Jayasinghe , EnitJayanth , S.I Swarnajith , April 2013[3],Billing is a critical function of both the Electricity and the Water Boards towards getting a meter read. Meter reading, even though it looks simple, is far from simple and involves processes that can give various problems. Most problems, currently seen, result from the manual processes followed. Calculation errors, delays in system updating and fault tracking issues are the major problems that companies find difficult to find answers for. This paper suggests a mobile based system to collect process and notify consumers about consumption. This system will be reliable, efficient and accurate to suit the requirements of these companies. The proposed solution uses evolving Mobile Technologies, over a solution which uses Mobile applications to handle a company's day today work. The burden on the Meter Reader is lessened and other new features have also been introduced. Customer interaction with the company is improved and customers can easily view their current electricity usage using their mobile phones. However, the feasibility of such a project for a third world country like Sri Lanka is a concern with regard to the cost factor involved. The project demands substantial investments. Will the country be able to meet the costs involved? Yet, most of the problems related to Electricity Billing are addressed through this system and this might prove to be the best solution for specific companies to optimize services on a low budge.

Ashutosh Kumar, Dharmendra Pratap Singh, Sagar Shubham, June 2021 [4],Science and innovation with all its interesting progressions has been taking human existence norms to a higher level. The entire world will be in a real sense stuck without these developments. This project is a development project, which makes the method of covering electricity bill basic contrasted with other existing tasks. This undertaking has been done using Java Swing as front end and MySQL as back end. The motivation behind the task is to construct an application program to lessen the manual work for dealing with the measure of units devoured by the clients and producing the power charge as per the type of customer – individual or business. It shows the details about customer, units devoured by them and bill history. It empowers them cover their bill if not paid. The date of payment will be refreshed while covering the bill. It keeps up the error free database and effectively joins the future turns of events and changes. Keywords: Bill Payment History, Bill Payment, Electricity bill, Java Swing, MySQL, Type of customer.

ShubhanshuYadav, March 2022[5],Science and technology with all its thrilling advances have brought the standards of daily life of person to the fore. The entire human beings definitely collapse beyond new things. This research is a novelty, which provides the method of collecting bill for power easier differentiate to else the previous research. This project work had apply using Java Swing as before and MySQL as the latter.

The aim of the project work is to create an app system to minimize physical labor to manage the number of units used by consumers & to generate a bill depending on the type of consumers -independent or business. Show the customer information, depleted units and credit record. It permit the customers to pay off its debt if they are not pay. The when customer pay the due amount then after time will be updated. This maintains the right information and it make it simple to access previous data for further changes later. Highlights: Bill record, Bill Paid, Electronic Bill payment, Java Swing, MySQL.

CHAPTER 3

REQUIREMENTS AND ANALYSIS

3.1 Problem Definition

The manual system is suffering from a series of drawbacks. Since whole of the bills is to be maintained with hands the process of keeping and maintaining the information is very tedious and lengthy to customer. It is very time consuming and laborious process because, staff need to be visited the customers place every month to give the bills and to receive the payments. For this reason, we have provided features Present system is partially automated (computerized); existing system is quite laborious as one must enter same information at different places.

3.2 Requirements Specification

The functional requirement of the electricity bill management system is that it does what it is meant for. A functional requirement describes what a software system should do, while non-functional requirements place constraints on how the system will do so. Functional requirements specify a function that a system or system component must be able to perform.

Few of its functional requirements are as given below: –

User data should be fed into the system: -this system is doing that properly in the user entity. After fetching the data of the customer, the bill can be made and sent to the customer.

Admin can add the users: -Admin can verify and add the user, which is they are doing with this system. He can also delete the users if required.

Non-functional necessities – are often divided into 2 main categories:

- Execution qualities, like security and usefulness, that square measure evident at the run time.

- Evolution qualities, like liabilities, maintainability, flexibility, and quantifiable, that square measure embodied within the static structure of the code.

Non-functional necessities place restrictions on the merchandise being developed, the event method, and specify external constraints that the merchandise should meet. Our project qualifies all the criteria of functional and non-functional accordingly and the system is up to mark performance wise.

Here we need to take care of few more things before heading towards the system. The most important feature of the electricity bill management system application world is the application's ease of usage .application will easy to use if made while keeping in mind that the user need not think twice about searching any feature.

Everything should be made distinctive by using the colour combination such that everything needed most frequently highlighted with focus colours. Using simple layouts like the card and grid layout etc. By varying colour and other UI combinations, many good intuitive interfaces can be made. Which ultimately makes the interface easy to use for a long time?

Keep things simple and consistent:–Simple and Harmonic way making UI is very intuitive and needs to follow.

Make good use of typography: –The typography is taken care very strictly as the need of the system.

Use colour and contrast properly:–Colour combo of lite and dark is good way emphasise and done well in this system.

Consider feedback messages:–The feedback form is a very good way taking feedback of forms and improving the system.

Simplified forms:–The form is made simple to fill with the clean user interface.

3.3 Planning and Scheduling

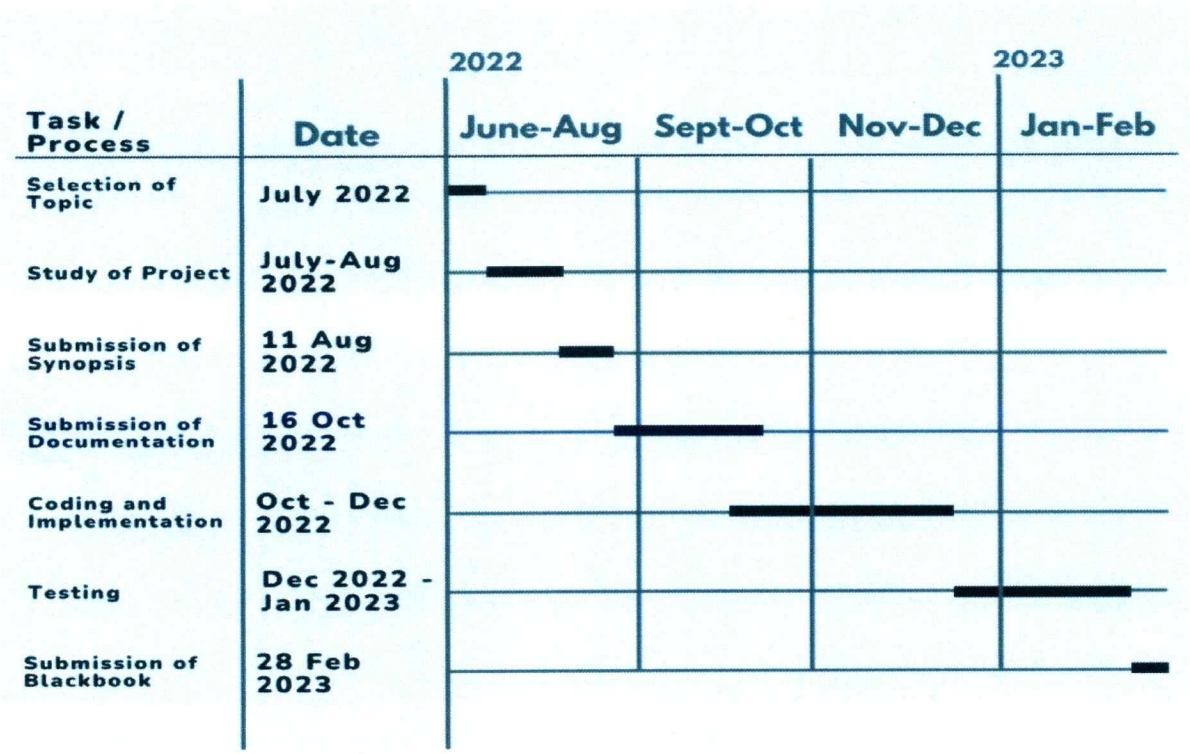


Fig 3.3.1 Gantt Chat

3.4 Software and Hardware Requirements

3.4.1 Hardware Requirements:

- Hardware Specification:-Processor Intel Pentium V or higher
- Clock Speed:-1.7GHzormore
- System Bus:-64bits
- RAM:-16GB
- HDD:-2TB
- Monitor:-LCD Monitor
- Keyboard:-Standard keyboard
- Mouse:-Compatible mouse

3.4.2 Software Requirements:

- Operating System:-Windows10
- Software:-Microsoft SQL Server
- Frontend:- Java core/swings (NetBeans)
- Backend: -My SQL

3.5 Preliminary Product Description

System design is an abstract representation of a system component and their relationship and which describe the aggregated functionally and performance of the system. It is also the plan or blueprint for how to obtain answer to the question being asked. The design specifies various type of approach.

Database design is one of the most important factors to keep in mind if you are concerned with application performance management. By designing your database to be efficient in each call it makes and to effectively create rows of data in the database, you can reduce the amount of CPU needed by the server to complete your request, thereby ensuring a faster application.

3.6 Conceptual Model

ER Diagram:-

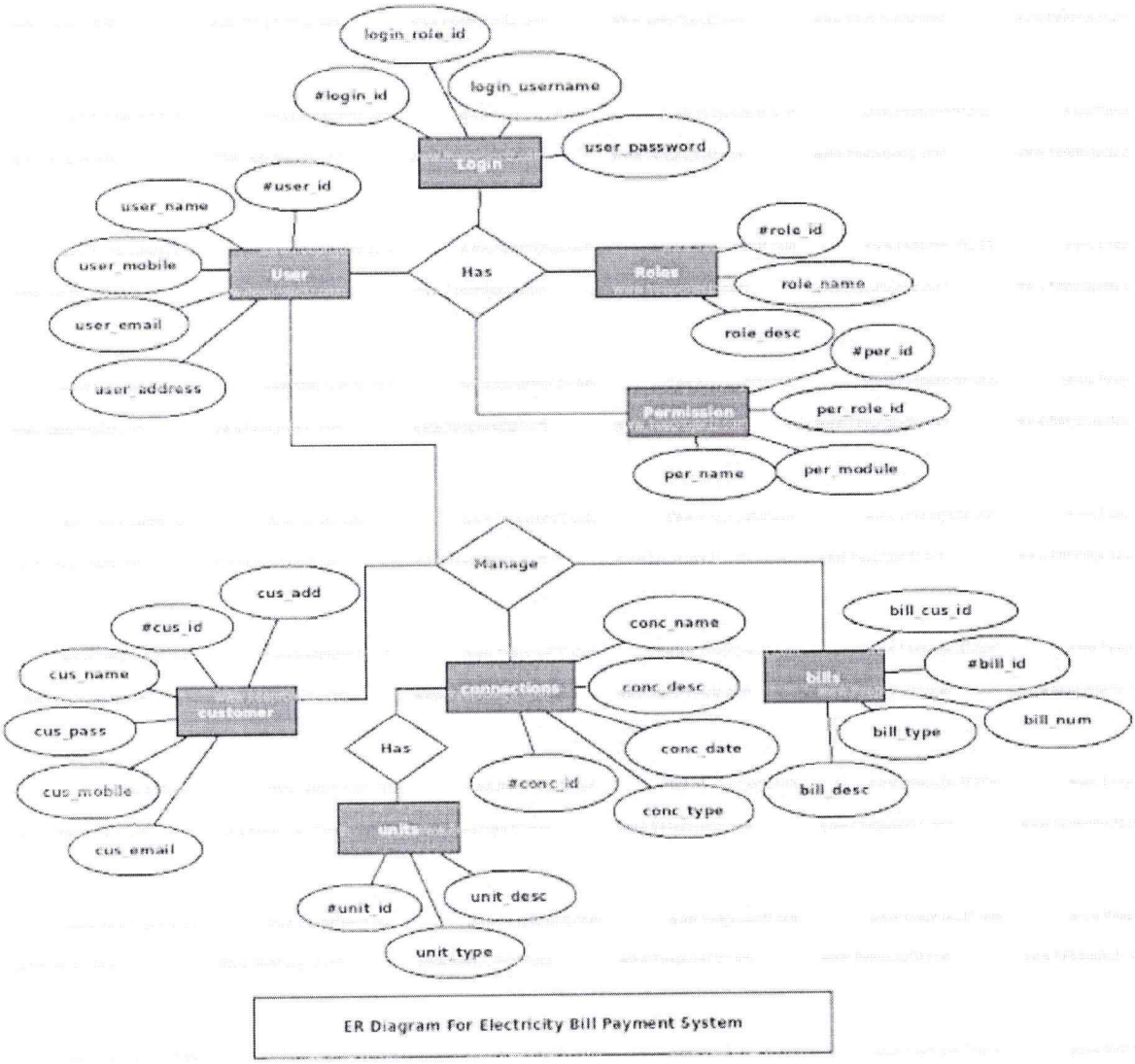


Fig 3.6.1 ER Diagram

Class Diagram :-

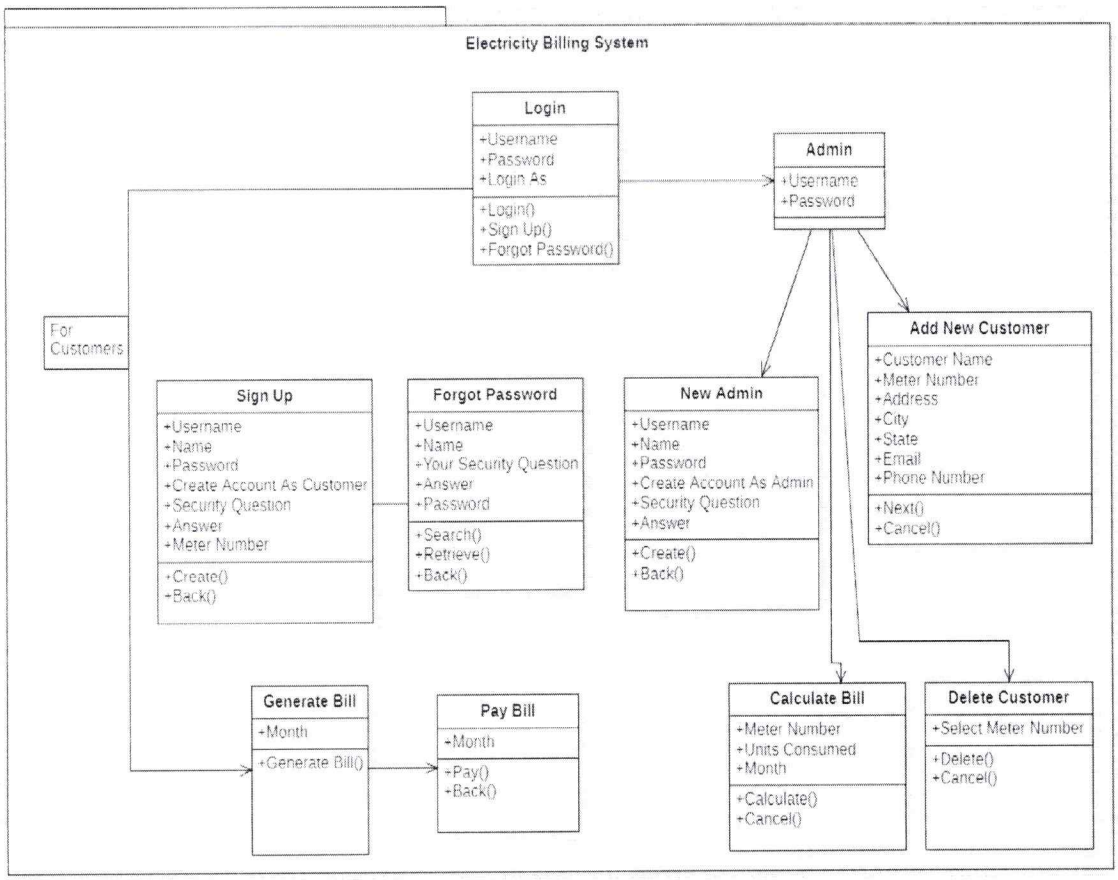


Fig 3.6.2 Class Diagram

Activity Diagram:-

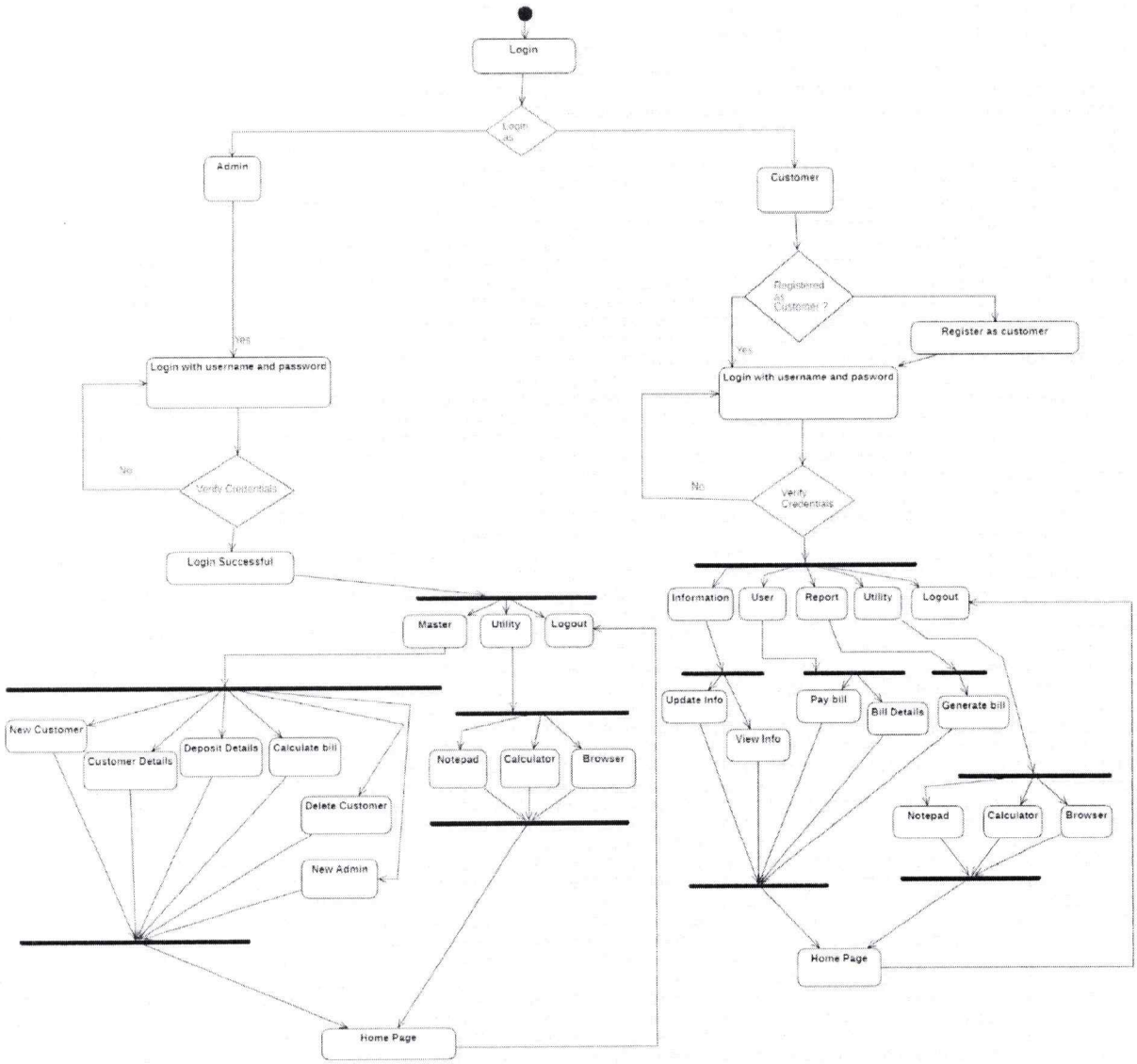


Fig 3.6.3Activity Diagram

Use Case Diagram:-

i)

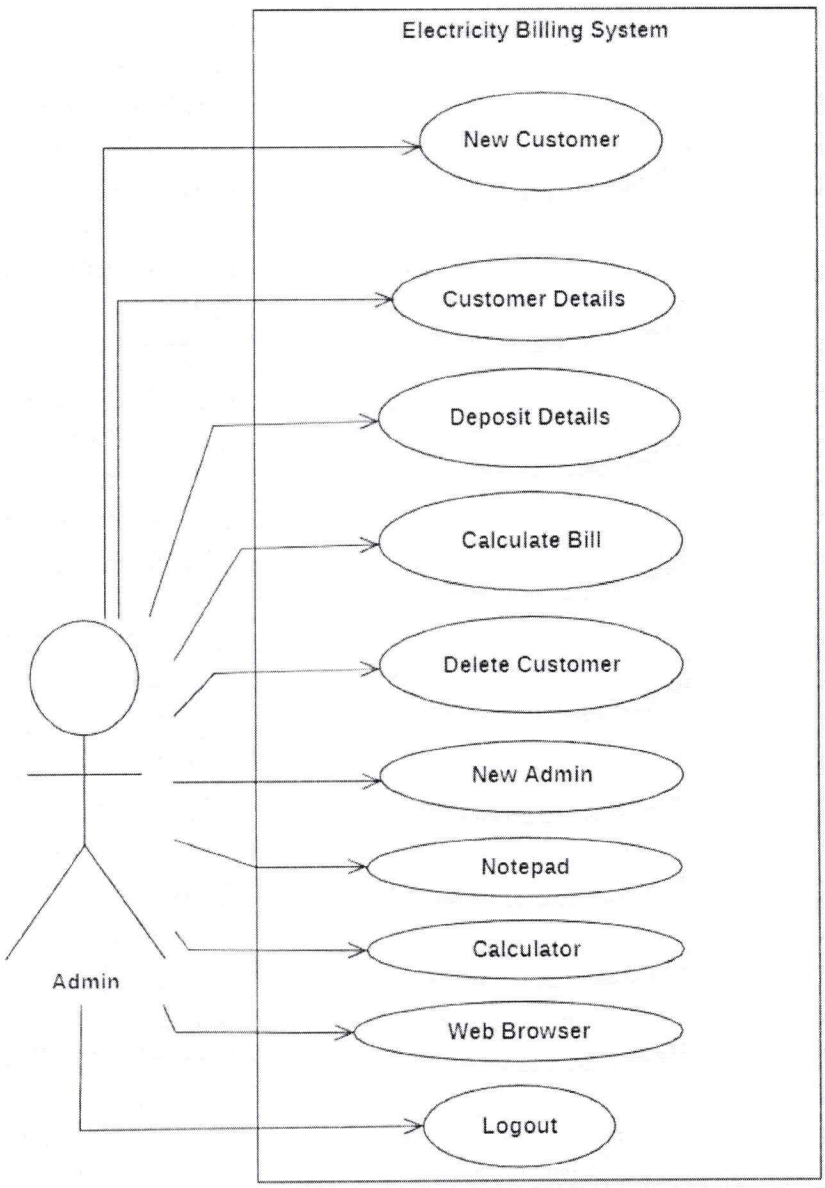


Fig 3.6.4Use Case Diagram for Admin

ii)

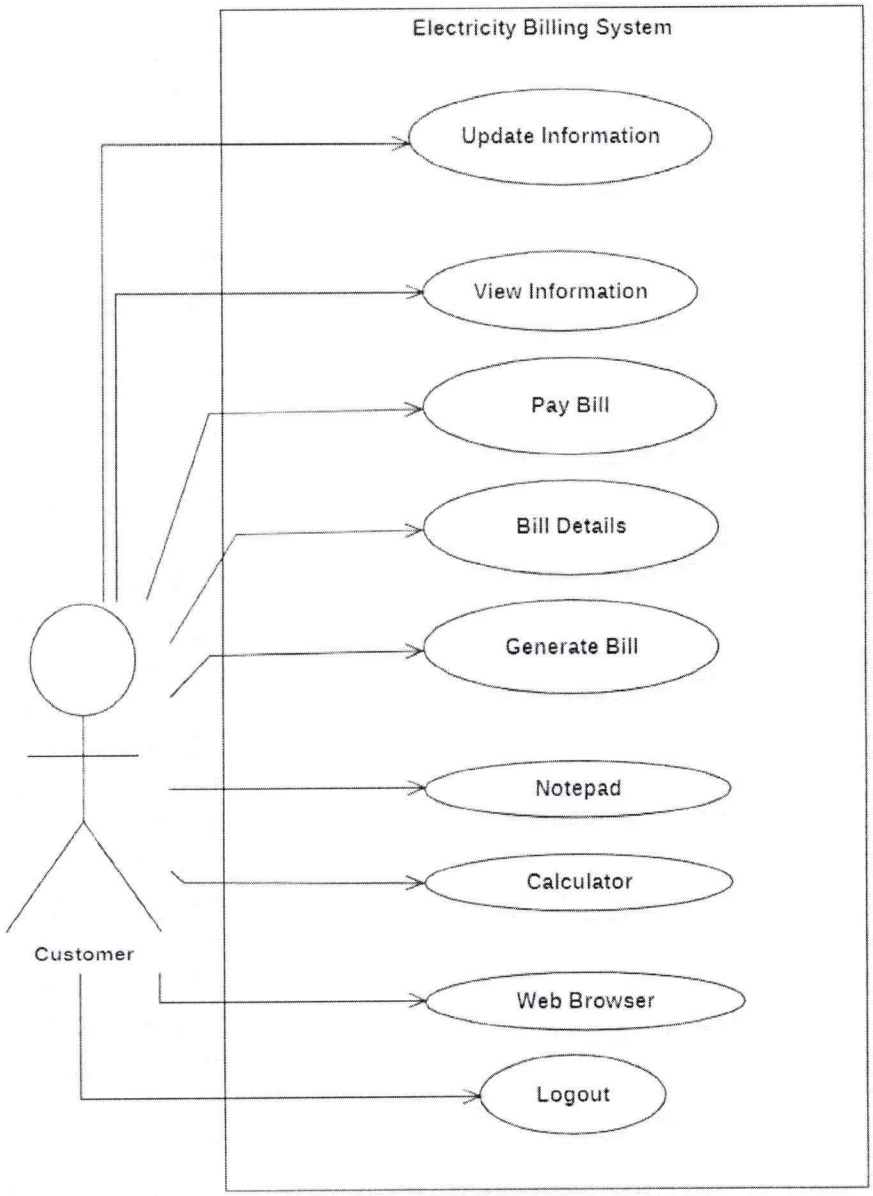


Fig 3.6.5 Use Case Diagram for Customer

CHAPTER 4

SYSTEM DESIGN

4.1 Basic Module

The system comprises of two major modules, which are further divided into sub- modules. They are as follows:

Administrative Login: - In the administrative login, the administrator has the authority of the system. The administrator can add, delete notifications and update the system. The administrator performs the following functions on the system:

- Consumers Registration: The Admin will register the consumer by entering the consumer's basic registration details such as: Name, Contact Address, Residential Address, Consumer type, Password and Email Address.
- View Registered Users: The Administrator can also view all the registered users in the system, make necessary updates and update the bill status of the consumers.

Consumer Login: - Consumers can login into the system and perform the following tasks:

- View Bill: Consumers can view their balance electricity bill amount of each month.
- Consumption Calculation: Consumers can calculate the total amount of units they consume in a month using a consumption calculator.
- Bill Calculation: Consumers can calculate the total number total amount that he/she will pay based on the units consumed, using a bill calculator.

4.2 Data Design

4.2.1 Schema Design

Database schema is described as database connections and constraints. It contains attributes. Every database has state instances represent current set of databases with values. There are different types of keys in a database schema.

A primary key is a table column that can be used to uniquely identify every row of the table. Any column that has this property, these columns are called candidate key. A composite primary key is a primary key consisting of more than one column. A foreign is a column or combination of columns that contains values that are found in the primary key of some table.

All the attributes of each table are interconnected by foreign key which is primary key in another column and composite key. Primary key cannot be null. The fact that many foreign key values repeat simply reflects the fact that its one- to-many relationship. In one-to-many relationship, the primary key has the one value and foreign key has many values

4.2.2 Data Integrity & Constraints

- It reduces manual processing time.
- It helps in making the system easy for handling.
- The maintenance cost is less.
- Future development can be incorporated.
- Helps in maintaining a free database.

Admin Panel : - The admin has the facility to Bill generation, categories, and subcategories. Similarly, if the admin wants to update any customer details then he/she has the provision to update as well as delete the customer details.

User Panel :-In the user panel, the user has to firstly signup. For instance, the user has to fill in some basic information regarding their name, Id proof, Contact details, E-mail id, etc. Therefore, after signing up on the site the user will get the username and password. Similarly, then the user becomes a member of the site.

After signing in the user has the facility to search Electronics items according to their requirement. Similarly, the user can search the product by just clicking on the product's image or on their name. Therefore, the user has the facility of choosing the product by their favourite brand.

4.3 Procedural Design

4.3.1 Logical Diagrams

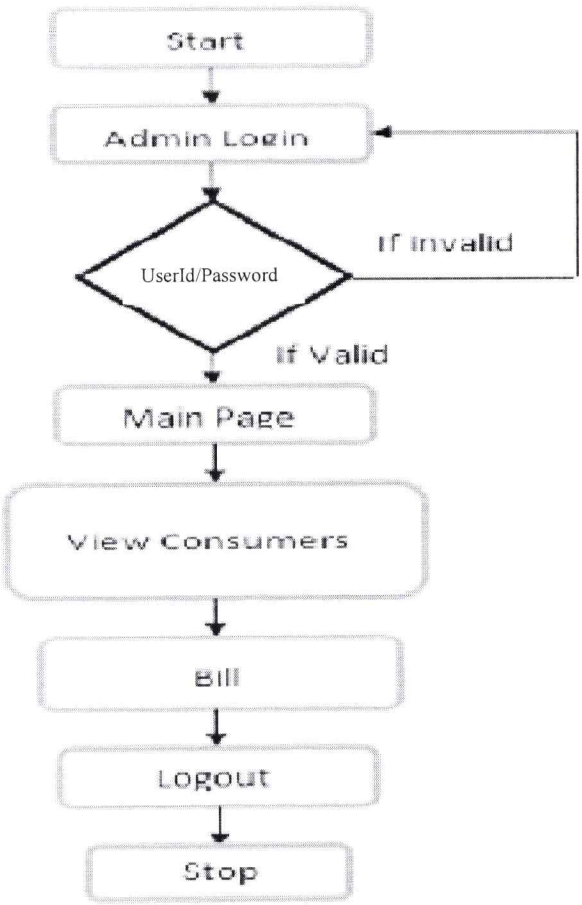


Fig 4.3.1.1 Flow-Chart of the Administrator

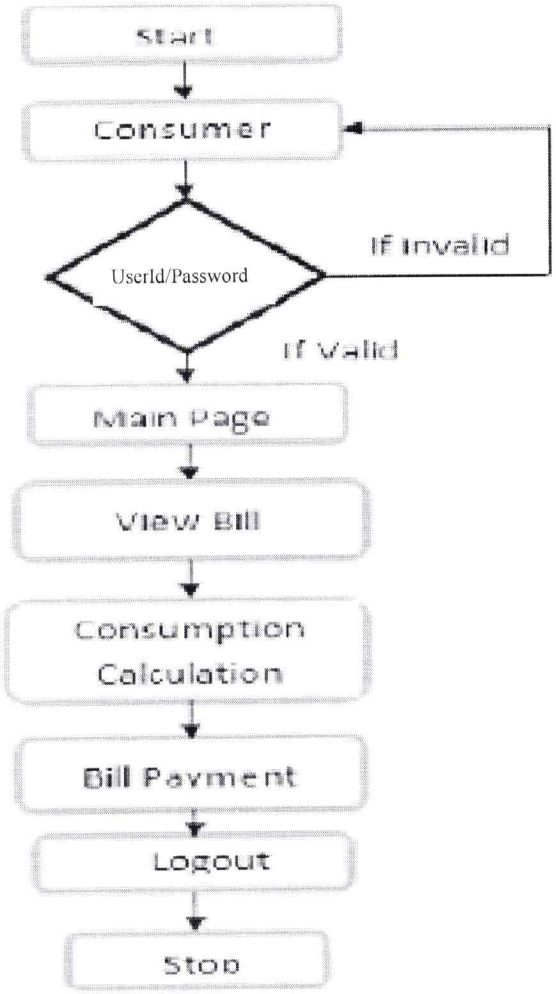


Fig 4.3.1.2Flow-Chart of the Customer

4.3.2 Data Structures

Insert statement:

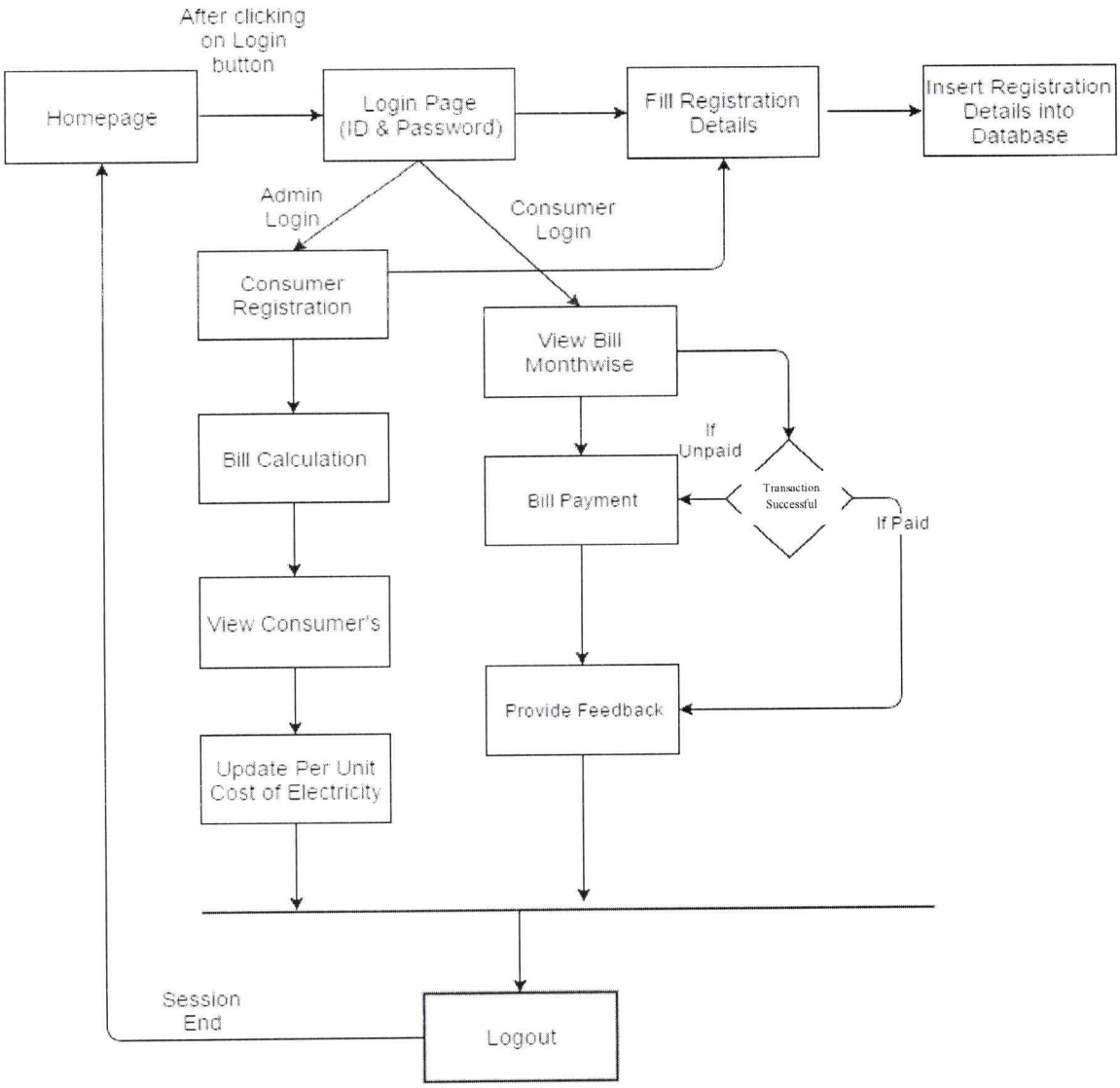
- The INSERT INTO statement is used to insert new records in a table.
- The INSERT INTO syntax would be as follows: INSERT INTO table name VALUES (value1, value2, value3,).

- The following SQL statement insert's a new record in the "customer" table: Insert into customer VALUES ("sai","12345"," btm"," Bangalore", "Karnataka", "aa@gmail.com", "9876543333").

Create statement:

- The CREATE TABLE Statement is used to create tables to store data. Integrity Constraints like primary key, unique key, foreign key can be defined for the columns while creating the table.
- The syntax would be as follows: CREATETABLE table_name (column1datatype, column2datatype, column3 datatype, column datatype, PRIMARY KEY (one or more columns)).
- The following SQL statement creates a table "customer" table: create table customer (name varchar (30), meter_no varchar (20) primary key, address varchar (50), city varchar (20), state varchar (30), email varchar (30), phone varchar (30));
- The following SQL statement creates a table "login" table: create table login (meter no archer (30), username archer (30), password archer (30), user varchar (30), question varchar (40), answer varchar (30));
- The following SQL statement creates a table "tax" table: create table tax (cost_per_unit int (20) primary key, meter_rent int (20),service_charge int (20),service tax int(20),swacch_bharat_cess int (20), gst int (20));
- The following SQL statement creates a table "bill" table: create table bill(meter_no varchar(20),foreign key(meter_no) references customer(meter_no) on delete cascade, month varchar (20), units int (20), total_bill int (20), status varchar (40));
- The following SQL statement creates a table "meter_info" table: create table meter_info (meter_no varchar (30), foreign key(meter_no) references customer(meter_no) on delete cascade, meter_locationvarchar (10), meter_type varchar (15), phase_code int (5), bill_typevarchar (10), days int (5));

4.3.3 Algorithm Design



4.4 User Interface Design

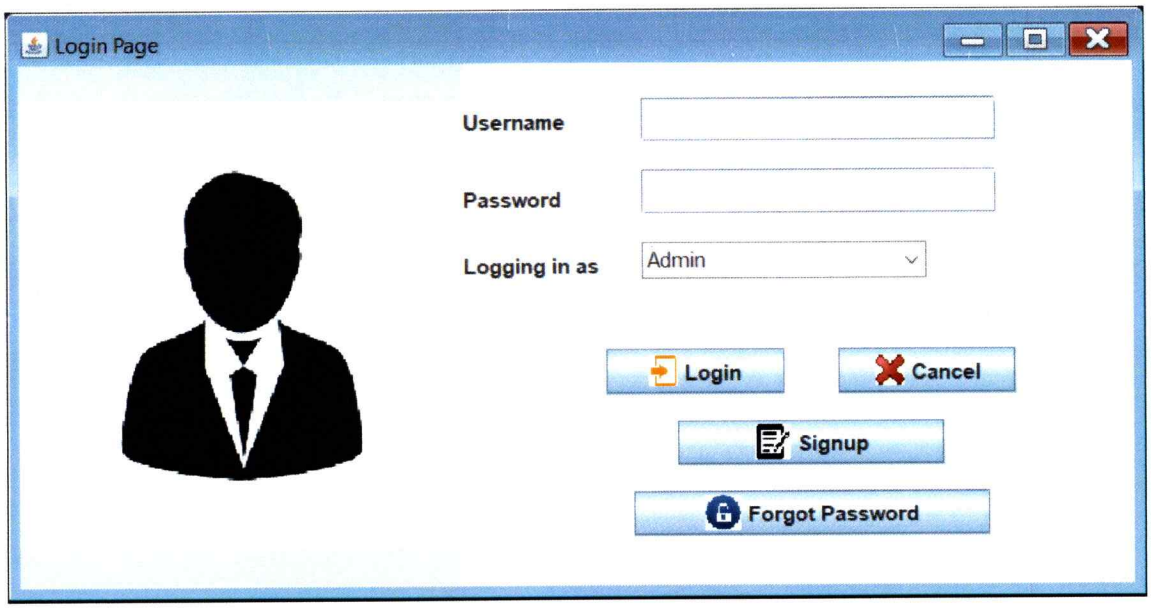


Fig 4.4.1 Login

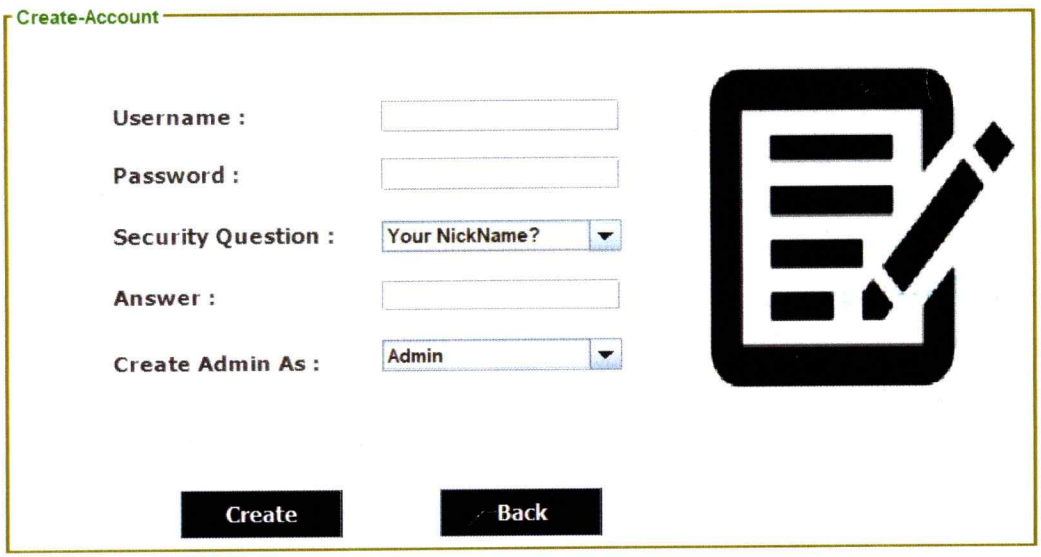


Fig 4.4.2 Sign Up Page

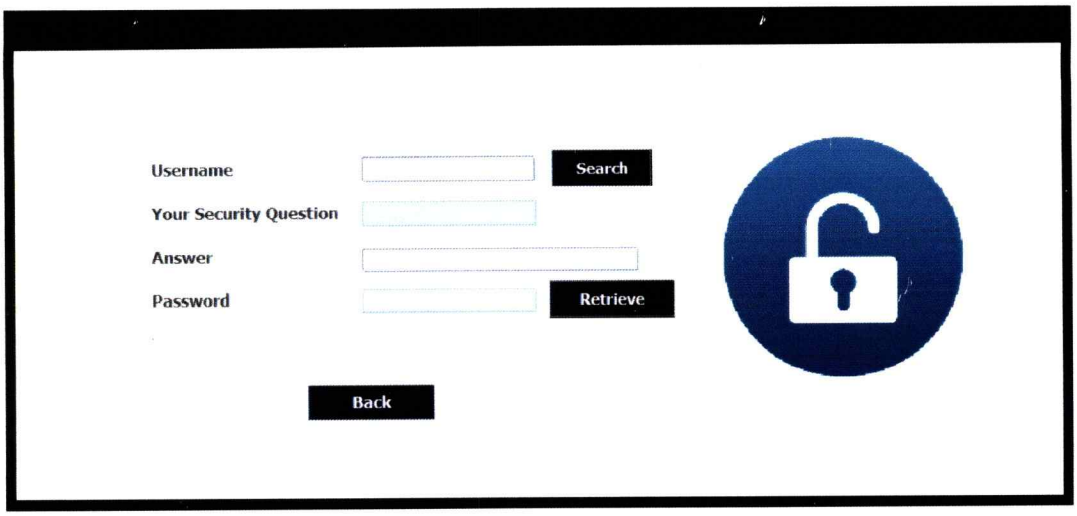
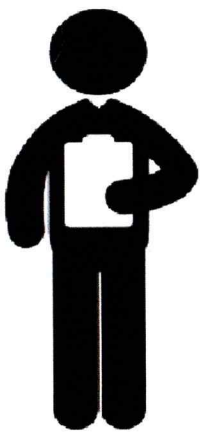


Fig 4.4.3 Forgot Password Page



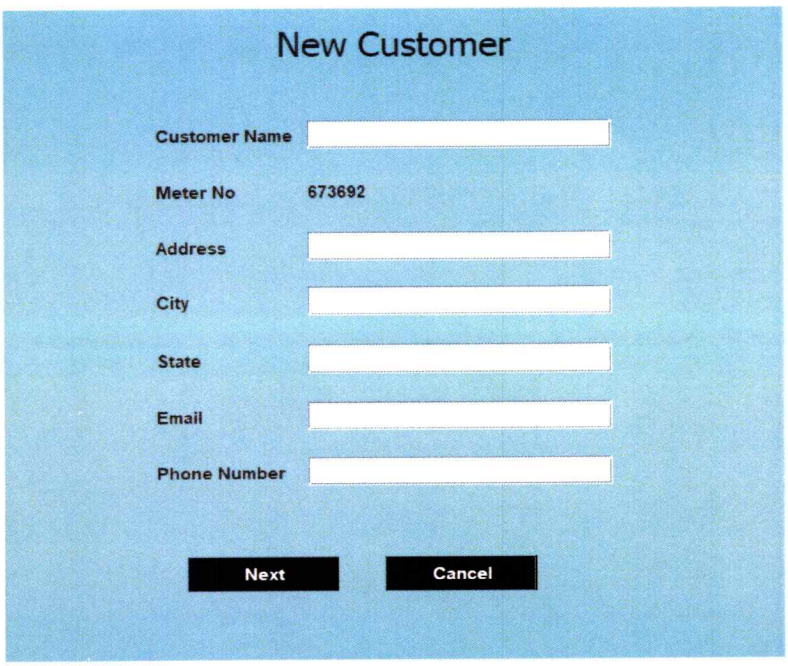


Fig 4.4.4 New Customer Page

4.5 Security Issues

The Security Issues that can arise in this application are :-

- If the customer forgets his/her login credentials he/she can use recovery methods or can contact authorities of he billing department.
- As this system is an online application of billing system the information of the customer must be secured and the data of the user will be secured from other users.
- The customer can provide the false information about the unit consume, the solution for this issue that we have used is the customer will have to take a snap of the meter reading along with the date and upload image to the system.
- The admin also have the access to make valid changes in information provided by the customer, which means if the customer tries to cheat he/she will be caught by the authorities, and strict action will be taken.

4.6 Test Cases Design

Here the entire application is tested. The reference document for this process is the requirement document, and the goal is to see IF the application meets its requirements. Each module and component of ethereal was thoroughly tested to remove bugs through a system testing strategy. Test cases were generated for all possible input sequences and the output was verified for its correctness.

Steps	Action	Expected output
Step1	The screen appears when the users run the program. 1. If admin login. 2.Ifcustomerlogin	A page with different menu's appears. 1.Adminpanelopens and 2.Customerpanelopens
Step 2	The screen appears when the admin logs in ands elects any one of the menus from the click of the mouse.	A window for adding new customer ,inserting tax, calculate bill, view deposit details etc.

Selection1	➢ New Customer ➢ Customer Details ➢ Deposit Details ➢ Calculate Bill ➢ Tax Details ➢ Delete Customer	
Step 2.1	The screen appears when the customer login and selects any one of the menus from the click of the mouse	A window for generating bill, update customer details, view details, generating bill
Selection2	Update Details View Details	
Selection2a	Generate Bill	
Selection2b	Pay Bill Bill Details	

Table 4.6.1 Test cases for Project

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation Approach

Algorithm :

- Start system
- Enter login name and password
- On clicking the log in button
- Connect to database
- Query database to know whether user credentials are correct
- If not , deny access and return login page with an error message
- If correct ,check if credentials for administrator
- If yes , allow login
- Set admin session ,re-direct administrator to admin login page
- If no , allow log in set user session
- Re-direct user to user home page

Implementation of Operations :

- Adding Customer: Here admin can add new customer to the customer list who started using electricity bill system.
- Searching Deposit Details: Here admin can search according to meter number and month to view deposit details.
- Viewing Details: Here admin and user can view customer details and about details.
- Adding Tax: Here admin can add tax details.
- Updating Customer: Here customer can update his/her details by using meter no of the customer.

5.2 Coding Details and Code Efficiency

5.2.1 Coding Details

Login Page Code :

The below code specifies the designing code of the login page. It includes the Title, Label and the image included in the login page.

```
Login() {

    super(title: "Login Page");
    getContentPane().setBackground(new Color(r: 173, g: 216, b: 230));
    setLayout(manager: null);


    //Image
    ImageIcon i4 = new ImageIcon(location: ClassLoader.getSystemResource(name: "images/logo1.jpg"));
    Image i5 = i4.getImage().getScaledInstance(width: 30, height: 30, hints: Image.SCALE_DEFAULT);
    ImageIcon i6 = new ImageIcon(image: i5);
    JLabel image1 = new JLabel(image: i6);
    image1.setBounds(x: 170, y: 22, width: 30, height: 30);
    add(comp: image1);


    //Title
    JLabel ebsheading = new JLabel(text: "Electricity Billing System");
    ebsheading.setBounds(x: 210, y: 17, width: 300, height: 40);
    ebsheading.setFont(new Font(name: "Tahoma", style: Font.PLAIN, size: 24));
    add(comp: ebsheading);


    //Username
    JLabel lblusername = new JLabel(text: "Username");
    lblusername.setBounds(x: 300, y: 120, width: 100, height: 20);
    add(comp: lblusername);

    username = new JTextField();
    username.setBounds(x: 400, y: 120, width: 150, height: 20);
    add(comp: username);


    //Password
    JLabel lblpassword = new JLabel(text: "Password");
    lblpassword.setBounds(x: 300, y: 160, width: 100, height: 20);
    add(comp: lblpassword);

    password = new JPasswordField();
    password.setBounds(x: 400, y: 160, width: 150, height: 20);
    add(comp: password);
```

Signup Page Code :

The below code specifies the designing code of the Signup page. It includes the Title, Label and the account type included in the Signup page.

```
Signup(){

    super(title: "SignUp Page");
    setSize(width: 640, height: 410);
    setLocation(x: 650, y: 350);
    getContentPane().setBackground(new Color(r: 173, g: 216, b: 230));
    setLayout(manager:null);

    //image
    ImageIcon il = new ImageIcon(location:ClassLoader.getSystemResource(name: "images/Light and Hand.jpg"));
    Image i2 = il.getImage().getScaledInstance(width: 200, height: 250, hints: Image.SCALE_DEFAULT);
    ImageIcon i3 = new ImageIcon(image: i2);
    JLabel image2 = new JLabel(image: i3);
    image2.setBounds(x: 50, y: 90, width: 200, height: 250);
    add(comp: image2);


    //Creating New Account
    JLabel ebsheading = new JLabel(text: "CREATING NEW ACCOUNT");
    ebsheading.setBounds(x: 210, y: 10, width: 300, height: 40);
    ebsheading.setFont(new Font(name: "Tahoma", style: Font.PLAIN, size: 18));
    add(comp: ebsheading);


    //Create Account As
    JLabel heading = new JLabel(text: "Create Account As");
    heading.setBounds(x: 290, y: 70, width: 110, height: 20);
    add(comp: heading);

    accountType = new Choice();
    accountType.add(item: "Admin");
    accountType.add(item: "Customer");
    accountType.setBounds(x: 420, y: 70, width: 150, height: 20);
    add(comp: accountType);


    //Meter Number
    JLabel lblmeter = new JLabel(text: "Meter Number");
    lblmeter.setBounds(x: 290, y: 110, width: 140, height: 20);
    lblmeter.setVisible(aFlag: false);
    add(comp: lblmeter);
```

ELECTRICITY BILLING SYSTEM

A Project Report

Submitted in partial fulfillment of the

Requirements for the award of the Degree of

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

By

Devendrasingh S Kanyal

Seat. No: 4020812

&

Parth N Patil

Seat. No: 4020870

Under the esteemed guidance of

Miss. CYNTHIA SHINDE

Assistant Professor

DEPARTMENT OF INFORMATION TECHNOLOGY

SONOPANT DANDEKAR ARTS, V.S. APTE COMMERCE & M.H.MEHTA SCIENCE COLLEGE

(Affiliated to University of Mumbai)

PALGHAR, 401404

MAHARASHTRA

2022-2023

PROFORMA FOR THE APPROVAL PROJECT PROPOSAL

PNR No.: ..... Roll no: 69021

1. Name of the Student

   Yeverdra singh . Sanjay Kayal

2. Title of the Project

   Electricity Billing System

3. Name of the Guide

   Mrs Sayli Bhosale

4. Teaching experience of the Guide 8 years

5. Is this your first submission? Yes ☑ No ☐

Signature of the Student

Date: 05/08/2022...

Signature of the Guide

Date: 05/08/2022

Signature of the coordinator

Date: 11/08/2022

PROFORMA FOR THE APPROVAL PROJECT PROPOSAL

PNR No.: ..... Roll no: 69022

1. Name of the Student

   Parth Narendra Patil

2. Title of the Project

   Electricity Billing System

3. Name of the Guide

   Mrs. Sayli Bhosale

4. Teaching experience of the Guide 8 years

5. Is this your first submission? Yes ☑ No ☐

Patil

Signature of the Student

Date: 05/08/2022

Patil

Signature of the Guide

Date: 05/08/2022

Signature of the coordinator

Date: 11/08/2022

SONOPANT DANDEKAR SHIKSHAN MANDALI'S SONOPANT DANDEKAR ARTS, V.S. APTE COMMERCE & M.H. MEHTA SCIENCE COLLEGE

(Affiliated to University of Mumbai)

PALGHAR MAHARASHTRA 401404

DEPARTMENT OF INFORMATION TECHNOLOGY

CERTIFICATE

This is to certify that the project entitled, "**ELECTRICITY BILLING SYSTEM**", is bonafied work of **DEVENDRASINGH S KANYAL** bearing Seat No: **4020812** submitted in partial fulfillment of the requirements for the award of degree of BACHELOR OF SCIENCE in INFORMATION TECHNOLOGY from University of Mumbai.

Shinde 06/04/2023

Internal Guide

Bagal 06/04/2023

Coordinator

24.4.23

External Examiner

College Seal

Date: 06/04/2023

DECLARATION

I hereby declare that the project entitled, **Electricity Billing System** done at **SDSM College,** has not been in any case duplicated to submit to any other university for the award of any degree. To the best of my knowledge other than me, no one has submitted to any other university.

The project is done in partial fulfillment of the requirements for the award of degree of **BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)** to be submitted as final semester project as part of our curriculum.

Devendrasingh S Kanyal

ABSTRACT

Electricity consumers are often faced with the problem of inaccuracy and delay in monthly billing due to some drawbacks. Thus, it is essential to have an efficient system for such purposes via electronic platform with consideration to proximity. The proposed system automates the conventional process of paying electricity bill by visiting the Electricity Board which is tiresome and time consuming. It is also designed to automate the electricity bill calculation and payment for user convenience. The system is developed with Java swings as the base programming language which can be used to develop websites, web applications and web services.

The Microsoft Structured Query Language (SQL) server is also used for creating back-end database. The system would be having two logins: the administrative and user login. The administrator can view the user's account details and can add the customer's information of consuming units of energy of the current month in their account. The Admin must feed the system with the electricity usage data into respective user's account. The system then calculates the electricity bill for every user and updates the information into their account every month. Users can then view their electricity bill and pay before the month end.

ACKNOWLEDGEMENT

The successful completion of any task would be incomplete without mentioning all those people who made it possible, the constant and encouragement, crowns the effort with success.

I wish many thanks to our Head of Department **Dr. ASHWIN BHAGAT** for providing guidance throughout the course and all those who have indirectly guided and helped us in preparation of this project.

I express my thanks to my project guide **Mrs. SAYLI BHOSALE & Miss. CYNTHIA SHINDE** for the constant motivation and valuable help through the project work.

I am indebted to my well-wishers and friends who encourage me in successful completion of the project.

SONOPANT DANDEKAR SHIKSHAN MANDALI'S SONOPANT DANDEKAR ARTS, V.S. APTE COMMERCE & M.H. MEHTA SCIENCE COLLEGE

(Affiliated to University of Mumbai)

PALGHAR MAHARASHTRA 401404

DEPARTMENT OF INFORMATION TECHNOLOGY

CERTIFICATE

This is to certify that the project entitled, "**ELECTRICITY BILLING SYSTEM**", is bonafied work of **PARTH N PATIL** bearing Seat. No: **4020870** submitted in partial fulfillment of the requirements for the award of degree of BACHELOR OF SCIENCE in INFORMATION TECHNOLOGY from University of Mumbai.

Shinde 06/04/2023

Internal Guide

Ragad 06/04/2023

Coordinator

24.4.23

External Examiner

S. D. S. M. COLLEGE Dept. of IT PALGHAR, DIST. PALGHAR

College Seal

Date: 06/04/2023

DECLARATION

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Parth N Patil

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1
INTRODUCTION

1.1 Background

The conventional system of electricity billing is not so effective; one staff must visit each customer's house to note the meter readings and collect the data. Then, another staff must compute the consumed units and calculate the money to be paid. Again, the bills prepared are to be delivered to customers. Finally, individual customer must go to electricity office to pay their dues.

Hence, the conventional electricity billing system is uneconomical, requires many staffs to do simple jobs and is a lengthy process overall. In order to solve this lengthy process of billing, a web based computerized system is essential. This proposed electricity billing system project overcomes all these drawbacks with the features. It is beneficial to both consumers and the company which provides electricity.

With the new system, there is reduction in the number of staffs to be employed by the company. The working speed and performance of the software is faster with high performance which saves time. Furthermore, there is very little chance of miscalculation and being corrupted by the staffs.

The software provides facility of data sharing; it does not require any staff as in the conventional system. Once it is installed on the system only the meter readings are to be given by the admin where customer can view all details, it has the provision of security restriction.

The electricity billing software calculates the units consumed by the customer and makes bills; it requires small storage for installation and functioning. There is provision for debugging if any problem is encountered in the system.

The system excludes the need of maintaining paper electricity bill, administrator does not have to keep a manual track of the users, and users can pay the amount without visiting the office. Thus, it saves human efforts and resources.

The main aim of our project is to satisfy customer by saving their time by payment process, maintaining records, and allowing the customer to view his/her records and permitting them to update their details.

1.2 Objectives

The system excludes the need of maintaining paper electricity bill, administrator does not have to keep a manual track of the users, and users can pay the amount without visiting the office. Thus, it saves human efforts and resources.

- To keep the information of Customer calculates the units consumed every month:-
  Helps to maintain information of customer such as login and password details, customer name, id, meter number, successful payments, late payment dues, etc. and other important details.

- To calculate the units consumed every month regularly and generate the bills adding penalty and rent:-
  Helps to calculate the number of units consumed by the customer and generate bill accordingly by adding all rents, taxes and dues etc.

- To save the time by implementing payment process online:-
  Online payment helps in cashless transactions and avoids visiting electricity payment office, also help to save our recourses such as energy, time, and fuels. Able to pay bills through any corner having internet on your fingertips.

1.3 Purpose Scope and Applicability

1.3.1 Purpose

- This project system excludes the need of maintaining paper electricity bill as all the electricity bill records are managed electronically.
- Administrator doesn't have to keep a manual track of the users. The system automatically calculates fine.
- Users don't have to visit to the office for bill payment.
- There is no need of delivery boy for delivery bills to user's place.
- Thus, it saves human efforts and resources.

1.3.2 Scope

- **Extensibility**: This software is extendable in ways that its original developers may not expect. The following principles enhances extensibility like hide data structure, avoid traversing multiple Links or methods avoid case statements on object type and distinguish public and private operations.

- **Reusability**: Reusability is possible as and when require in this application. We can update it next version. Reusable software reduces design, coding and testing cost by amortizing effort over several designs. Reducing the amount of code also simplifies understanding, which increases the likelihood that the code is correct. We follow up both types of reusability. Sharing of newly written code within a project and reuse of previously written code on new projects.

- **Understand ability:** A method is understandable if someone other than the creator of the method can understand the code (as well as the creator after a time lapse). We use the method, which small and coherent helps to accomplish this.

- **Cost-effectiveness:** Its cost is under the budget and make within given time period. It is desirable to aim for a system with a minimum cost subject to the condition that it must satisfy the entire requirement .Scope of this document is to put down the requirements, clearly identifying the information needed by the user, the source of the information and outputs expected from the system.

1.3.3 Applicability

This system can be applicable in the areas where electricity is supplied by the government and have meters installed. The customer must have a little technical knowledge for handling smart application, through which he/she can able to use this system to pay online electricity bills.

1.4 Achievements

This system saves the various resources and energy. It helps to make payment easier and faster. It helps to make less and less usage of papers and allow us to GO PAPERLESS.

With the new system, there is reduction in the number of staffs to be employed by the company. The working speed and performance of the software is faster with high performance which saves time. Furthermore, there is very little chance of miscalculation and being corrupted by the staffs.

1.5 Organization of Report

The main aim of our project is to satisfy customer by saving their time by payment process, maintaining records, and allowing the customer to view his/her records and permitting them to update their details .The firm handles all the work manually, which is very tedious and mismatched.

CHAPTER 2

SURVEY OF TECHNOLOGIES

Zamia Benazir, DivaPrabha.P,2018 [1],Science and technology with all its fascinating advancements has been taking human life standards to the next level. The whole world will be literally jammed without these innovations. This project is an innovation, which makes the way of paying electricity bill simple compared to other existing projects. This project has been implemented using Java Swing as front end and MySQL as back end. The purpose of the project is to build an application program to reduce the manual work for managing the number of units consumed by the customers and generating the electricity bill according to the type of customer – individual or commercial. It displays the details of the customers, units consumed by them and bill history. It enables them pay their bill if not paid. The date of payment will be updated while paying the bill. It maintains error free database and easily incorporates the future developments and changes.

A. Andrew, P.U. Okorie, Nov 2019[2],Electricity consumers are often faced with the problem of inaccuracy and delay in monthly billing due to the drawback in reading pattern and human errors. Thus, it is essential to have an efficient system for such purposes via electronic platform with consideration to proximity. The proposed system automates the conventional process of paying electricity bill by visiting the Electricity Board which is tiresome and time consuming. It is also designed to automate the electricity bill calculation and payment for user convenience. The system is developed with Microsoft Visual Studio using C# as the base programming language which can be used to develop websites, web applications and web services. The Microsoft Structured Query Language (SQL) server is also used for creating back-end database. The system would be having two logins: the administrative and user login. The administrator can view the user's account details and can add or update the customer's information of consuming units of energy of the current month in their account. The Admin has to feed the system with the electricity usage data into respective users account. The system then calculates the electricity bill for every user and updates the information into their account every month. Users can then view their electricity bill and pay before the month end.

M.R.M.S.B. Rathnayaka , I.D.S.Jayasinghe , EnitJayanth , S.I Swarnajith , April 2013[3],Billing is a critical function of both the Electricity and the Water Boards towards getting a meter read. Meter reading, even though it looks simple, is far from simple and involves processes that can give various problems. Most problems, currently seen, result from the manual processes followed. Calculation errors, delays in system updating and fault tracking issues are the major problems that companies find difficult to find answers for. This paper suggests a mobile based system to collect process and notify consumers about consumption. This system will be reliable, efficient and accurate to suit the requirements of these companies. The proposed solution uses evolving Mobile Technologies, over a solution which uses Mobile applications to handle a company's day today work. The burden on the Meter Reader is lessened and other new features have also been introduced. Customer interaction with the company is improved and customers can easily view their current electricity usage using their mobile phones. However, the feasibility of such a project for a third world country like Sri Lanka is a concern with regard to the cost factor involved. The project demands substantial investments. Will the country be able to meet the costs involved? Yet, most of the problems related to Electricity Billing are addressed through this system and this might prove to be the best solution for specific companies to optimize services on a low budge.

Ashutosh Kumar, Dharmendra Pratap Singh, Sagar Shubham, June 2021 [4],Science and innovation with all its interesting progressions has been taking human existence norms to a higher level. The entire world will be in a real sense stuck without these developments. This project is a development project, which makes the method of covering electricity bill basic contrasted with other existing tasks. This undertaking has been done using Java Swing as front end and MySQL as back end. The motivation behind the task is to construct an application program to lessen the manual work for dealing with the measure of units devoured by the clients and producing the power charge as per the type of customer – individual or business. It shows the details about customer, units devoured by them and bill history. It empowers them cover their bill if not paid. The date of payment will be refreshed while covering the bill. It keeps up the error free database and effectively joins the future turns of events and changes. Keywords: Bill Payment History, Bill Payment, Electricity bill, Java Swing, MySQL, Type of customer.

ShubhanshuYadav, March 2022[5],Science and technology with all its thrilling advances have brought the standards of daily life of person to the fore. The entire human beings definitely collapse beyond new things. This research is a novelty, which provides the method of collecting bill for power easier differentiate to else the previous research. This project work had apply using Java Swing as before and MySQL as the latter.

The aim of the project work is to create an app system to minimize physical labor to manage the number of units used by consumers & to generate a bill depending on the type of consumers -independent or business. Show the customer information, depleted units and credit record. It permit the customers to pay off its debt if they are not pay. The when customer pay the due amount then after time will be updated. This maintains the right information and it make it simple to access previous data for further changes later. Highlights: Bill record, Bill Paid, Electronic Bill payment, Java Swing, MySQL.

CHAPTER 3

REQUIREMENTS AND ANALYSIS

3.1 Problem Definition

The manual system is suffering from a series of drawbacks. Since whole of the bills is to be maintained with hands the process of keeping and maintaining the information is very tedious and lengthy to customer. It is very time consuming and laborious process because, staff need to be visited the customers place every month to give the bills and to receive the payments. For this reason, we have provided features Present system is partially automated (computerized); existing system is quite laborious as one must enter same information at different places.

3.2 Requirements Specification

The functional requirement of the electricity bill management system is that it does what it is meant for. A functional requirement describes what a software system should do, while non-functional requirements place constraints on how the system will do so. Functional requirements specify a function that a system or system component must be able to perform.

Few of its functional requirements are as given below: –

User data should be fed into the system: -this system is doing that properly in the user entity. After fetching the data of the customer, the bill can be made and sent to the customer.

Admin can add the users: -Admin can verify and add the user, which is they are doing with this system. He can also delete the users if required.

Non-functional necessities – are often divided into 2 main categories:

- Execution qualities, like security and usefulness, that square measure evident at the run time.

- Evolution qualities, like liabilities, maintainability, flexibility, and quantifiable, that square measure embodied within the static structure of the code.

Non-functional necessities place restrictions on the merchandise being developed, the event method, and specify external constraints that the merchandise should meet. Our project qualifies all the criteria of functional and non-functional accordingly and the system is up to mark performance wise.

Here we need to take care of few more things before heading towards the system. The most important feature of the electricity bill management system application world is the application's ease of usage .application will easy to use if made while keeping in mind that the user need not think twice about searching any feature.

Everything should be made distinctive by using the colour combination such that everything needed most frequently highlighted with focus colours. Using simple layouts like the card and grid layout etc. By varying colour and other UI combinations, many good intuitive interfaces can be made. Which ultimately makes the interface easy to use for a long time?

Keep things simple and consistent:–Simple and Harmonic way making UI is very intuitive and needs to follow.

Make good use of typography: –The typography is taken care very strictly as the need of the system.

Use colour and contrast properly:–Colour combo of lite and dark is good way emphasise and done well in this system.

Consider feedback messages:–The feedback form is a very good way taking feedback of forms and improving the system.

Simplified forms:–The form is made simple to fill with the clean user interface.

3.3 Planning and Scheduling

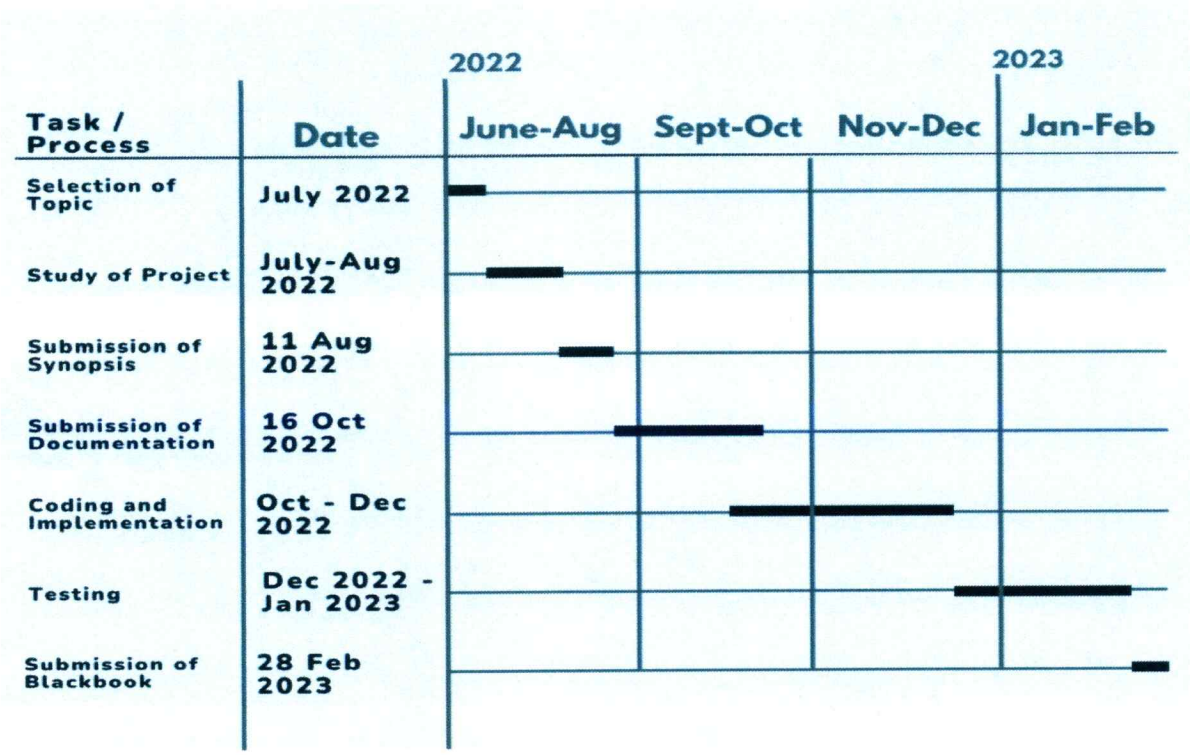


Fig 3.3.1 Gantt Chat

3.4 Software and Hardware Requirements

3.4.1 Hardware Requirements:

- Hardware Specification:-Processor Intel Pentium V or higher
- Clock Speed:-1.7GHzormore
- System Bus:-64bits
- RAM:-16GB
- HDD:-2TB
- Monitor:-LCD Monitor
- Keyboard:-Standard keyboard
- Mouse:-Compatible mouse

3.4.2 Software Requirements:

- Operating System:-Windows10
- Software:-Microsoft SQL Server
- Frontend:- Java core/swings (NetBeans)
- Backend: -My SQL

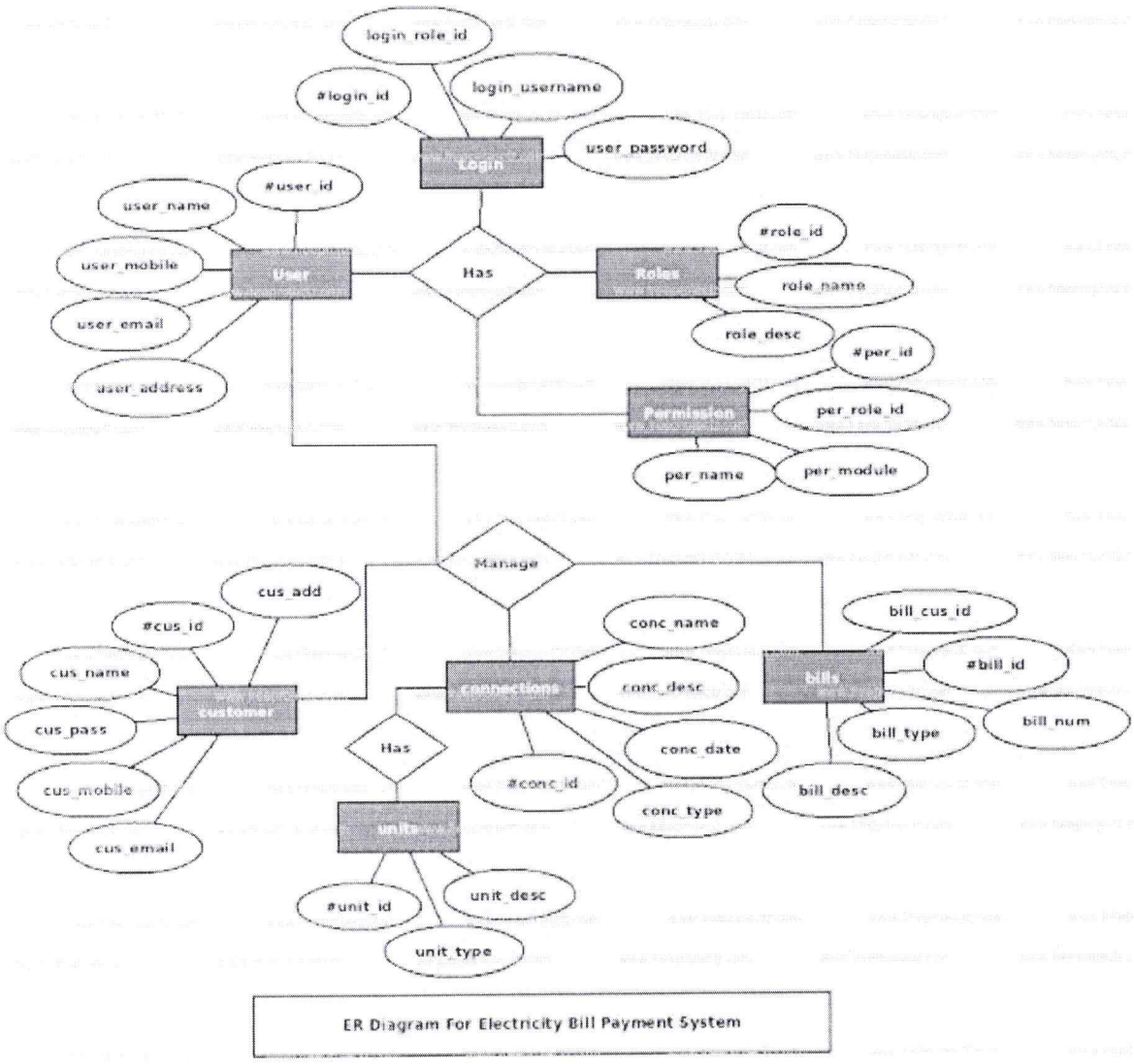
3.5 Preliminary Product Description

System design is an abstract representation of a system component and their relationship and which describe the aggregated functionally and performance of the system. It is also the plan or blueprint for how to obtain answer to the question being asked. The design specifies various type of approach.

Database design is one of the most important factors to keep in mind if you are concerned with application performance management. By designing your database to be efficient in each call it makes and to effectively create rows of data in the database, you can reduce the amount of CPU needed by the server to complete your request, thereby ensuring a faster application.

3.6 Conceptual Model

ER Diagram:-



ER Diagram For Electricity Bill Payment System

Fig 3.6.1 ER Diagram

Class Diagram :-

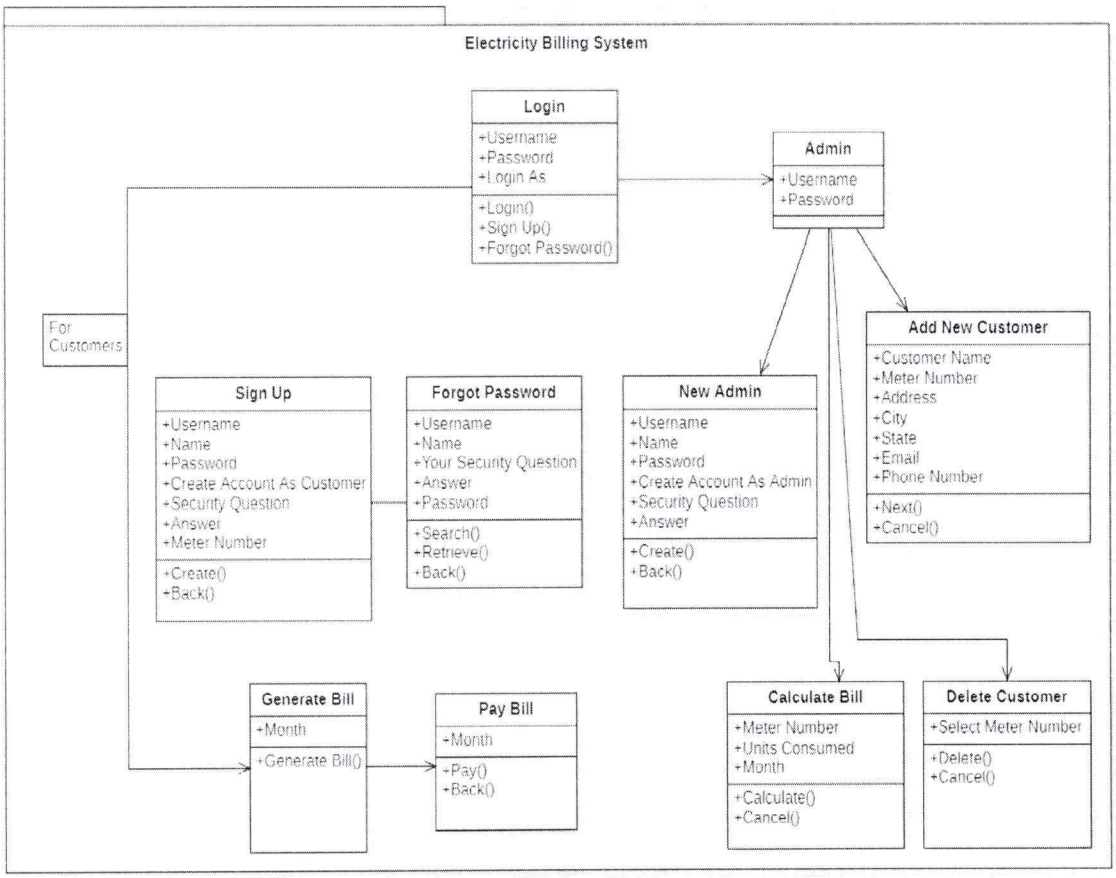


Fig 3.6.2 Class Diagram

Activity Diagram:-

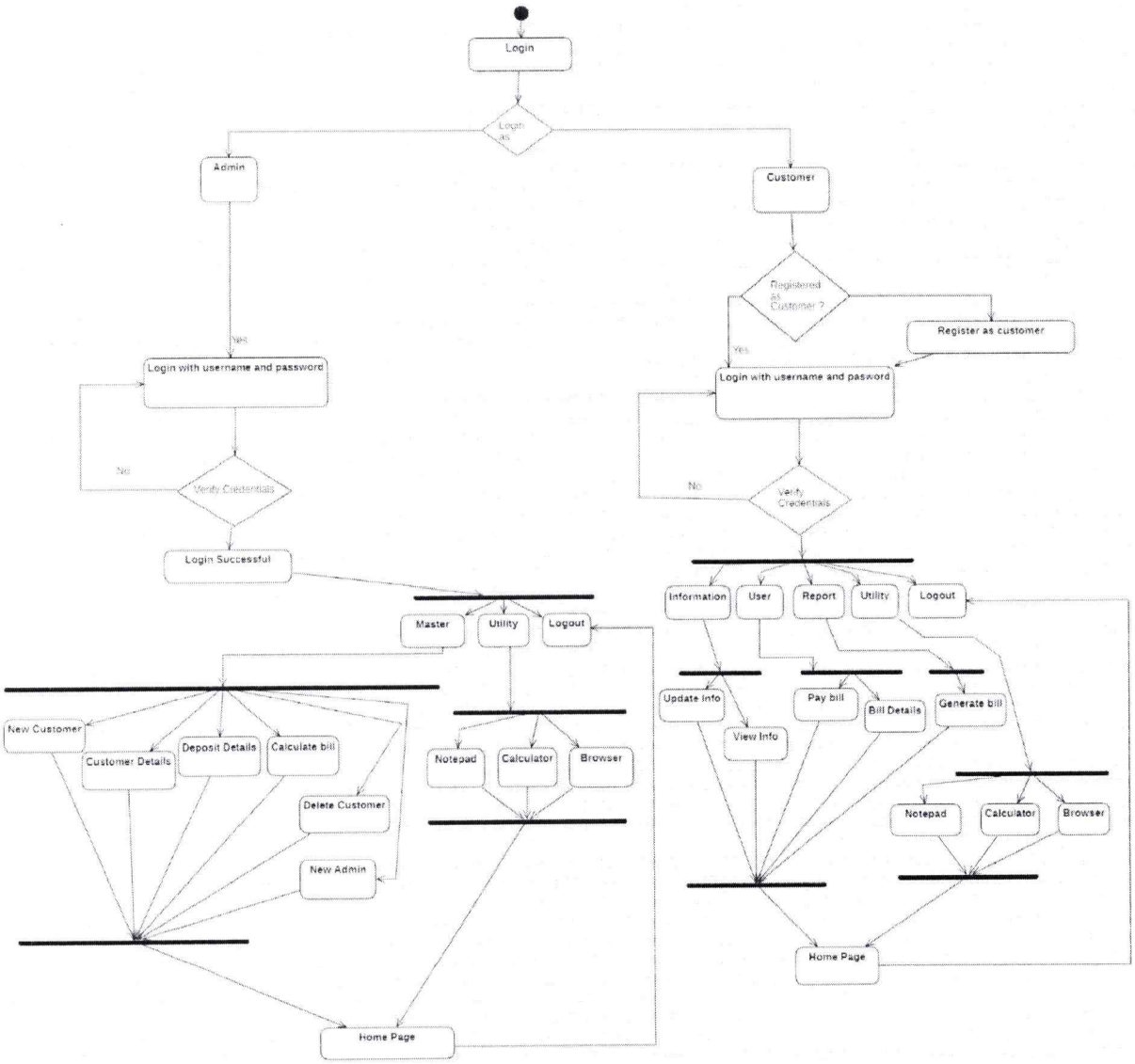


Fig 3.6.3Activity Diagram

Use Case Diagram:-

i)

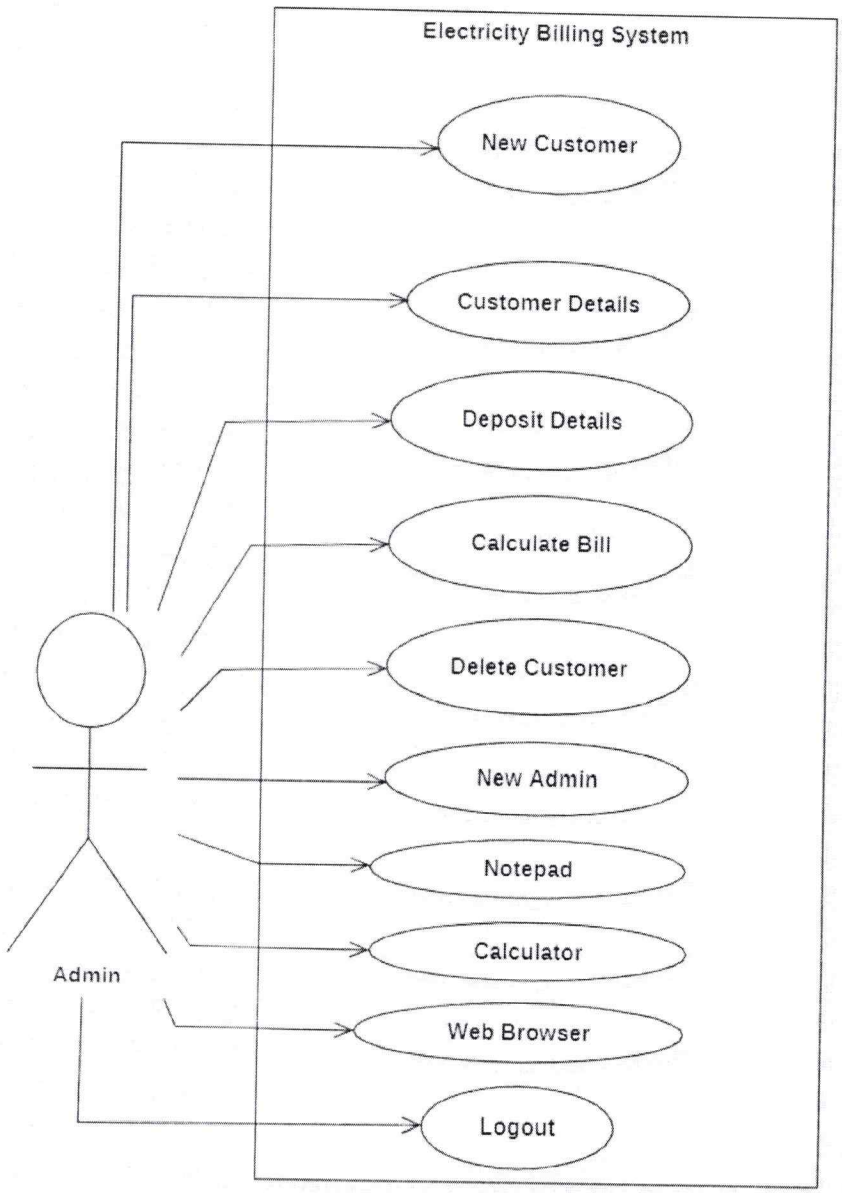


Fig 3.6.4Use Case Diagram for Admin

ii)

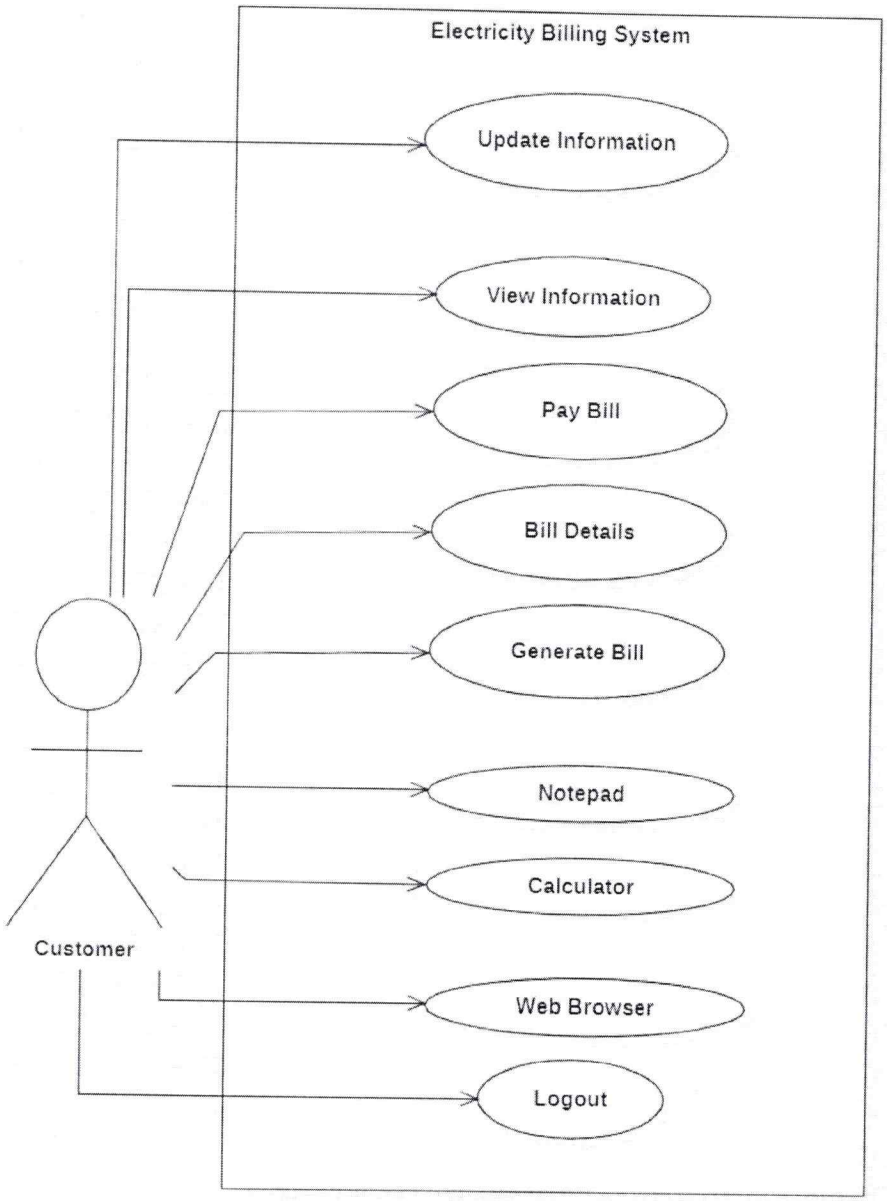


Fig 3.6.5 Use Case Diagram for Customer

CHAPTER 4

SYSTEM DESIGN

4.1 Basic Module

The system comprises of two major modules, which are further divided into sub- modules. They are as follows:

Administrative Login: - In the administrative login, the administrator has the authority of the system. The administrator can add, delete notifications and update the system. The administrator performs the following functions on the system:

- Consumers Registration: The Admin will register the consumer by entering the consumer's basic registration details such as: Name, Contact Address, Residential Address, Consumer type, Password and Email Address.
- View Registered Users: The Administrator can also view all the registered users in the system, make necessary updates and update the bill status of the consumers.

Consumer Login: - Consumers can login into the system and perform the following tasks:

- View Bill: Consumers can view their balance electricity bill amount of each month.
- Consumption Calculation: Consumers can calculate the total amount of units they consume in a month using a consumption calculator.
- Bill Calculation: Consumers can calculate the total number total amount that he/she will pay based on the units consumed, using a bill calculator.

4.2 Data Design

4.2.1 Schema Design

Database schema is described as database connections and constraints. It contains attributes. Every database has state instances represent current set of databases with values. There are different types of keys in a database schema.

A primary key is a table column that can be used to uniquely identify every row of the table. Any column that has this property, these columns are called candidate key. A composite primary key is a primary key consisting of more than one column. A foreign is a column or combination of columns that contains values that are found in the primary key of some table.

All the attributes of each table are interconnected by foreign key which is primary key in another column and composite key. Primary key cannot be null. The fact that many foreign key values repeat simply reflects the fact that its one- to-many relationship. In one-to-many relationship, the primary key has the one value and foreign key has many values

4.2.2 Data Integrity & Constraints

- It reduces manual processing time.
- It helps in making the system easy for handling.
- The maintenance cost is less.
- Future development can be incorporated.
- Helps in maintaining a free database.

Admin Panel : - The admin has the facility to Bill generation, categories, and subcategories. Similarly, if the admin wants to update any customer details then he/she has the provision to update as well as delete the customer details.

User Panel :-In the user panel, the user has to firstly signup. For instance, the user has to fill in some basic information regarding their name, Id proof, Contact details, E-mail id, etc. Therefore, after signing up on the site the user will get the username and password. Similarly, then the user becomes a member of the site.

After signing in the user has the facility to search Electronics items according to their requirement. Similarly, the user can search the product by just clicking on the product's image or on their name. Therefore, the user has the facility of choosing the product by their favourite brand.

4.3 Procedural Design

4.3.1 Logical Diagrams

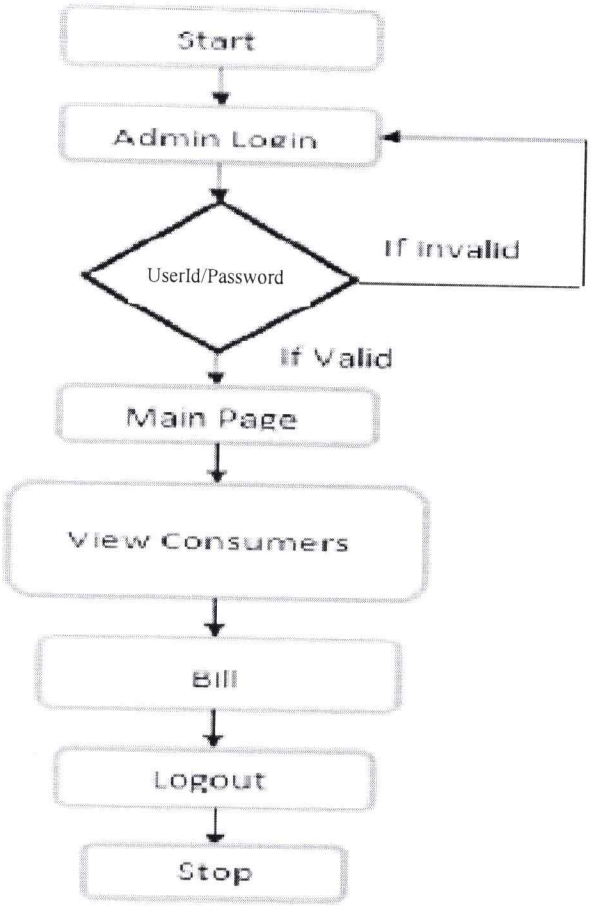


Fig 4.3.1.1 Flow-Chart of the Administrator

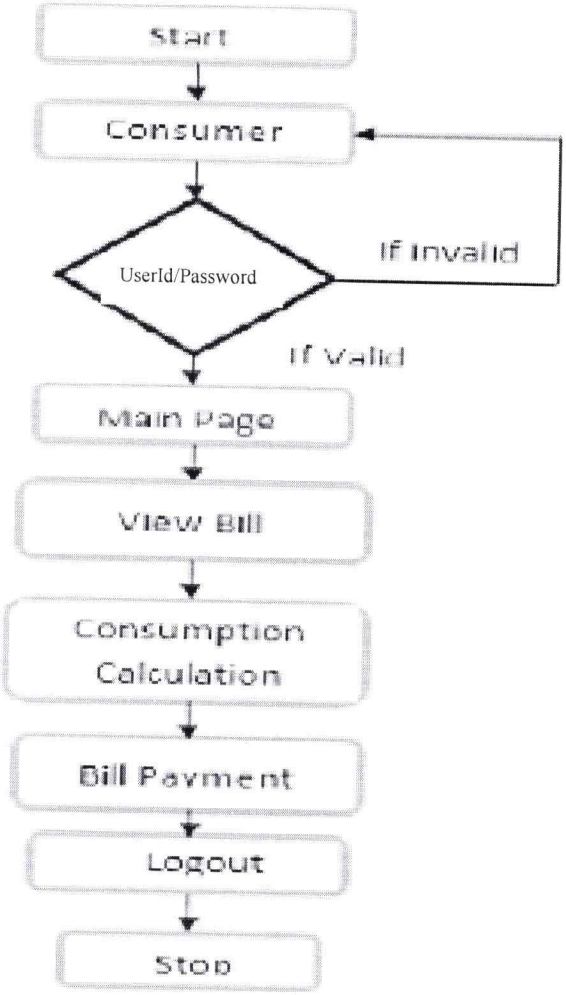


Fig 4.3.1.2Flow-Chart of the Customer

4.3.2 Data Structures

Insert statement:

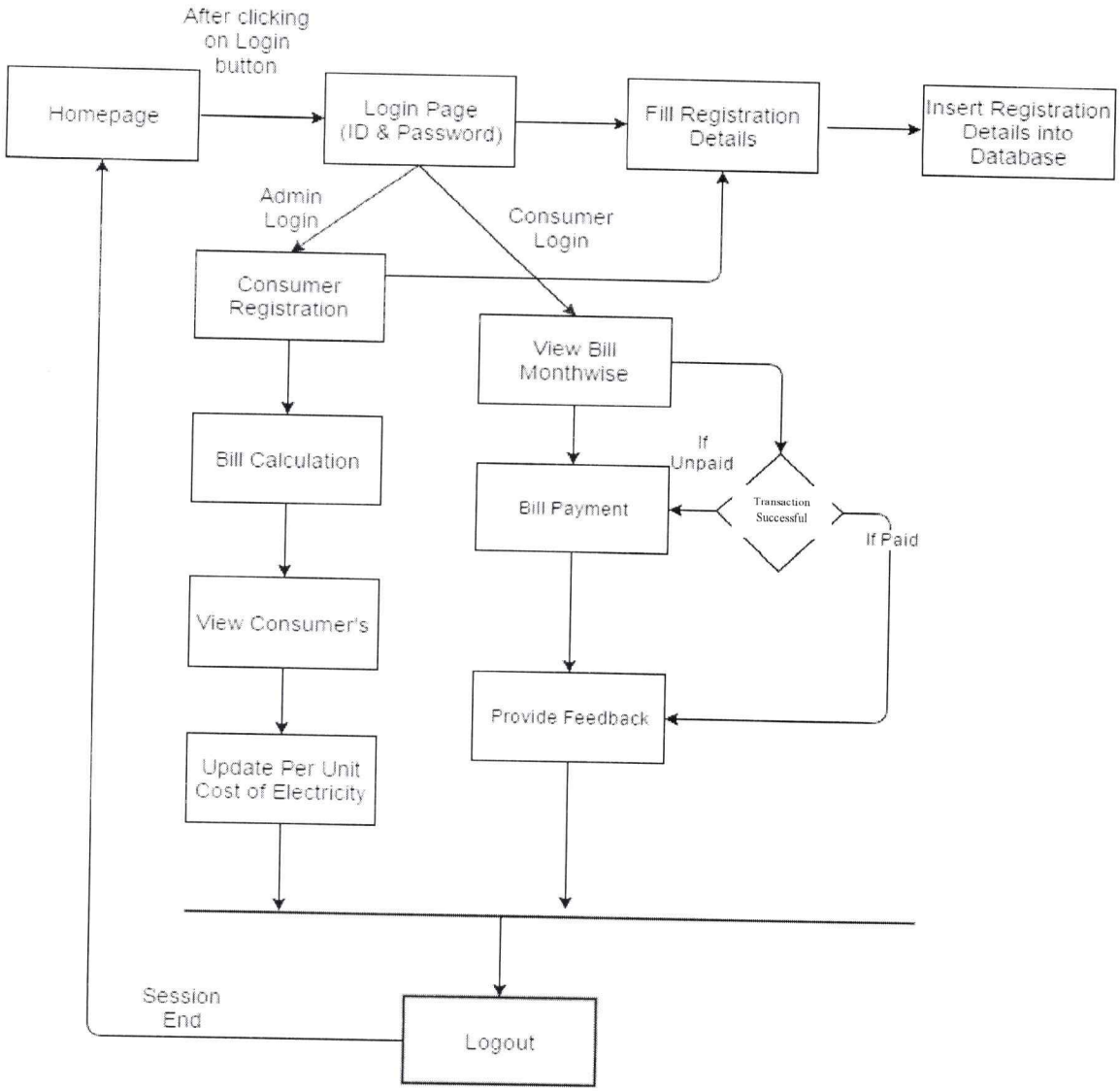
- The INSERT INTO statement is used to insert new records in a table.
- The INSERT INTO syntax would be as follows: INSERT INTO table name VALUES (value1, value2, value3,).

- The following SQL statement insert's a new record in the "customer" table: Insert into customer VALUES ("sai","12345"," btm"," Bangalore", "Karnataka", "aa@gmail.com", "9876543333").

Create statement:

- The CREATE TABLE Statement is used to create tables to store data. Integrity Constraints like primary key, unique key, foreign key can be defined for the columns while creating the table.
- The syntax would be as follows: CREATETABLE table_name (column1datatype, column2datatype, column3 datatype, column datatype, PRIMARY KEY (one or more columns)).
- The following SQL statement creates a table "customer" table: create table customer (name varchar (30), meter_no varchar (20) primary key, address varchar (50), city varchar (20), state varchar (30), email varchar (30), phone varchar (30));
- The following SQL statement creates a table "login" table: create table login (meter no archer (30), username archer (30), password archer (30), user varchar (30), question varchar (40), answer varchar (30));
- The following SQL statement creates a table "tax" table: create table tax (cost_per_unit int (20) primary key, meter_rent int (20),service_charge int (20),service tax int(20),swacch_bharat_cess int (20), gst int (20));
- The following SQL statement creates a table "bill" table: create table bill(meter_no varchar(20),foreign key(meter_no) references customer(meter_no) on delete cascade, month varchar (20), units int (20), total_bill int (20), status varchar (40));
- The following SQL statement creates a table "meter_info" table: create table meter_info (meter_no varchar (30), foreign key(meter_no) references customer(meter_no) on delete cascade, meter_locationvarchar (10), meter_type varchar (15), phase_code int (5), bill_typevarchar (10), days int (5));

4.3.3 Algorithm Design



4.4 User Interface Design

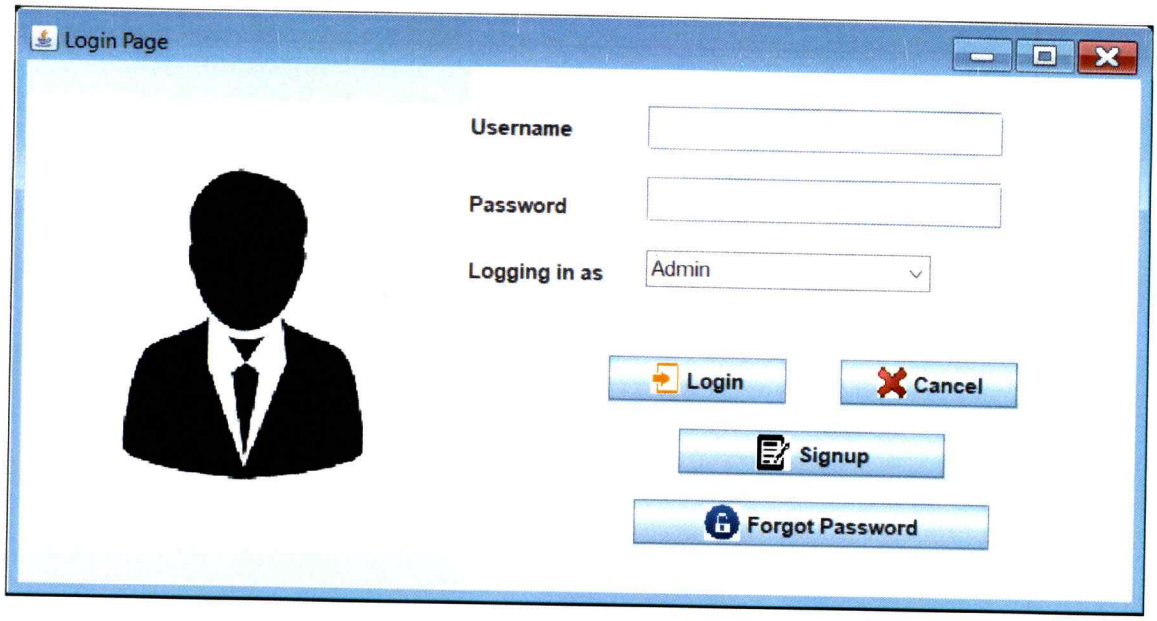


Fig 4.4.1 Login

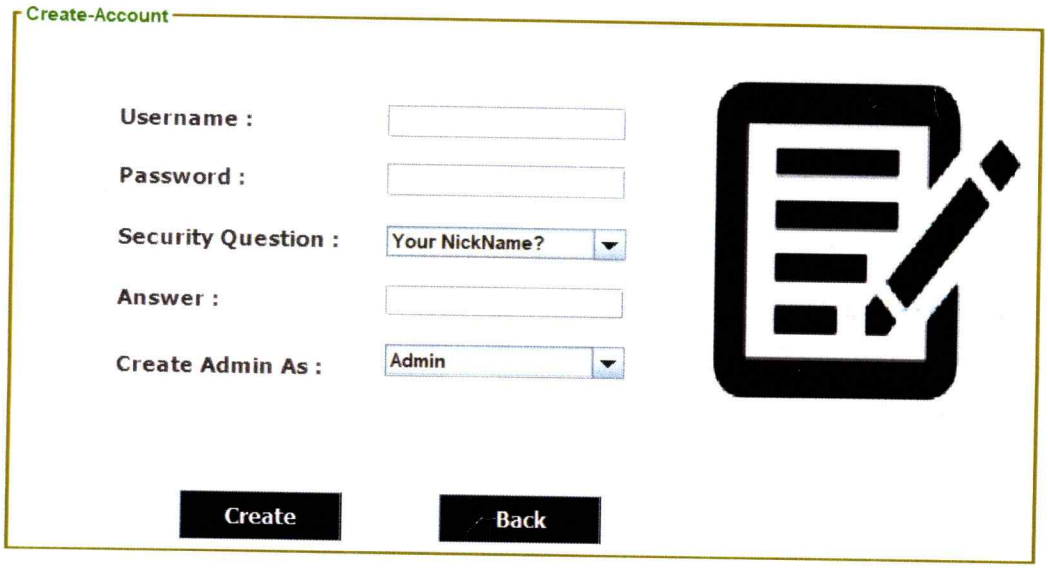


Fig 4.4.2 Sign Up Page

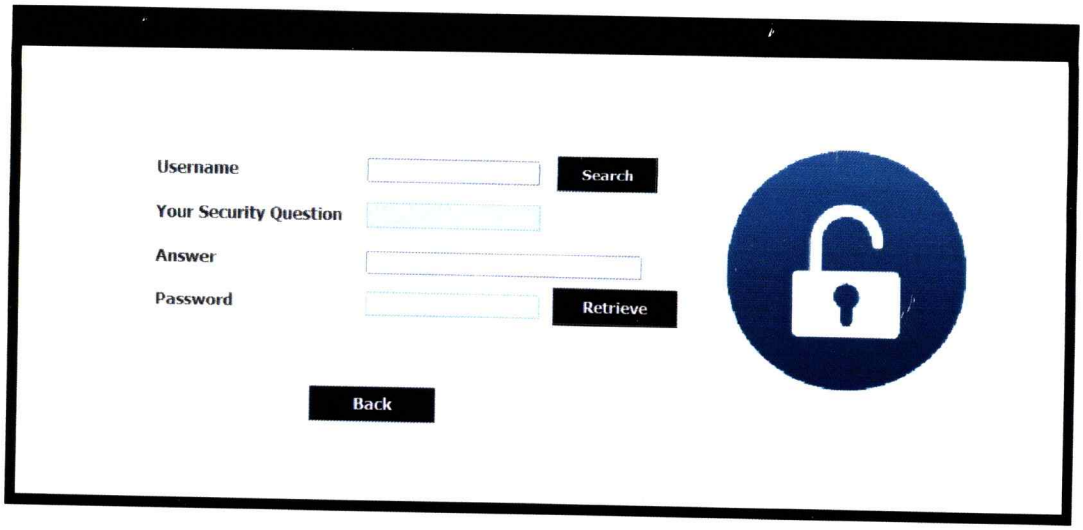
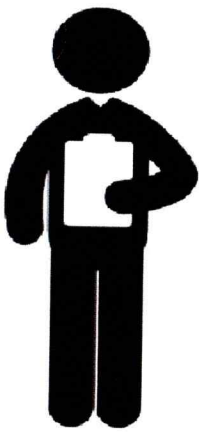


Fig 4.4.3 Forgot Password Page



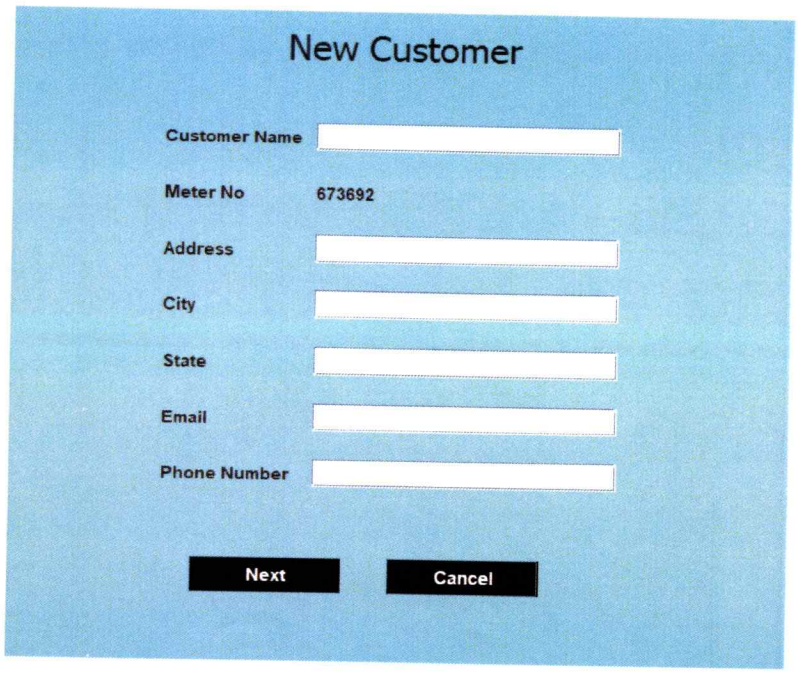


Fig 4.4.4 New Customer Page

4.5 Security Issues

The Security Issues that can arise in this application are :-

- If the customer forgets his/her login credentials he/she can use recovery methods or can contact authorities of he billing department.
- As this system is an online application of billing system the information of the customer must be secured and the data of the user will be secured from other users.
- The customer can provide the false information about the unit consume, the solution for this issue that we have used is the customer will have to take a snap of the meter reading along with the date and upload image to the system.
- The admin also have the access to make valid changes in information provided by the customer, which means if the customer tries to cheat he/she will be caught by the authorities, and strict action will be taken.

4.6 Test Cases Design

Here the entire application is tested. The reference document for this process is the requirement document, and the goal is to see IF the application meets its requirements. Each module and component of ethereal was thoroughly tested to remove bugs through a system testing strategy. Test cases were generated for all possible input sequences and the output was verified for its correctness.

Steps	Action	Expected output
Step1	The screen appears when the users run the program. 1. If admin login. 2.Ifcustomerlogin	A page with different menu's appears. 1.Adminpanelopens and 2.Customerpanelopens
Step 2	The screen appears when the admin logs in ands elects any one of the menus from the click of the mouse.	A window for adding new customer ,inserting tax, calculate bill, view deposit details etc.

Selection1	➢ New Customer ➢ Customer Details ➢ Deposit Details ➢ Calculate Bill ➢ Tax Details ➢ Delete Customer	
Step 2.1	The screen appears when the customer login and selects any one of the menus from the click of the mouse	A window for generating bill, update customer details, view details, generating bill
Selection2	Update Details View Details	
Selection2a	Generate Bill	
Selection2b	Pay Bill Bill Details	

Table 4.6.1 Test cases for Project

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation Approach

Algorithm :

- Start system
- Enter login name and password
- On clicking the log in button
- Connect to database
- Query database to know whether user credentials are correct
- If not , deny access and return login page with an error message
- If correct ,check if credentials for administrator
- If yes , allow login
- Set admin session ,re-direct administrator to admin login page
- If no , allow log in set user session
- Re-direct user to user home page

Implementation of Operations :

- Adding Customer: Here admin can add new customer to the customer list who started using electricity bill system.
- Searching Deposit Details: Here admin can search according to meter number and month to view deposit details.
- Viewing Details: Here admin and user can view customer details and about details.
- Adding Tax: Here admin can add tax details.
- Updating Customer: Here customer can update his/her details by using meter no of the customer.

5.2 Coding Details and Code Efficiency

5.2.1 Coding Details

Login Page Code :

The below code specifies the designing code of the login page. It includes the Title, Label and the image included in the login page.

```
Login() {

    super(title: "Login Page");
    getContentPane().setBackground(new Color(r: 173, g: 216, b: 230));
    setLayout(manager: null);


    //Image
    ImageIcon i4 = new ImageIcon(location: ClassLoader.getSystemResource(name: "images/logo1.jpg"));
    Image i5 = i4.getImage().getScaledInstance(width: 30, height: 30, hints: Image.SCALE_DEFAULT);
    ImageIcon i6 = new ImageIcon(image: i5);
    JLabel image1 = new JLabel(image: i6);
    image1.setBounds(x: 170, y: 22, width: 30, height: 30);
    add(comp: image1);


    //Title
    JLabel ebsheading = new JLabel(text: "Electricity Billing System");
    ebsheading.setBounds(x: 210, y: 17, width: 300, height: 40);
    ebsheading.setFont(new Font(name: "Tahoma", style: Font.PLAIN, size: 24));
    add(comp: ebsheading);


    //Username
    JLabel lblusername = new JLabel(text: "Username");
    lblusername.setBounds(x: 300, y: 120, width: 100, height: 20);
    add(comp: lblusername);

    username = new JTextField();
    username.setBounds(x: 400, y: 120, width: 150, height: 20);
    add(comp: username);


    //Password
    JLabel lblpassword = new JLabel(text: "Password");
    lblpassword.setBounds(x: 300, y: 160, width: 100, height: 20);
    add(comp: lblpassword);

    password = new JPasswordField();
    password.setBounds(x: 400, y: 160, width: 150, height: 20);
    add(comp: password);
```

Signup Page Code :

The below code specifies the designing code of the Signup page. It includes the Title, Label and the account type included in the Signup page.

```
Signup(){

    super(title: "SignUp Page");
    setSize(width: 640, height: 410);
    setLocation(x: 650, y: 350);
    getContentPane().setBackground(new Color(r: 173, g: 216, b: 230));
    setLayout(manager:null);

    //image
    ImageIcon i1 = new ImageIcon(location:ClassLoader.getSystemResource(name: "images/Light and Hand.jpg"));
    Image i2 = i1.getImage().getScaledInstance(width: 200, height: 250, hints: Image.SCALE_DEFAULT);
    ImageIcon i3 = new ImageIcon(image: i2);
    JLabel image2 = new JLabel(image: i3);
    image2.setBounds(x: 50, y: 90, width: 200, height: 250);
    add(comp: image2);


    //Creating New Account
    JLabel ebsheading = new JLabel(text: "CREATING NEW ACCOUNT");
    ebsheading.setBounds(x: 210, y: 10, width: 300, height: 40);
    ebsheading.setFont(new Font(name: "Tahoma", style: Font.PLAIN, size: 18));
    add(comp: ebsheading);


    //Create Account As
    JLabel heading = new JLabel(text: "Create Account As");
    heading.setBounds(x: 290, y: 70, width: 110, height: 20);
    add(comp: heading);

    accountType = new Choice();
    accountType.add(item: "Admin");
    accountType.add(item: "Customer");
    accountType.setBounds(x: 420, y: 70, width: 150, height: 20);
    add(comp: accountType);


    //Meter Number
    JLabel lblmeter = new JLabel(text: "Meter Number");
    lblmeter.setBounds(x: 290, y: 110, width: 140, height: 20);
    lblmeter.setVisible(aFlag: false);
    add(comp: lblmeter);
```

ELECTRICITY BILLING SYSTEM

A Project Report
Submitted in partial fulfillment of the
Requirements for the award of the Degree of
BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

By

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Seat. No: 4020812

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SONOPANT DANDEKAR ARTS, V.S. APTE COMMERCE & M.H.MEHTA SCIENCE COLLEGE

(Affiliated to University of Mumbai)

PALGHAR, 401404

MAHARASHTRA

2022-2023

PROFORMA FOR THE APPROVAL PROJECT PROPOSAL

PNR No.: ..... Roll no: 69021

1. Name of the Student
   Devendra Singh , Sanjay Nayal
2. Title of the Project
   Electricity Billing System
3. Name of the Guide
   Mrs Sayli Bhosale
4. Teaching experience of the Guide 8 years
5. Is this your first submission? Yes ☑ No ☐

Signature of the Student

Date: 05/08/2022

Signature of the Guide

Date: 05/08/2022

Signature of the coordinator

Date: 11/08/2022

PROFORMA FOR THE APPROVAL PROJECT PROPOSAL

PNR No.: ..... Roll no: 69022

1. Name of the Student

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2. Title of the Project

   Electricity Billing System

3. Name of the Guide

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4. Teaching experience of the Guide 8 years

5. Is this your first submission? Yes ☑ No ☐

Signature of the Student

Date: 05/08/2022

Signature of the Guide

Date: 05/08/2022

Signature of the coordinator

Date: 11/08/2022

SONOPANT DANDEKAR SHIKSHAN MANDALI'S SONOPANT DANDEKAR ARTS, V.S. APTE COMMERCE & M.H. MEHTA SCIENCE COLLEGE

(Affiliated to University of Mumbai)

PALGHAR MAHARASHTRA 401404

DEPARTMENT OF INFORMATION TECHNOLOGY

CERTIFICATE

This is to certify that the project entitled, "**ELECTRICITY BILLING SYSTEM**", is bonafied work of **DEVENDRASINGH S KANYAL** bearing Seat No: **4020812** submitted in partial fulfillment of the requirements for the award of degree of BACHELOR OF SCIENCE in INFORMATION TECHNOLOGY from University of Mumbai.

Shinde 06/04/2023

Internal Guide

Bagad 06/04/2023

Coordinator

Kapoor 24.4.23

External Examiner

College Seal

Date: 06/04/2023

DECLARATION

I hereby declare that the project entitled, **Electricity Billing System** done at **SDSM College,** has not been in any case duplicated to submit to any other university for the award of any degree. To the best of my knowledge other than me, no one has submitted to any other university.

The project is done in partial fulfillment of the requirements for the award of degree of **BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)** to be submitted as final semester project as part of our curriculum.

Devendrasingh S Kanyal

ABSTRACT

Electricity consumers are often faced with the problem of inaccuracy and delay in monthly billing due to some drawbacks. Thus, it is essential to have an efficient system for such purposes via electronic platform with consideration to proximity. The proposed system automates the conventional process of paying electricity bill by visiting the Electricity Board which is tiresome and time consuming. It is also designed to automate the electricity bill calculation and payment for user convenience. The system is developed with Java swings as the base programming language which can be used to develop websites, web applications and web services.

The Microsoft Structured Query Language (SQL) server is also used for creating back-end database. The system would be having two logins: the administrative and user login. The administrator can view the user's account details and can add the customer's information of consuming units of energy of the current month in their account. The Admin must feed the system with the electricity usage data into respective user's account. The system then calculates the electricity bill for every user and updates the information into their account every month. Users can then view their electricity bill and pay before the month end.

ACKNOWLEDGEMENT

The successful completion of any task would be incomplete without mentioning all those people who made it possible, the constant and encouragement, crowns the effort with success.

I wish many thanks to our Head of Department **Dr. ASHWIN BHAGAT** for providing guidance throughout the course and all those who have indirectly guided and helped us in preparation of this project.

I express my thanks to my project guide **Mrs. SAYLI BHOSALE & Miss. CYNTHIA SHINDE** for the constant motivation and valuable help through the project work.

I am indebted to my well-wishers and friends who encourage me in successful completion of the project.

SONOPANT DANDEKAR SHIKSHAN MANDALI'S SONOPANT DANDEKAR ARTS, V.S. APTE COMMERCE & M.H. MEHTA SCIENCE COLLEGE

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CERTIFICATE

This is to certify that the project entitled, "**ELECTRICITY BILLING SYSTEM**", is bonafied work of **PARTH N PATIL** bearing Seat. No: **4020870** submitted in partial fulfillment of the requirements for the award of degree of BACHELOR OF SCIENCE in INFORMATION TECHNOLOGY from University of Mumbai.

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24.4.23

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S. D. S. M. COLLEGE Dept. of IT PALGHAR, DIST. PALGHAR

College Seal

Date: 06/04/2023

DECLARATION

I hereby declare that the project entitled, **Electricity Billing System** done at **SDSM College,** has not been in any case duplicated to submit to any other university for the award of any degree. To the best of my knowledge other than me, no one has submitted to any other university.

The project is done in partial fulfillment of the requirements for the award of degree of **BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)** to be submitted as final semester project as part of our curriculum.

Parth N Patil

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CHAPTER 1
INTRODUCTION

1.1 Background

The conventional system of electricity billing is not so effective; one staff must visit each customer's house to note the meter readings and collect the data. Then, another staff must compute the consumed units and calculate the money to be paid. Again, the bills prepared are to be delivered to customers. Finally, individual customer must go to electricity office to pay their dues.

Hence, the conventional electricity billing system is uneconomical, requires many staffs to do simple jobs and is a lengthy process overall. In order to solve this lengthy process of billing, a web based computerized system is essential. This proposed electricity billing system project overcomes all these drawbacks with the features. It is beneficial to both consumers and the company which provides electricity.

With the new system, there is reduction in the number of staffs to be employed by the company. The working speed and performance of the software is faster with high performance which saves time. Furthermore, there is very little chance of miscalculation and being corrupted by the staffs.

The software provides facility of data sharing; it does not require any staff as in the conventional system. Once it is installed on the system only the meter readings are to be given by the admin where customer can view all details, it has the provision of security restriction.

The electricity billing software calculates the units consumed by the customer and makes bills; it requires small storage for installation and functioning. There is provision for debugging if any problem is encountered in the system.

The system excludes the need of maintaining paper electricity bill, administrator does not have to keep a manual track of the users, and users can pay the amount without visiting the office. Thus, it saves human efforts and resources.

The main aim of our project is to satisfy customer by saving their time by payment process, maintaining records, and allowing the customer to view his/her records and permitting them to update their details.

1.2 Objectives

The system excludes the need of maintaining paper electricity bill, administrator does not have to keep a manual track of the users, and users can pay the amount without visiting the office. Thus, it saves human efforts and resources.

- To keep the information of Customer calculates the units consumed every month:-
  Helps to maintain information of customer such as login and password details, customer name, id, meter number, successful payments, late payment dues, etc. and other important details.

- To calculate the units consumed every month regularly and generate the bills adding penalty and rent:-
  Helps to calculate the number of units consumed by the customer and generate bill accordingly by adding all rents, taxes and dues etc.

- To save the time by implementing payment process online:-
  Online payment helps in cashless transactions and avoids visiting electricity payment office, also help to save our recourses such as energy, time, and fuels. Able to pay bills through any corner having internet on your fingertips.

1.3 Purpose Scope and Applicability

1.3.1 Purpose

- This project system excludes the need of maintaining paper electricity bill as all the electricity bill records are managed electronically.
- Administrator doesn't have to keep a manual track of the users. The system automatically calculates fine.
- Users don't have to visit to the office for bill payment.
- There is no need of delivery boy for delivery bills to user's place.
- Thus, it saves human efforts and resources.

1.3.2 Scope

- **Extensibility**: This software is extendable in ways that its original developers may not expect. The following principles enhances extensibility like hide data structure, avoid traversing multiple Links or methods avoid case statements on object type and distinguish public and private operations.

- **Reusability**: Reusability is possible as and when require in this application. We can update it next version. Reusable software reduces design, coding and testing cost by amortizing effort over several designs. Reducing the amount of code also simplifies understanding, which increases the likelihood that the code is correct. We follow up both types of reusability. Sharing of newly written code within a project and reuse of previously written code on new projects.

- **Understand ability:** A method is understandable if someone other than the creator of the method can understand the code (as well as the creator after a time lapse). We use the method, which small and coherent helps to accomplish this.

- **Cost-effectiveness:** Its cost is under the budget and make within given time period. It is desirable to aim for a system with a minimum cost subject to the condition that it must satisfy the entire requirement .Scope of this document is to put down the requirements, clearly identifying the information needed by the user, the source of the information and outputs expected from the system.

1.3.3 Applicability

This system can be applicable in the areas where electricity is supplied by the government and have meters installed. The customer must have a little technical knowledge for handling smart application, through which he/she can able to use this system to pay online electricity bills.

1.4 Achievements

This system saves the various resources and energy. It helps to make payment easier and faster. It helps to make less and less usage of papers and allow us to GO PAPERLESS.

With the new system, there is reduction in the number of staffs to be employed by the company. The working speed and performance of the software is faster with high performance which saves time. Furthermore, there is very little chance of miscalculation and being corrupted by the staffs.

1.5 Organization of Report

The main aim of our project is to satisfy customer by saving their time by payment process, maintaining records, and allowing the customer to view his/her records and permitting them to update their details .The firm handles all the work manually, which is very tedious and mismatched.

CHAPTER 2

SURVEY OF TECHNOLOGIES

Zamia Benazir, DivaPrabha.P,2018 [1],Science and technology with all its fascinating advancements has been taking human life standards to the next level. The whole world will be literally jammed without these innovations. This project is an innovation, which makes the way of paying electricity bill simple compared to other existing projects. This project has been implemented using Java Swing as front end and MySQL as back end. The purpose of the project is to build an application program to reduce the manual work for managing the number of units consumed by the customers and generating the electricity bill according to the type of customer – individual or commercial. It displays the details of the customers, units consumed by them and bill history. It enables them pay their bill if not paid. The date of payment will be updated while paying the bill. It maintains error free database and easily incorporates the future developments and changes.

A. Andrew, P.U. Okorie, Nov 2019[2],Electricity consumers are often faced with the problem of inaccuracy and delay in monthly billing due to the drawback in reading pattern and human errors. Thus, it is essential to have an efficient system for such purposes via electronic platform with consideration to proximity. The proposed system automates the conventional process of paying electricity bill by visiting the Electricity Board which is tiresome and time consuming. It is also designed to automate the electricity bill calculation and payment for user convenience. The system is developed with Microsoft Visual Studio using C# as the base programming language which can be used to develop websites, web applications and web services. The Microsoft Structured Query Language (SQL) server is also used for creating back-end database. The system would be having two logins: the administrative and user login. The administrator can view the user's account details and can add or update the customer's information of consuming units of energy of the current month in their account. The Admin has to feed the system with the electricity usage data into respective users account. The system then calculates the electricity bill for every user and updates the information into their account every month. Users can then view their electricity bill and pay before the month end.

M.R.M.S.B. Rathnayaka , I.D.S.Jayasinghe , EnitJayanth , S.I Swarnajith , April 2013[3],Billing is a critical function of both the Electricity and the Water Boards towards getting a meter read. Meter reading, even though it looks simple, is far from simple and involves processes that can give various problems. Most problems, currently seen, result from the manual processes followed. Calculation errors, delays in system updating and fault tracking issues are the major problems that companies find difficult to find answers for. This paper suggests a mobile based system to collect process and notify consumers about consumption. This system will be reliable, efficient and accurate to suit the requirements of these companies. The proposed solution uses evolving Mobile Technologies, over a solution which uses Mobile applications to handle a company's day today work. The burden on the Meter Reader is lessened and other new features have also been introduced. Customer interaction with the company is improved and customers can easily view their current electricity usage using their mobile phones. However, the feasibility of such a project for a third world country like Sri Lanka is a concern with regard to the cost factor involved. The project demands substantial investments. Will the country be able to meet the costs involved? Yet, most of the problems related to Electricity Billing are addressed through this system and this might prove to be the best solution for specific companies to optimize services on a low budge.

Ashutosh Kumar, Dharmendra Pratap Singh, Sagar Shubham, June 2021 [4],Science and innovation with all its interesting progressions has been taking human existence norms to a higher level. The entire world will be in a real sense stuck without these developments. This project is a development project, which makes the method of covering electricity bill basic contrasted with other existing tasks. This undertaking has been done using Java Swing as front end and MySQL as back end. The motivation behind the task is to construct an application program to lessen the manual work for dealing with the measure of units devoured by the clients and producing the power charge as per the type of customer – individual or business. It shows the details about customer, units devoured by them and bill history. It empowers them cover their bill if not paid. The date of payment will be refreshed while covering the bill. It keeps up the error free database and effectively joins the future turns of events and changes. Keywords: Bill Payment History, Bill Payment, Electricity bill, Java Swing, MySQL, Type of customer.

ShubhanshuYadav, March 2022[5],Science and technology with all its thrilling advances have brought the standards of daily life of person to the fore. The entire human beings definitely collapse beyond new things. This research is a novelty, which provides the method of collecting bill for power easier differentiate to else the previous research. This project work had apply using Java Swing as before and MySQL as the latter.

The aim of the project work is to create an app system to minimize physical labor to manage the number of units used by consumers & to generate a bill depending on the type of consumers -independent or business. Show the customer information, depleted units and credit record. It permit the customers to pay off its debt if they are not pay. The when customer pay the due amount then after time will be updated. This maintains the right information and it make it simple to access previous data for further changes later. Highlights: Bill record, Bill Paid, Electronic Bill payment, Java Swing, MySQL.

CHAPTER 3

REQUIREMENTS AND ANALYSIS

3.1 Problem Definition

The manual system is suffering from a series of drawbacks. Since whole of the bills is to be maintained with hands the process of keeping and maintaining the information is very tedious and lengthy to customer. It is very time consuming and laborious process because, staff need to be visited the customers place every month to give the bills and to receive the payments. For this reason, we have provided features Present system is partially automated (computerized); existing system is quite laborious as one must enter same information at different places.

3.2 Requirements Specification

The functional requirement of the electricity bill management system is that it does what it is meant for. A functional requirement describes what a software system should do, while non-functional requirements place constraints on how the system will do so. Functional requirements specify a function that a system or system component must be able to perform.

Few of its functional requirements are as given below: –

User data should be fed into the system: -this system is doing that properly in the user entity. After fetching the data of the customer, the bill can be made and sent to the customer.

Admin can add the users: -Admin can verify and add the user, which is they are doing with this system. He can also delete the users if required.

Non-functional necessities – are often divided into 2 main categories:

- Execution qualities, like security and usefulness, that square measure evident at the run time.

- Evolution qualities, like liabilities, maintainability, flexibility, and quantifiable, that square measure embodied within the static structure of the code.

Non-functional necessities place restrictions on the merchandise being developed, the event method, and specify external constraints that the merchandise should meet. Our project qualifies all the criteria of functional and non-functional accordingly and the system is up to mark performance wise.

Here we need to take care of few more things before heading towards the system. The most important feature of the electricity bill management system application world is the application's ease of usage .application will easy to use if made while keeping in mind that the user need not think twice about searching any feature.

Everything should be made distinctive by using the colour combination such that everything needed most frequently highlighted with focus colours. Using simple layouts like the card and grid layout etc. By varying colour and other UI combinations, many good intuitive interfaces can be made. Which ultimately makes the interface easy to use for a long time?

Keep things simple and consistent:–Simple and Harmonic way making UI is very intuitive and needs to follow.

Make good use of typography: –The typography is taken care very strictly as the need of the system.

Use colour and contrast properly:–Colour combo of lite and dark is good way emphasise and done well in this system.

Consider feedback messages:–The feedback form is a very good way taking feedback of forms and improving the system.

Simplified forms:–The form is made simple to fill with the clean user interface.

3.3 Planning and Scheduling

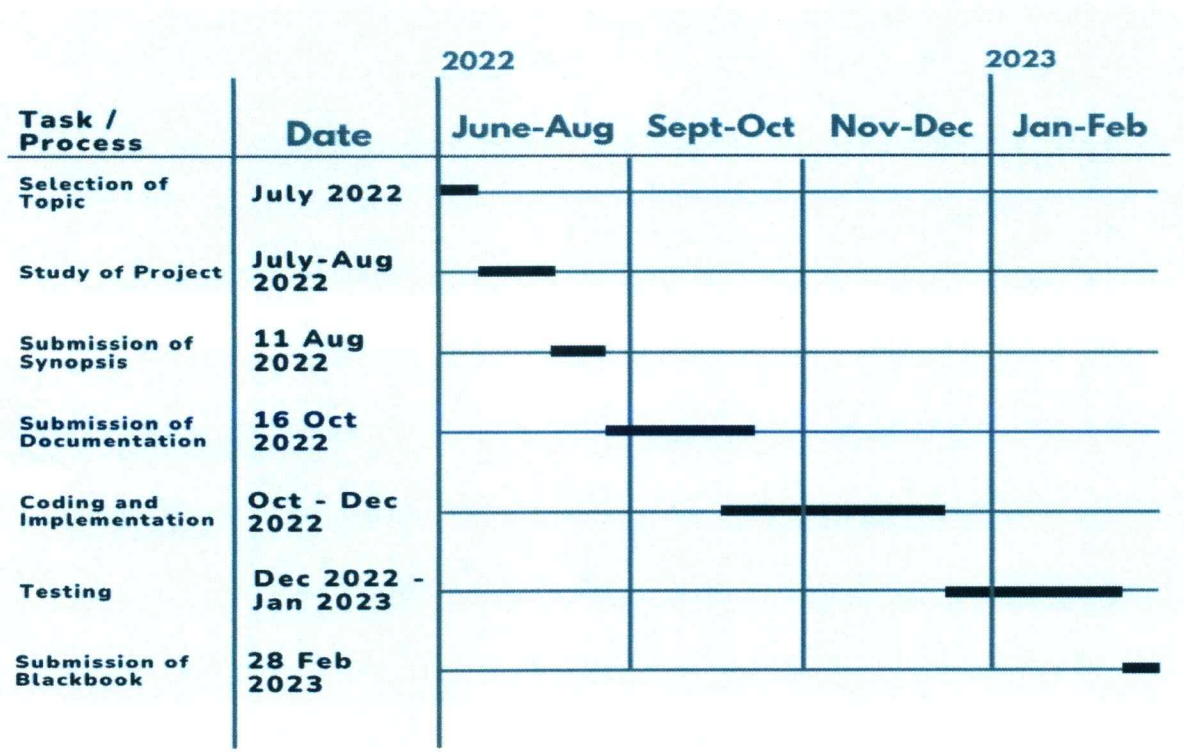


Fig 3.3.1 Gantt Chat

3.4 Software and Hardware Requirements

3.4.1 Hardware Requirements:

- Hardware Specification:-Processor Intel Pentium V or higher
- Clock Speed:-1.7GHzormore
- System Bus:-64bits
- RAM:-16GB
- HDD:-2TB
- Monitor:-LCD Monitor
- Keyboard:-Standard keyboard
- Mouse:-Compatible mouse

3.4.2 Software Requirements:

- Operating System:-Windows10
- Software:-Microsoft SQL Server
- Frontend:- Java core/swings (NetBeans)
- Backend: -My SQL

3.5 Preliminary Product Description

System design is an abstract representation of a system component and their relationship and which describe the aggregated functionally and performance of the system. It is also the plan or blueprint for how to obtain answer to the question being asked. The design specifies various type of approach.

Database design is one of the most important factors to keep in mind if you are concerned with application performance management. By designing your database to be efficient in each call it makes and to effectively create rows of data in the database, you can reduce the amount of CPU needed by the server to complete your request, thereby ensuring a faster application.

3.6 Conceptual Model

ER Diagram:-

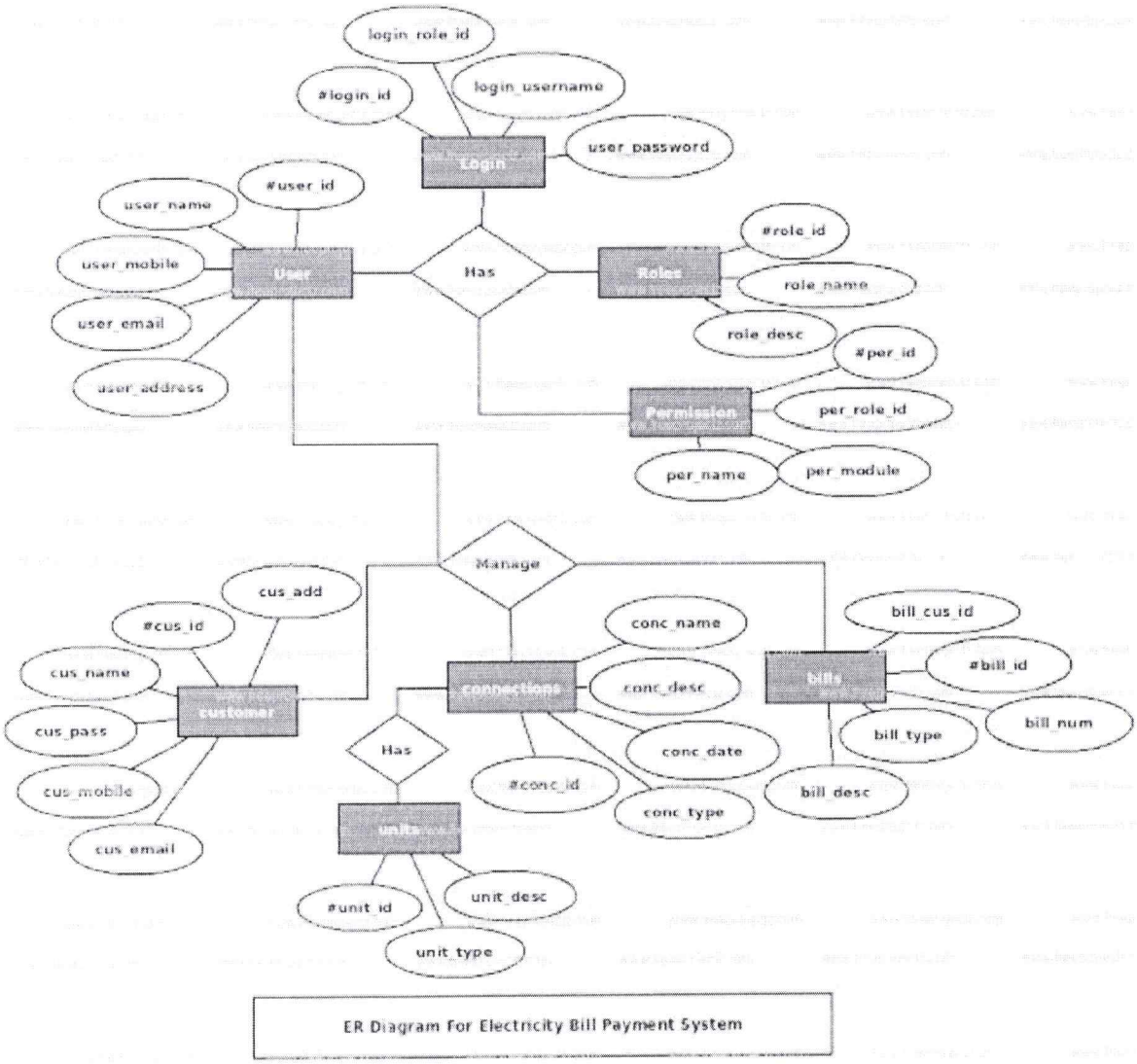


Fig 3.6.1 ER Diagram

Class Diagram :-

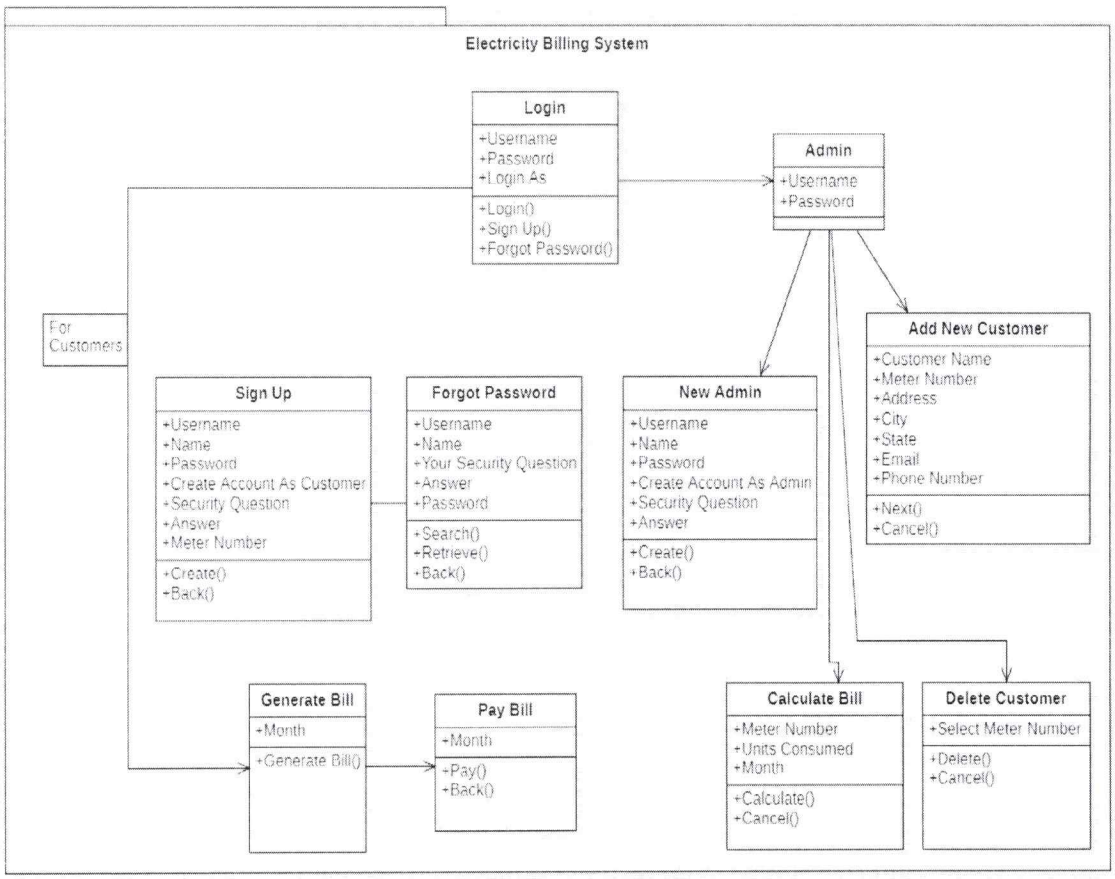


Fig 3.6.2 Class Diagram

Activity Diagram:-

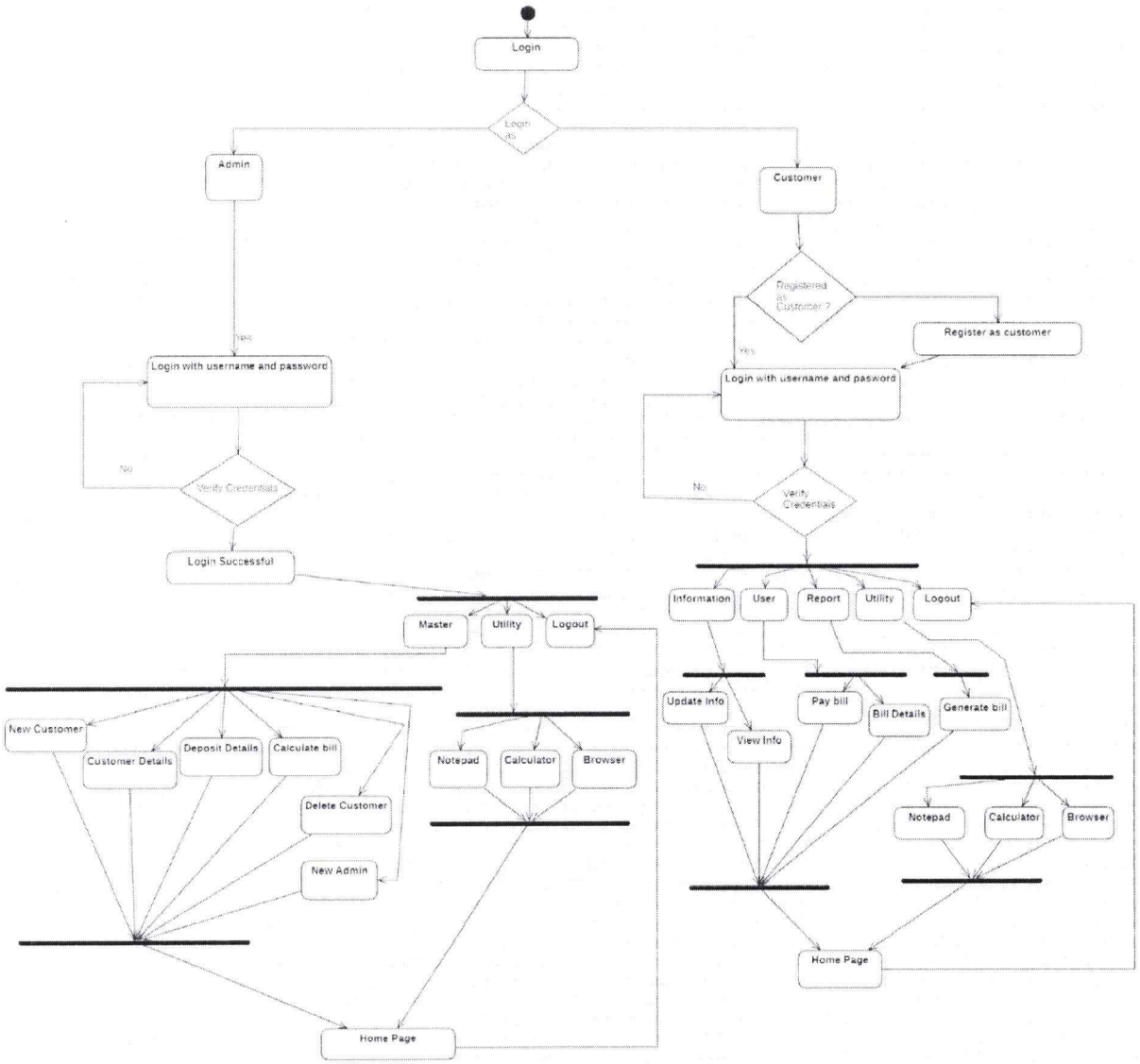


Fig 3.6.3Activity Diagram

Use Case Diagram:-

i)

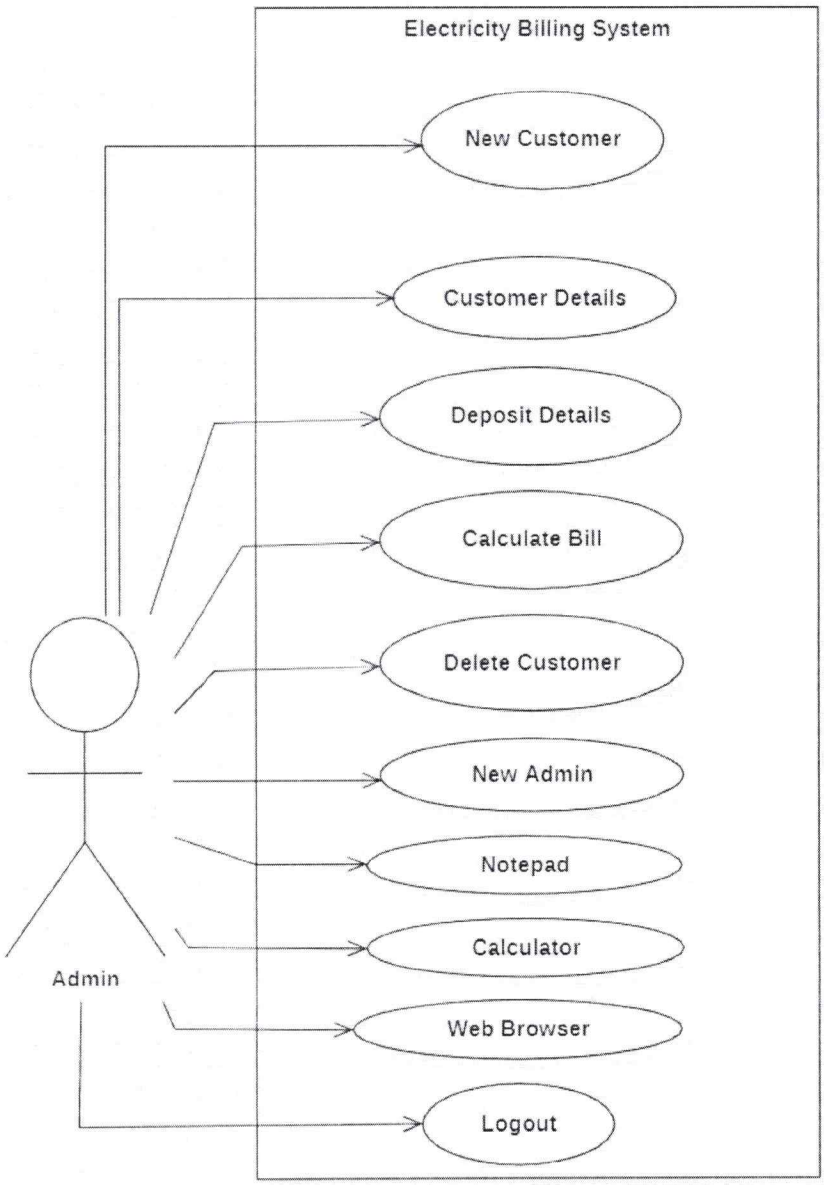


Fig 3.6.4Use Case Diagram for Admin

ii)

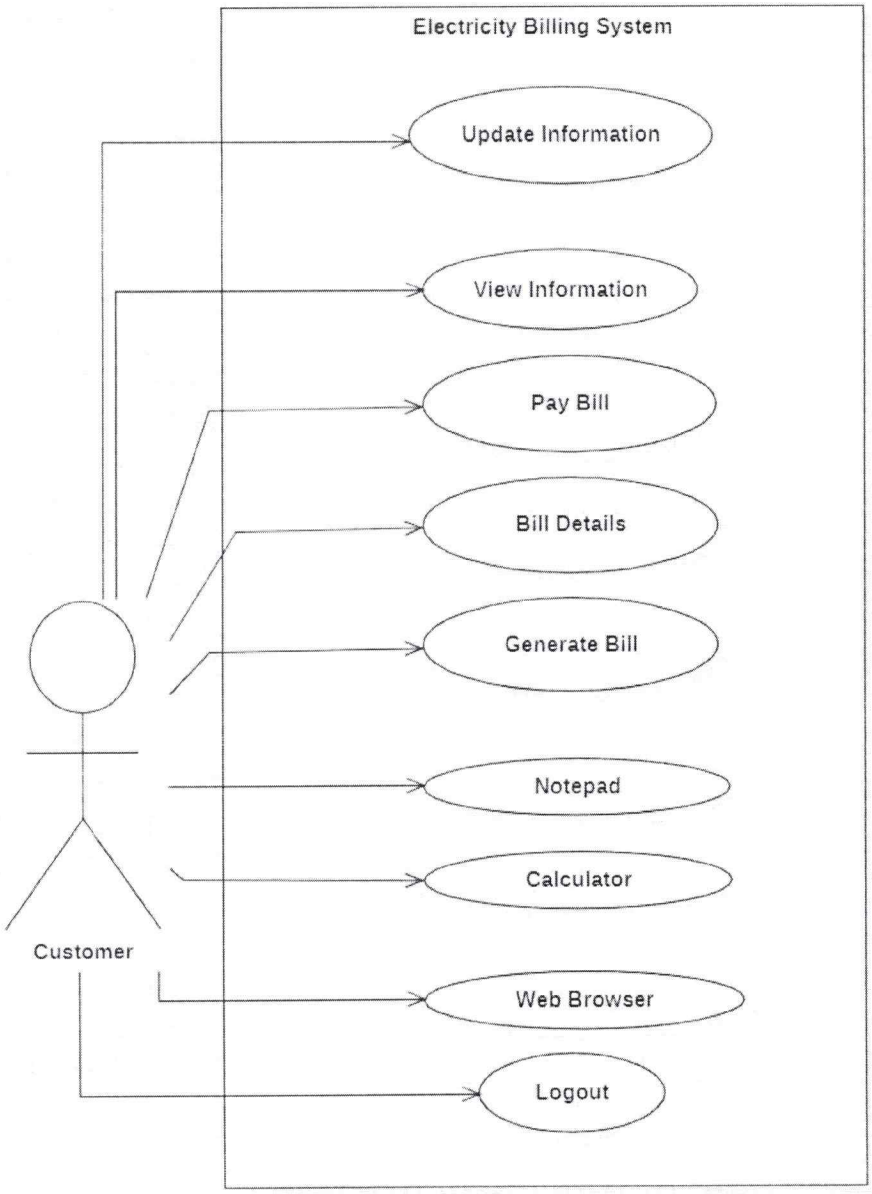


Fig 3.6.5 Use Case Diagram for Customer

CHAPTER 4

SYSTEM DESIGN

4.1 Basic Module

The system comprises of two major modules, which are further divided into sub- modules. They are as follows:

Administrative Login: - In the administrative login, the administrator has the authority of the system. The administrator can add, delete notifications and update the system. The administrator performs the following functions on the system:

- Consumers Registration: The Admin will register the consumer by entering the consumer's basic registration details such as: Name, Contact Address, Residential Address, Consumer type, Password and Email Address.
- View Registered Users: The Administrator can also view all the registered users in the system, make necessary updates and update the bill status of the consumers.

Consumer Login: - Consumers can login into the system and perform the following tasks:

- View Bill: Consumers can view their balance electricity bill amount of each month.
- Consumption Calculation: Consumers can calculate the total amount of units they consume in a month using a consumption calculator.
- Bill Calculation: Consumers can calculate the total number total amount that he/she will pay based on the units consumed, using a bill calculator.

4.2 Data Design

4.2.1 Schema Design

Database schema is described as database connections and constraints. It contains attributes. Every database has state instances represent current set of databases with values. There are different types of keys in a database schema.

A primary key is a table column that can be used to uniquely identify every row of the table. Any column that has this property, these columns are called candidate key. A composite primary key is a primary key consisting of more than one column. A foreign is a column or combination of columns that contains values that are found in the primary key of some table.

All the attributes of each table are interconnected by foreign key which is primary key in another column and composite key. Primary key cannot be null. The fact that many foreign key values repeat simply reflects the fact that its one- to-many relationship. In one-to-many relationship, the primary key has the one value and foreign key has many values

4.2.2 Data Integrity & Constraints

- It reduces manual processing time.
- It helps in making the system easy for handling.
- The maintenance cost is less.
- Future development can be incorporated.
- Helps in maintaining a free database.

Admin Panel : - The admin has the facility to Bill generation, categories, and subcategories. Similarly, if the admin wants to update any customer details then he/she has the provision to update as well as delete the customer details.

User Panel :-In the user panel, the user has to firstly signup. For instance, the user has to fill in some basic information regarding their name, Id proof, Contact details, E-mail id, etc. Therefore, after signing up on the site the user will get the username and password. Similarly, then the user becomes a member of the site.

After signing in the user has the facility to search Electronics items according to their requirement. Similarly, the user can search the product by just clicking on the product's image or on their name. Therefore, the user has the facility of choosing the product by their favourite brand.

4.3 Procedural Design

4.3.1 Logical Diagrams

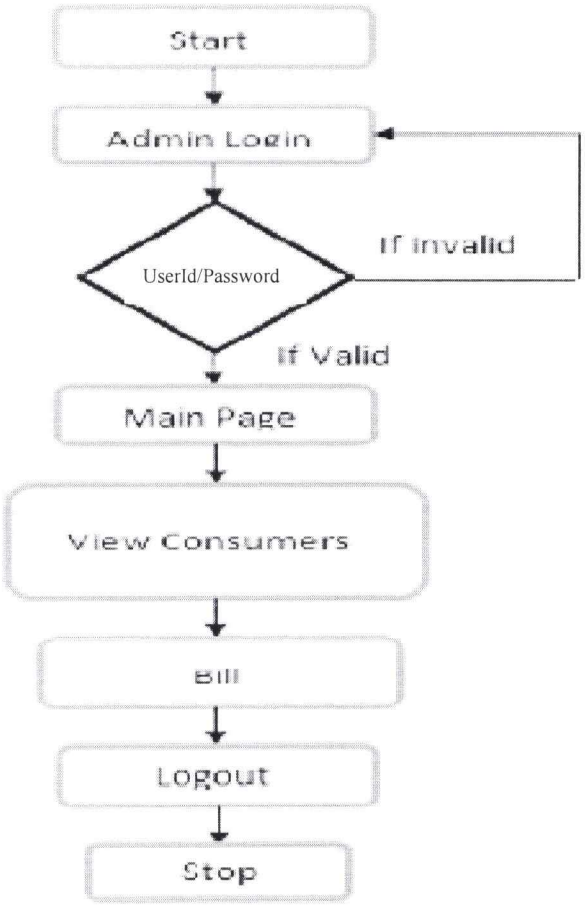


Fig 4.3.1.1 Flow-Chart of the Administrator

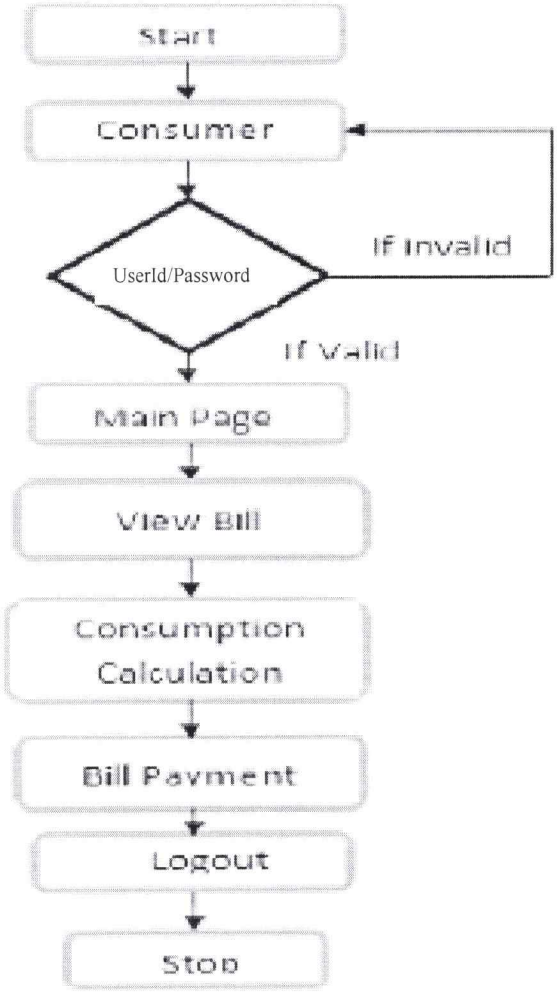


Fig 4.3.1.2Flow-Chart of the Customer

4.3.2 Data Structures

Insert statement:

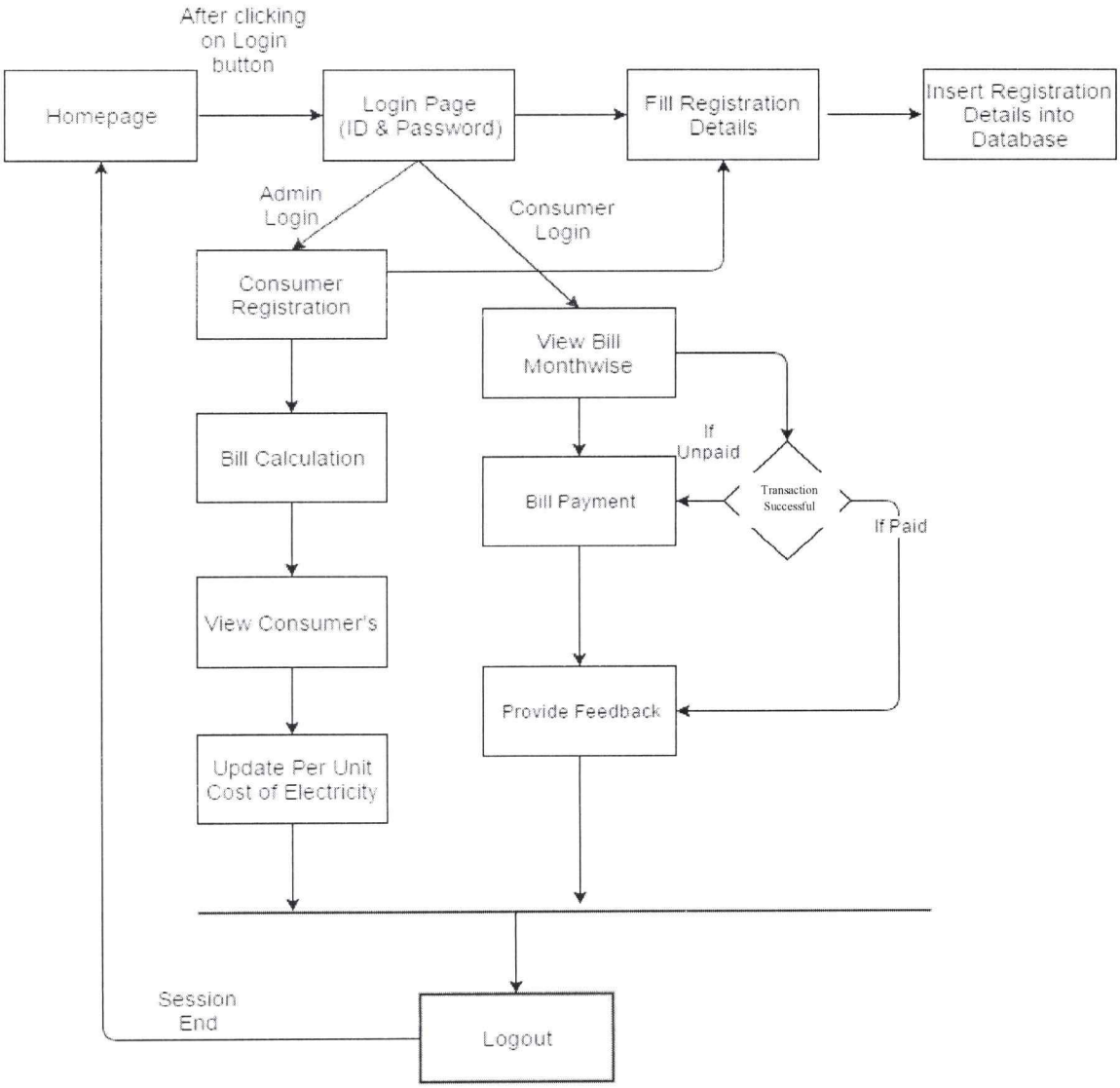
- The INSERT INTO statement is used to insert new records in a table.
- The INSERT INTO syntax would be as follows: INSERT INTO table name VALUES (value1, value2, value3,).

- The following SQL statement insert's a new record in the "customer" table: Insert into customer VALUES ("sai","12345"," btm"," Bangalore", "Karnataka", "aa@gmail.com", "9876543333").

Create statement:

- The CREATE TABLE Statement is used to create tables to store data. Integrity Constraints like primary key, unique key, foreign key can be defined for the columns while creating the table.
- The syntax would be as follows: CREATETABLE table_name (column1datatype, column2datatype, column3 datatype, column datatype, PRIMARY KEY (one or more columns)).
- The following SQL statement creates a table "customer" table: create table customer (name varchar (30), meter_no varchar (20) primary key, address varchar (50), city varchar (20), state varchar (30), email varchar (30), phone varchar (30));
- The following SQL statement creates a table "login" table: create table login (meter no archer (30), username archer (30), password archer (30), user varchar (30), question varchar (40), answer varchar (30));
- The following SQL statement creates a table "tax" table: create table tax (cost_per_unit int (20) primary key, meter_rent int (20),service_charge int (20),service tax int(20),swacch_bharat_cess int (20), gst int (20));
- The following SQL statement creates a table "bill" table: create table bill(meter_no varchar(20),foreign key(meter_no) references customer(meter_no) on delete cascade, month varchar (20), units int (20), total_bill int (20), status varchar (40));
- The following SQL statement creates a table "meter_info" table: create table meter_info (meter_no varchar (30), foreign key(meter_no) references customer(meter_no) on delete cascade, meter_locationvarchar (10), meter_type varchar (15), phase_code int (5), bill_typevarchar (10), days int (5));

4.3.3 Algorithm Design



4.4 User Interface Design

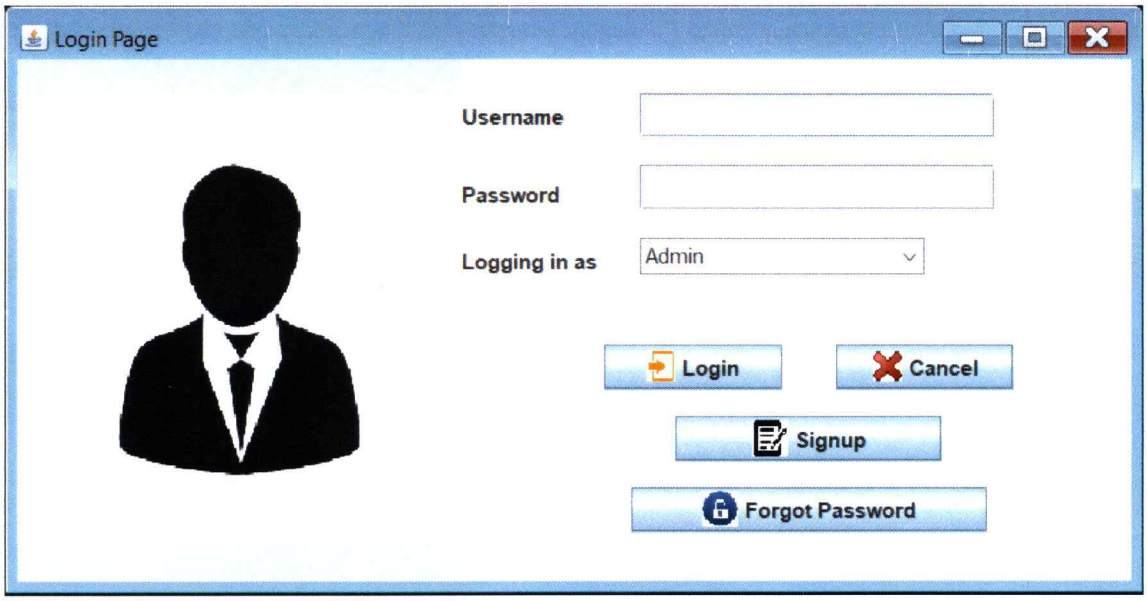


Fig 4.4.1 Login

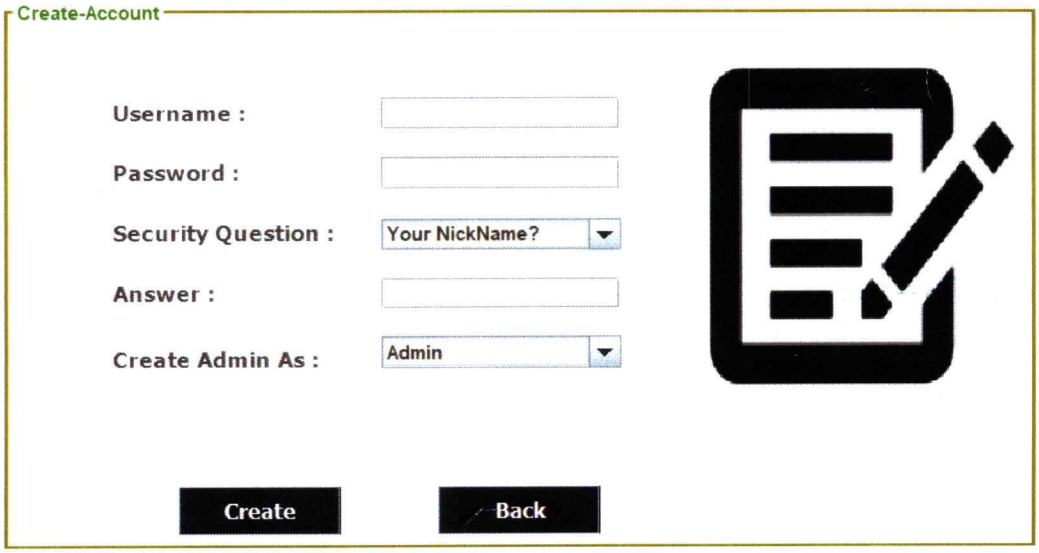


Fig 4.4.2 Sign Up Page

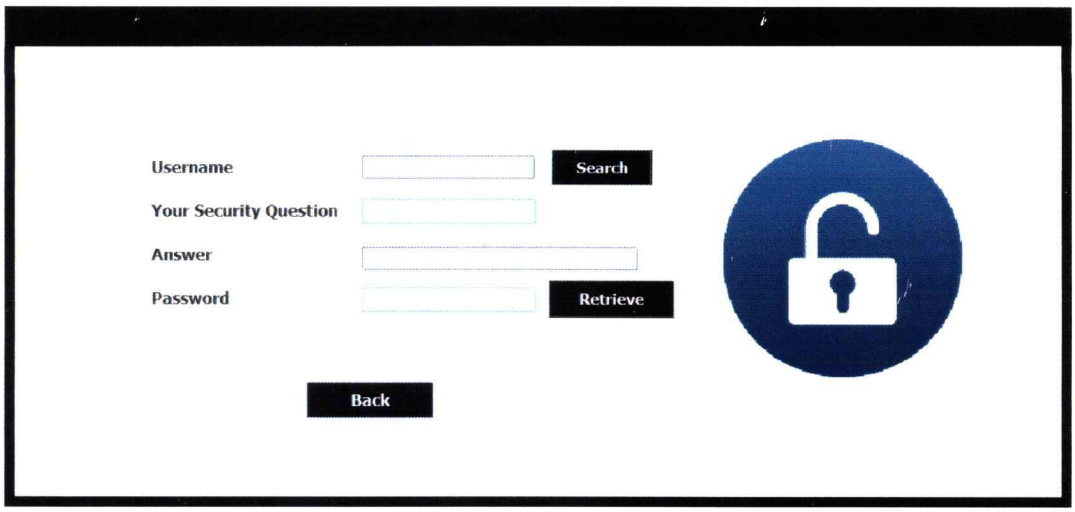
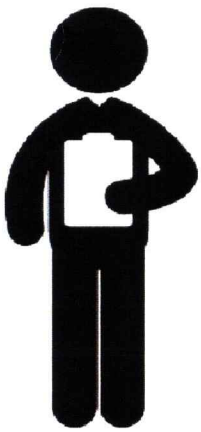


Fig 4.4.3 Forgot Password Page



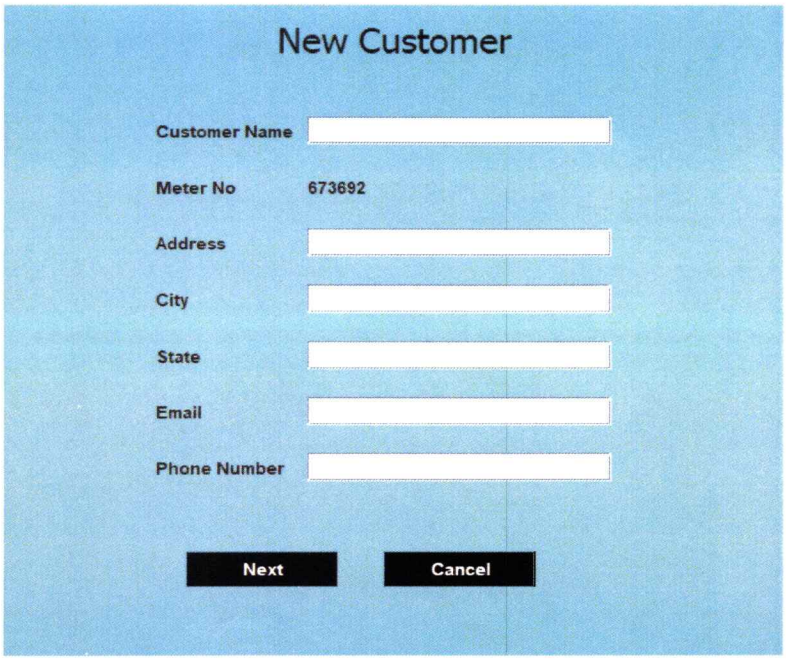


Fig 4.4.4 New Customer Page

4.5 Security Issues

The Security Issues that can arise in this application are :-

- If the customer forgets his/her login credentials he/she can use recovery methods or can contact authorities of he billing department.
- As this system is an online application of billing system the information of the customer must be secured and the data of the user will be secured from other users.
- The customer can provide the false information about the unit consume, the solution for this issue that we have used is the customer will have to take a snap of the meter reading along with the date and upload image to the system.
- The admin also have the access to make valid changes in information provided by the customer, which means if the customer tries to cheat he/she will be caught by the authorities, and strict action will be taken.

4.6 Test Cases Design

Here the entire application is tested. The reference document for this process is the requirement document, and the goal is to see IF the application meets its requirements. Each module and component of ethereal was thoroughly tested to remove bugs through a system testing strategy. Test cases were generated for all possible input sequences and the output was verified for its correctness.

Steps	Action	Expected output
Step1	The screen appears when the users run the program. 1. If admin login. 2.Ifcustomerlogin	A page with different menu's appears. 1.Adminpanelopens and 2.Customerpanelopens
Step 2	The screen appears when the admin logs in ands elects any one of the menus from the click of the mouse.	A window for adding new customer ,inserting tax, calculate bill, view deposit details etc.

Selection1	➢ New Customer ➢ Customer Details ➢ Deposit Details ➢ Calculate Bill ➢ Tax Details ➢ Delete Customer	
Step 2.1	The screen appears when the customer login and selects any one of the menus from the click of the mouse	A window for generating bill, update customer details, view details, generating bill
Selection2	Update Details View Details	
Selection2a	Generate Bill	
Selection2b	Pay Bill Bill Details	

Table 4.6.1 Test cases for Project

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation Approach

Algorithm :

- Start system
- Enter login name and password
- On clicking the log in button
- Connect to database
- Query database to know whether user credentials are correct
- If not , deny access and return login page with an error message
- If correct ,check if credentials for administrator
- If yes , allow login
- Set admin session ,re-direct administrator to admin login page
- If no , allow log in set user session
- Re-direct user to user home page

Implementation of Operations :

- Adding Customer: Here admin can add new customer to the customer list who started using electricity bill system.
- Searching Deposit Details: Here admin can search according to meter number and month to view deposit details.
- Viewing Details: Here admin and user can view customer details and about details.
- Adding Tax: Here admin can add tax details.
- Updating Customer: Here customer can update his/her details by using meter no of the customer.

5.2 Coding Details and Code Efficiency

5.2.1 Coding Details

Login Page Code :

The below code specifies the designing code of the login page. It includes the Title, Label and the image included in the login page.

```
Login() {

    super(title: "Login Page");
    getContentPane().setBackground(new Color(r: 173, g: 216, b: 230));
    setLayout(manager: null);


    //Image
    ImageIcon i4 = new ImageIcon(location: ClassLoader.getSystemResource(name: "images/logo1.jpg"));
    Image i5 = i4.getImage().getScaledInstance(width: 30, height: 30, hints: Image.SCALE_DEFAULT);
    ImageIcon i6 = new ImageIcon(image: i5);
    JLabel image1 = new JLabel(image: i6);
    image1.setBounds(x: 170, y: 22, width: 30, height: 30);
    add(comp: image1);


    //Title
    JLabel ebsheading = new JLabel(text: "Electricity Billing System");
    ebsheading.setBounds(x: 210, y: 17, width: 300, height: 40);
    ebsheading.setFont(new Font(name: "Tahoma", style: Font.PLAIN, size: 24));
    add(comp: ebsheading);


    //Username
    JLabel lblusername = new JLabel(text: "Username");
    lblusername.setBounds(x: 300, y: 120, width: 100, height: 20);
    add(comp: lblusername);

    username = new JTextField();
    username.setBounds(x: 400, y: 120, width: 150, height: 20);
    add(comp: username);


    //Password
    JLabel lblpassword = new JLabel(text: "Password");
    lblpassword.setBounds(x: 300, y: 160, width: 100, height: 20);
    add(comp: lblpassword);

    password = new JPasswordField();
    password.setBounds(x: 400, y: 160, width: 150, height: 20);
    add(comp: password);
```

Signup Page Code :

The below code specifies the designing code of the Signup page. It includes the Title, Label and the account type included in the Signup page.

```
Signup(){

    super(title: "SignUp Page");
    setSize(width: 640, height: 410);
    setLocation(x: 650, y: 350);
    getContentPane().setBackground(new Color(r: 173, g: 216, b: 230));
    setLayout(manager:null);

    //image
    ImageIcon il = new ImageIcon(location:ClassLoader.getSystemResource(name: "images/Light and Hand.jpg"));
    Image i2 = il.getImage().getScaledInstance(width: 200, height: 250, hints: Image.SCALE_DEFAULT);
    ImageIcon i3 = new ImageIcon(image: i2);
    JLabel image2 = new JLabel(image: i3);
    image2.setBounds(x: 50, y: 90, width: 200, height: 250);
    add(comp: image2);


    //Creating New Account
    JLabel ebsheading = new JLabel(text: "CREATING NEW ACCOUNT");
    ebsheading.setBounds(x: 210, y: 10, width: 300, height: 40);
    ebsheading.setFont(new Font(name: "Tahoma", style: Font.PLAIN, size: 18));
    add(comp: ebsheading);


    //Create Account As
    JLabel heading = new JLabel(text: "Create Account As");
    heading.setBounds(x: 290, y: 70, width: 110, height: 20);
    add(comp: heading);

    accountType = new Choice();
    accountType.add(item: "Admin");
    accountType.add(item: "Customer");
    accountType.setBounds(x: 420, y: 70, width: 150, height: 20);
    add(comp: accountType);


    //Meter Number
    JLabel lblmeter = new JLabel(text: "Meter Number");
    lblmeter.setBounds(x: 290, y: 110, width: 140, height: 20);
    lblmeter.setVisible(aFlag: false);
    add(comp: lblmeter);
```

Admin Validation Code :

The below code specifies the validation included in the Login page. The condition for the Username Length, name and Admin Password is specified in this code.

```
if (atype.equals(anObject: "Admin")) {
    if(Pattern.matches(regex: "^[0-9]+$", input: username.getText())){
        JOptionPane.showMessageDialog(parentComponent: this, message: "Invalid Username");

    }else{
    if(!Pattern.matches(regex: "^[a-z0-9]+$", input: username.getText())){

        JOptionPane.showMessageDialog(parentComponent: this, message: "Invalid Username");
    }
    else{
        String check1 = "select username from login where username = '"+username+"' ";
        ResultSet rs = c.s.executeQuery(string:check1);
        if ((rs.next())) {
            JOptionPane.showMessageDialog(parentComponent: this, message: "Username Unavailable");
        }
        else{
        if(!(username.length() >=3 && username.length() <=15)){
            JOptionPane.showMessageDialog(parentComponent: this, message: "Username Length Must be Between 3-15");
        }
        else{
            if(!Pattern.matches(regex: "^[A-Za-z ]+$", input: name.getText())){

                JOptionPane.showMessageDialog(parentComponent: this, message: "Invalid Name");
            }
            else{
                if(!(sname.length() <= 30)){
                    JOptionPane.showMessageDialog(parentComponent: this, message: "Sorry! Name Maximum Length is 30");
                }
                else{
                    if(!(spassword.length() >=8 && spassword.length() <=16)){
                        JOptionPane.showMessageDialog(parentComponent: this, message: "Password Length Must be Between 8-16");
                    }
                    else{
                        if(!(password.getText().equals(anObject: "adminPass@3rd"))){
                                JOptionPane.showMessageDialog(parentComponent: this, message: "Incorrect Password");
                        }
                        else{

                        query = "insert into login values('"+smeter+"', '"+username+"', '"+sname+"', '"+spassword+"', '"+atype+"')";
                        c.s.executeUpdate(string:query);

                        JOptionPane.showMessageDialog(parentComponent: this, message: "Account Created Successfully");
                        JOptionPane.showMessageDialog(parentComponent: this, "REMEMBER.!!\n" + "Username : "+username.getText());

                        setVisible(b: false);
                        new Login();
```

Home Page :

The below code specifies all the tab in the Admin's Home Page. It includes New Customer, Customer Details, Deposit Details, Calculate Bill and Bill Details.

```
202
203     public void actionPerformed(ActionEvent ae) {
204         String msg = ae.getActionCommand();
205         if (msg.equals(anObject: "New Customer")) {
206             new NewCustomer();
207         } else if (msg.equals(anObject: "Customer Details")) {
208             new CustomerDetails();
209         } else if (msg.equals(anObject: "Deposit Details")) {
210             new DepositDetails();
211         } else if (msg.equals(anObject: "Calculate Bill")) {
212             new CalculateBill();
213         } else if (msg.equals(anObject: "View Information")) {
214             new ViewInformation(meter);
215         } else if (msg.equals(anObject: "Update Information")) {
216             new UpdateInformation(meter);
217         } else if (msg.equals(anObject: "Bill Details")) {
218             new BillDetails(meter);
219         } else if (msg.equals(anObject: "Notepad")) {
220             try {
221                 Runtime.getRuntime().exec(command: "notepad.exe");
222             } catch (Exception e) {
223                 e.printStackTrace();
224             }
225         } else if (msg.equals(anObject: "Calculator")) {
226             try {
227                 Runtime.getRuntime().exec(command: "calc.exe");
228             } catch (Exception e) {
229                 e.printStackTrace();
230             }
231         } else if (msg.equals(anObject: "Exit")) {
232             setVisible(b: false);
233             new Login();
234         } else if (msg.equals(anObject: "Pay Bill")) {
235             new PayBill(meter);
236         } else if (msg.equals(anObject: "Generate Bill")) {
237             new GenerateBill(meter);
238         }
239     }
240
241     public static void main(String[] args) {
242         new Project(atype: "", meter: "");
243     }
244 }
245
```

Meter Information Code :

Information about the meter such as location where the meter is located inside the house or out, Customer name i.e., owner of the meter , Phase details and the unit consumed are mentioned in this code.

```
JLabel lblname = new JLabel(text: "Meter Number");
lblname.setBounds(x: 70, y: 80, width: 100, height:20);
image.add(comp: lblname);

JLabel lblmeternumber = new JLabel(text: meternumber);
lblmeternumber.setBounds(x: 200, y: 80, width: 100, height:20);
image.add(comp: lblmeternumber);

JLabel lblmeterno = new JLabel(text: "Meter Location");
lblmeterno.setBounds(x: 70, y: 120, width: 100, height:20);
image.add(comp: lblmeterno);

meterlocation = new Choice();
meterlocation.add(item: "Outdoor");
meterlocation.add(item: "Indoor");
meterlocation.setBounds(x: 200, y: 120, width: 100, height:20);
image.add(comp: meterlocation);

JLabel lbladdress = new JLabel(text: "Meter Type");
lbladdress.setBounds(x: 70, y: 160, width: 100, height:20);
image.add(comp: lbladdress);

metertype = new Choice();
metertype.add(item: "Electric Meter");
metertype.add(item: "Solar Meter");
metertype.add(item: "Smart Meter");
metertype.setBounds(x: 200, y: 160, width: 100, height:20);
image.add(comp: metertype);

JLabel lblcity = new JLabel(text: "Phase Code");
lblcity.setBounds(x: 70, y: 200, width: 100, height:20);
image.add(comp: lblcity);

phasecode = new Choice();
phasecode.add(item: "011-Phase");
phasecode.add(item: "022-Phase");
phasecode.add(item: "033-Phase");
phasecode.add(item: "044-Phase");
phasecode.add(item: "055-Phase");
phasecode.add(item: "066-Phase");
phasecode.add(item: "077-Phase");
phasecode.setBounds(x: 200, y: 200, width: 100, height:20);
image.add(comp: phasecode);

JLabel lblstate = new JLabel(text: "Bill Type");
lblstate.setBounds(x: 70, y: 240, width: 100, height:20);
image.add(comp: lblstate);

billtype = new Choice();
billtype.add(item: "Normal");
billtype.add(item: "Industial");
```

Bill Calculate :

All The charges included in the Bill such as services charge, service tax, swacch bharat, fixed tax are described in the below code.

```
        try {
            ConnectJDBC c = new ConnectJDBC();
            ResultSet rs = c.s.executeQuery(string:query);


            while(rs.next()) {

                if(unit_consumed <= 100){
                    totalbill += unit_consumed * 4;
                }
                else if(unit_consumed <= 300){
                    totalbill += (100*4) + (unit_consumed-100)*7;
                }
                else if(unit_consumed <= 500){
                    totalbill += (100*4) + (200*7) + (unit_consumed-300)*10;
                }
                else if(unit_consumed >500){

                    totalbill += (100*4) + (200*7) + (200*10) + (unit_consumed-500)*12;
                }

                totalbill += Integer.parseInt(s: rs.getString(string:"meter_rent"));
                totalbill += Integer.parseInt(s: rs.getString(string:"service_charge"));
                totalbill += Integer.parseInt(s: rs.getString(string:"service_tax"));
                totalbill += Integer.parseInt(s: rs.getString(string:"swacch_bharat_cess"));
                totalbill += Integer.parseInt(s: rs.getString(string:"fixed_tax"));
            }
        } catch (Exception e) {
            e.printStackTrace();
        }

        String query2 = "insert into bill values('"+meter+"', '"+month+"', '"+units+"', '"+totalbill+"', 'Not Paid')";

        try {
            ConnectJDBC c  =  new ConnectJDBC();
            c.s.executeUpdate(string:query2);

            JOptionPane.showMessageDialog(parentComponent: null, message:"Customer Bill Updated Successfully");
            setVisible(b: false);

        } catch (Exception e) {
            e.printStackTrace();
        }
        }
    } else {
        setVisible(b: false);
    }
}
```

Update Information :

The below code helps to update the customer information.

```
JLabel lblemail = new JLabel(text: "Email");
lblemail.setBounds(x: 300, y: 270, width: 100, height:20);
lblemail.setForeground(fg: Color.WHITE);
image.add(comp: lblemail);

tfemail = new JTextField();
tfemail.setBounds(x: 440, y: 270, width: 200, height:20);
image.add(comp: tfemail);

JLabel lblphone = new JLabel(text: "Phone");
lblphone.setBounds(x: 300, y: 310, width: 100, height:20);
lblphone.setForeground(fg: Color.WHITE);
image.add(comp: lblphone);

tfphone = new JTextField();
tfphone.setBounds(x: 440, y: 310, width: 200, height:20);
image.add(comp: tfphone);

try {
    ConnectJDBC c = new ConnectJDBC();
    ResultSet rs = c.s.executeQuery("select * from customer where meter_no = '"+meter+"'");
    while(rs.next()) {
        name.setText(text: rs.getString(string:"name"));
        tfaddress.setText(t: rs.getString(string:"address"));
        tfcity.setText(t: rs.getString(string:"city"));
        tfstate.setText(t: rs.getString(string:"state"));
        tfemail.setText(t: rs.getString(string:"email"));
        tfphone.setText(t: rs.getString(string:"phone"));
        meternumber.setText(text: rs.getString(string:"meter_no"));
    }
} catch (Exception e) {
    e.printStackTrace();
}

update = new JButton(text: "Update");
update.setBackground(bg: Color.BLACK);
update.setForeground(fg: Color.WHITE);
update.setBounds(x: 340, y: 390, width: 100,height:25);
image.add(comp: update);
update.addActionListener(l: this);

cancel = new JButton(text: "Cancel");
cancel.setBackground(bg: Color.BLACK);
cancel.setForeground(fg: Color.WHITE);
cancel.setBounds(x: 470, y: 390, width: 100,height:25);
image.add(comp: cancel);
cancel.addActionListener(l: this);
```

Pay Bill :

This code allows the customers to pay the bill it has two button “pay” and “back”. The pay button will redirect to payment gate way and back will close the pay bill window.

```
try {
    ConnectJDBC c = new ConnectJDBC();
    ResultSet rs = c.s.executeQuery("select * from customer where meter_no = '"+meter+"'");
    while(rs.next()) {
        meternumber.setText(text: meter);
        labelname.setText(text: rs.getString(string:"name"));
    }

    rs = c.s.executeQuery("select * from bill where meter_no = '"+meter+"' AND month = 'January'");
    while(rs.next()) {
        labelunits.setText(text: rs.getString(string:"units"));
        labeltotalbill.setText(text: rs.getString(string:"totalbill"));
        labelstatus.setText(text: rs.getString(string:"status"));
    }
} catch (Exception e) {
    e.printStackTrace();
}

cmonth.addItemListener(new ItemListener(){
    @Override
    public void itemStateChanged(ItemEvent ae) {
        try {
            ConnectJDBC c = new ConnectJDBC();
            ResultSet rs = c.s.executeQuery("select * from bill where meter_no = '"+meter+"' AND month
            while(rs.next()) {
                labelunits.setText(text: rs.getString(string:"units"));
                labeltotalbill.setText(text: rs.getString(string:"totalbill"));
                labelstatus.setText(text: rs.getString(string:"status"));
            }
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
});


pay = new JButton(text: "Pay");
pay.setBackground(bg: Color.BLACK);
pay.setForeground(fg: Color.WHITE);
pay.setBounds(x: 100, y: 460, width: 100, height:25);
pay.addActionListener(l: this);
add(comp: pay);

back = new JButton(text: "Back");
back.setBackground(bg: Color.BLACK);
back.setForeground(fg: Color.WHITE);
back.setBounds(x: 230, y: 460, width: 100, height:25);
back.addActionListener(l: this);
add(comp: back);
```

Generate Bill :

This code contains the customer, meter, tax, total bill, and unit consumed by the customer with final payable amount.

```
if(rs.next()) {
    area.append("\n    Customer Name : " + rs.getString(string:"name"));
    area.append("\n    Meter Number : " + rs.getString(string:"meter_no"));
    area.append("\n    Address : " + rs.getString(string:"address"));
    area.append("\n    City : " + rs.getString(string:"city"));
    area.append("\n    State : " + rs.getString(string:"state"));
    area.append("\n    Email : " + rs.getString(string:"email"));
    area.append("\n    Phone : " + rs.getString(string:"phone"));
    area.append(str:"\n---------------------------------------------------");
    area.append(str:"\n");
}

rs = c.s.executeQuery("select * from meter_info where meter_no = '"+meter+"'");

if(rs.next()) {
    area.append("\n    Meter Location : " + rs.getString(string:"meter_location"));
    area.append("\n    Meter Type : " + rs.getString(string:"meter_type"));
    area.append("\n    Phase Code : " + rs.getString(string:"phase_code"));
    area.append("\n    Bill Type : " + rs.getString(string:"bill_type"));
    area.append("\n    Days : " + rs.getString(string:"days"));
    area.append(str:"\n---------------------------------------------------");
    area.append(str:"\n");
}

rs = c.s.executeQuery(string:"select * from tax");

if(rs.next()) {
    area.append(str:"\n");
    area.append("\n    1-100 : Cost Per Unit : " + unit100);
    area.append("\n    101-300 : Cost Per Unit : " + unit300);
    area.append("\n    301-500 : Cost Per Unit : " + unit500);
    area.append("\n    Greater than 500 : Cost Per Unit : " + unitg500);
    area.append("\n\n    Meter Rent : " + rs.getString(string:"meter_rent"));
    area.append("\n    Service Charge : " + rs.getString(string:"service_charge"));
    area.append("\n    Service Tax : " + rs.getString(string:"service_tax"));
    area.append("\n    Swacch Bharat Abhiyan : " + rs.getString(string:"swacch_bharat_cess"));
    area.append("\n    Fixed Tax : " + rs.getString(string:"fixed_tax"));
    area.append(str:"\n");
}

rs = c.s.executeQuery("select * from bill where meter_no = '"+meter+"' and month='"+month+"'");

if(rs.next()) {
    area.append(str:"\n");
    area.append("\n    Current Month : " + rs.getString(string:"month"));
    area.append("\n    Units Consumed : " + rs.getString(string:"units"));
    area.append("\n    Total Charges : " + rs.getString(string:"totalbill"));
    area.append(str:"\n---------------------------------------------------");
    area.append("\n    Total Payable : " + rs.getString(string:"totalbill"));
    area.append(str:"\n");
}
```

5.2.2 Code Efficiency

Given an integer **U** denoting the amount of KWh units of electricity consumed, the task is to calculate the electricity bill with the help of the below charges:

- 1 to 100 units :- Rs 4/unit
- 100 to 300 units :- Rs 7/unit
- 300 to 500 units :- Rs 10/unit
- above 500 units :- Rs 12/unit

Examples1 :

Input: U = 250
Output: 1670

Explanation:
Charge for the first 100 units – 4*100 = 400
Charge for the 100 to 300 units – 7*150 = 1050
Including all the Tax = 220
Total Electricity Bill = 400+ 1050 + 220= 1670

Examples2 :

Input : U = 95
Output : 600

Explanation :
Charge for the first 100 units – 4*95 = 380
Including all the Tax = 220
Total Electricity Bill = 380 + 220 = 600

Approach : The idea is to identify the charge bar in which it falls and then calculate the bill according to the charges mentioned above. Below is the illustration of the steps:

- Check units consumed is less than equal to the 100, If yes then the total electricity bill will be :

  Total Electricity Bill = 220 + (units * 4)

- Else if, check that units consumed is less than equal to the 300, if yes then total electricity bill will be :

  Total Electricity Bill = 220 + (100*4) + (units-100)*7

- Else if, check that units consumed is less than equal to the 500, if yes then total electricity bill will be :

Total Electricity Bill = 220 + (100*4) + (200*7) + (units-300)*10

- Else if, check that units consumed greater than 500, if yes then total electricity bill will be :

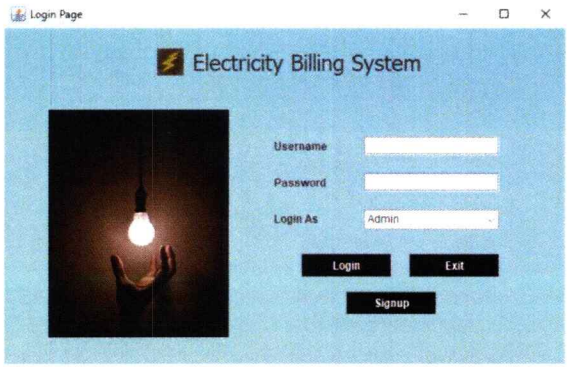
  Total Electricity Bill = 220 + (100*4) + (200*7) + (200*10) + (units-500)*12

Time Complexity & Auxiliary Space :
Time Complexity : O(1)
Auxiliary Space : O(1)

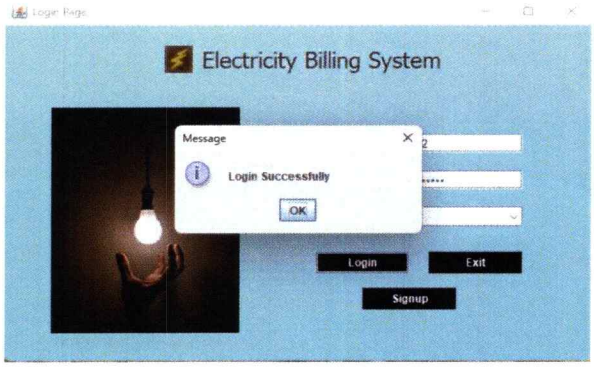
5.3 Testing Approach

5.3.1 Unit Testing

A "Unit" is the smallest possible software component in your app (i.e, functions, classes, or components). Individual unit tests make sure that the core component of your app is behaving as expected, and that a future commit to one area of your code doesn't break code in another. If it does, you likely have a bug in either your new or old code (or in a poorly written/outdated test).

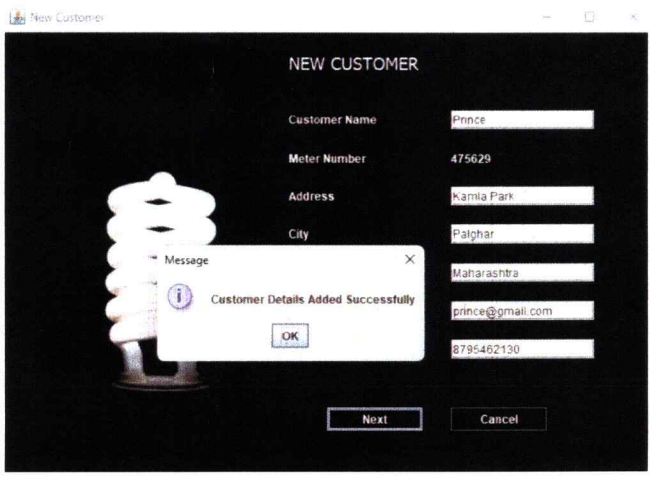


If the admin enters the specified password Login successful messages appears on the screen.



5.3.2 Integrated Testing

Integration testing (sometimes called integration and testing, abbreviated I&T) is the phase in software testing in which individual software modules are combined and tested as a group. Integration testing is conducted to evaluate the compliance of a system or component with specified functional requirements. It occurs after unit testing and before system testing. Integration testing takes as its input modules that have been unit tested, groups them in larger aggregates, applies tests defined in an integration test plan to those aggregates, and delivers as its output the integrated system ready for system testing



5.3.3 System Testing

System testing, also referred to as system-level tests or system-integration testing, is the process in which a quality assurance (QA) team evaluates how the various components of an application interact together in the full, integrated system or application.

5.4 Modifications and Improvements

Error 1 :

```
public class Start extends JFrame implements Runnable {

    Thread t;

    public Start(){

        ImageIcon img = new ImageIcon(location: ClassLoader.getSystemResource(name: "images/Start.jpg"));
        JLabel lbl = new JLabel(image: img);
        add(comp: lbl);


        setSize(width: 1640,height: 720);
        setLocation(x: 150,y: 130);
        setVisible(b: true);

        t = new Thread(new Start());
        t.start(); // to call run()
```

Epilogue :

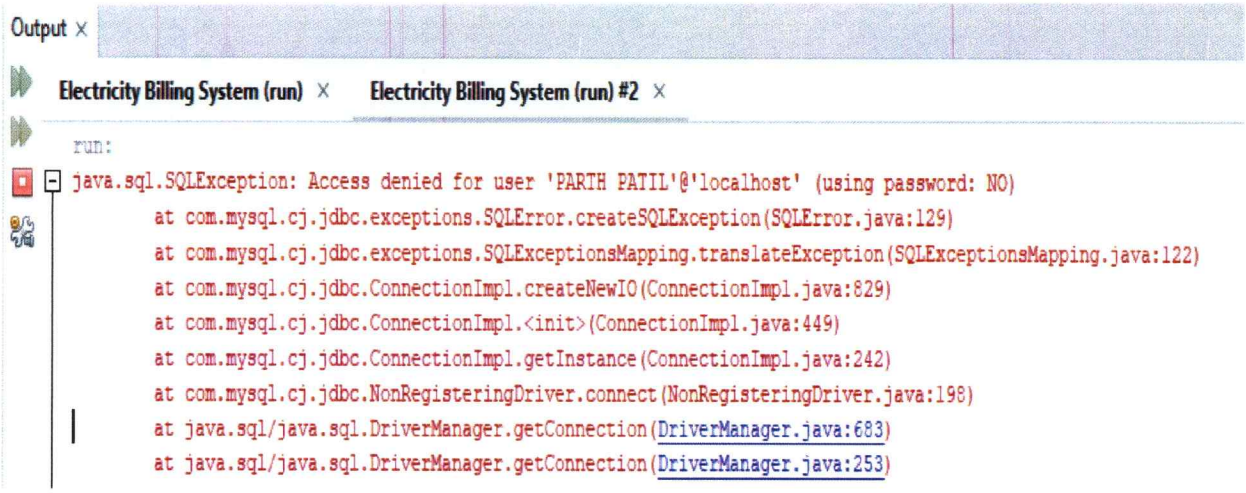
In above code the selected line of code was leading to infinity loop because we passed the parameter as object of the class.

Modified code :

```
public class Start extends JFrame implements Runnable {

    Thread t;

    public Start(){

        ImageIcon img = new ImageIcon(location: ClassLoader.getSystemResource(name: "images/Start.jpg"));
        JLabel lbl = new JLabel(image: img);
        add(comp: lbl);


        setSize(width: 1640,height: 720);
        setLocation(x: 150,y: 130);
        setVisible(b: true);

        t = new Thread(task: this);
        t.start(); // to call run()
```

In the above code the error was solved by passing the reference of the class by using **this** keyword.

Error 2 :



Epilogue :

This exception occurred because there was a error in the connecting string which is used for database connection. The error was there was no specification of user and password.

Modified code :

In the above code the error was solved by passing the proper user and password in the connecting string.

Error 3 :

```
134             }
135         } else if (ae.getSource() == cancel) {
136
137             setVisible(b: false);
138
139         } else if (ae.getSource() == signup) {
140
141             setVisible(b: false);
142             new Signup();
143         }
144     }
```

Epilogue :

Because of the above code the system was closing even after clicking on cancel button even after setting visibility to false.

Modified code :

```
134             }
135         } else if (ae.getSource() == cancel) {
136
137             System.exit(status: 1);
138             setVisible(b: false);
139
140         } else if (ae.getSource() == signup) {
141
142             setVisible(b: false);
143             new Signup();
144         }
145     }
```

In the above code now by clicking on the cancel button the entire project gets closed by using system. exit() command.

Error 4 :

Epilogue :

In this project we have admin and customer login. Meter No. field was available for the logins but it should be available only for the customer login.

Modified code :

```
109
        accountType.addItemListener(new ItemListener() {
            public void itemStateChanged(ItemEvent ae) {
112
                String user = accountType.getSelectedItem();
114
                if (user.equals(anObject: "Customer")) {
                    lblmeter.setVisible(aFlag: true);
                    meter.setVisible(aFlag: true);
                    name.setEditable(b: false);
                } else {
                    lblmeter.setVisible(aFlag: false);
                    meter.setVisible(aFlag: false);
                    name.setEditable(b: true);
                }
            }
        });
126
```

In the above code we added event on the dropdown list, where after selecting customer the Meter No. is available now only for customer login.

5.5 Test Cases

UNIT TEST CASES

Following is the Negative test case report for the **Login and signup process** of different individuals according to their designations.

Test Scenario:		Login / Signup	Test case ID:		UT	
Pre-Requisite:		A valid account	Priority:		Very High	
Sr. No.	Action	Input	Expected Output	Obtained Output	Test Result	Efficiency
1	Admin Login	Incorrect Username/Password	Enter valid details	Login Successful	Fail	100%
2	Customer Login	Incorrect Username/Password	Enter valid details	Enter valid details	Pass	100%
3	Registration (Admin)	Incorrect Credentials	Enter valid details	Signup Successful	Fail	100%
4	Registration (Customer)	Incorrect Credentials	Enter valid details	Enter valid details	Pass	100%

Table 5.5.1 Negative Unit Test Cases

Negative testing ensures that your application can gracefully handle invalid input or unexpected user behavior. In the above Test cases incorrect details were entered to test the system against the invalid or unexpected details and 2 out of 4 test cases were pass by the system.

Remark: 2 out of 4 processes were found to be successful with 50% accuracy.

Conclusion: NEGATIVE TESTING WAS PASSED!

Following is the Positive test case report for the **Login and signup process** of different individuals according to their designations.

Test Scenario:		Login / Signup	Test case ID:		UT	
Pre-Requisite:		A valid account	Priority:		Very High	
Sr. No.	Action	Input	Expected Output	Obtained Output	Test Result	Efficiency
1	Admin Login	Username/Password	Admin Panel (Home Page)	Admin Panel (Home Page)	Fail	100%
2	Customer Login	Username/Password	User Panel (Home Page)	User Panel (Home Page)	Pass	100%
3	Registration (Admin)	Registration Credentials	Registration Successful	Enter valid details	Fail	100%
4	Registration (Customer)	Registration Credentials	Enter valid details	Enter valid details	Pass	100%

Table 5.5.2 Positive Unit Test Cases

Positive testing is a testing technique to show that a product or application under test does what it is supposed to do and is provided with the correct details. In the above test cases 2 out of 4 Test was unsuccessful.

Remark: 2 out of 4 processes were found to be successful. 50% accuracy was achieved.

Conclusion: POSITIVE TESTING WAS PASSED!

INTEGRATED TEST CASES

Following is the test report for different process included in an **Deposit Details** process.

Test Scenario:		Deposit Details	Test case ID:		IT	
Pre-Requisite:		A valid account	Priority:		Very High	
Sr. No.	Action	Input	Expected Output	Obtained Output	Test Result	Efficiency
1	Search	Meter No. / Month	Bill Details(Paid /Unpaid)	Bill Details(Paid /Unpaid)	Pass	100%
2	Print	Meter No. / Month	Print Bill	Print Bill	Pass	100%

Table 5.5.3 Integrated Test Cases

After entering the correct Meter No. and Month customer can search the units consumed by clicking on the search button and can print the bill by clicking on the print button. The system passed both the test as it was working as per its requirements.

Remark: Both the processes were found to be successful. 100% accuracy was achieved.

Conclusion: DEPOSIT DETAILS TESTING PASSED!

CHAPTER 6

RESULTS AND DISCUSSION

6.1 Test Reports

FINAL TEST REPORT 1

Following is the final test report for the **Login process** of different individuals according to their designations.

Test Scenario:		Login	Test case ID:		SP1	
Pre-Requisite:		A valid account	Priority:		Very High	
Sr. No.	Action	Input	Expected Output	Obtained Output	Test Result	Efficiency
1	Admin Login	Username/Password	Admin Panel (Home Page)	Admin panel (Home Page)	Successful	100%
2	User Login	Username/Password	User Panel (Home Page)	User Panel Home Page)	Successful	100%

Table 6.1.1 Final Test Report 1

It was observed that the Login form pages for admin & user were loaded successfully with the expected layout & 100% accuracy. On entering the relevant details into the form, the expected output was obtained.

Remark: All the processes were found to be successful with 100% accuracy.

Conclusion: LOGIN PROCESS TESTING PASSED!

FINAL TEST REPORT 2

Following is the final test report for the **Registration process** of different individuals according to their designations.

Test Scenario:		Registration	Test case ID:		SP2	
Pre-Requisite:		A valid account	Priority:		Very High	
Sr. No.	Action	Input	Expected Output	Obtained Output	Test Result	Efficiency
1	Admin Registration	Name/Username/ Password	Registration Successful (notification)	Registration Successful (notification)	Successful	100%
2	User Registration	Name/Username/ Password	Registration Successful (notification)	Registration Successful (notification)	Successful	100%

Table 6.1.2 Final Test Report 2

The Registration Form pages for Admin & User were loaded successfully with the expected layout& 100% accuracy. On entering the relevant details into the form, the expected output was obtained. All the details were exactly inserted to the respective database successfully after clicking the "Register" button.

Remark: All the processes were found to be successful with 100% accuracy.

Conclusion: REGISTRATION TESTING PASSED!

FINAL TEST REPORT 3

Following is the test report for different process included in an **Deposit Bill Details** process.

Test Scenario:		Deposit Bill Details	Test case ID:		SP3	
Pre-Requisite:		A valid account	Priority:		Very High	
Sr. No.	Action	Input	Expected Output	Obtained Output	Test Result	Efficiency
1	Search	Meter No. / Month	Bill Details	Bill Details	Pass	100%
2	Print	Meter No. / Month	Print Bill	Print Bill	Pass	100%

Table 6.1.3 Final Test Report 3

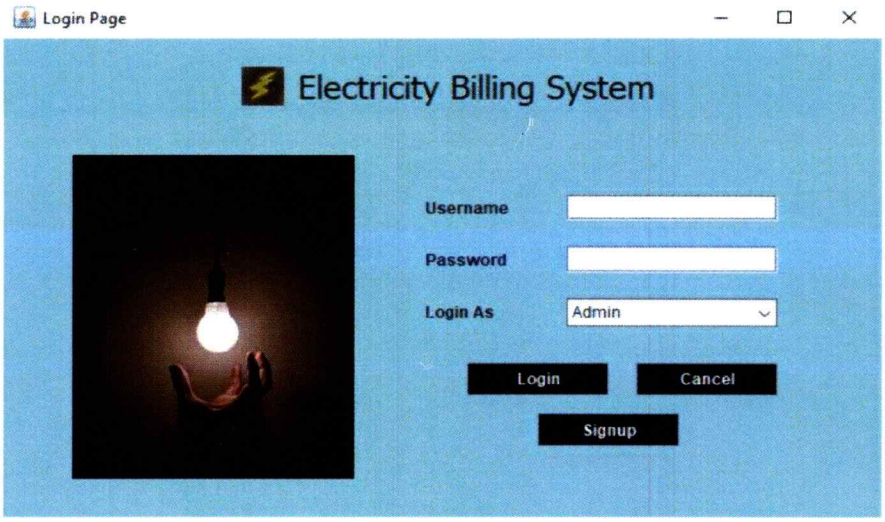
After entering the correct Meter No. and Month customer can search the units consumed by clicking on the search button and can print the bill by clicking on the print button. The system passed both the test as it was working as per its requirements.

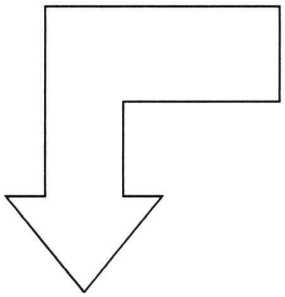
Remark: Both the processes were found to be successful. 100% accuracy was achieved.

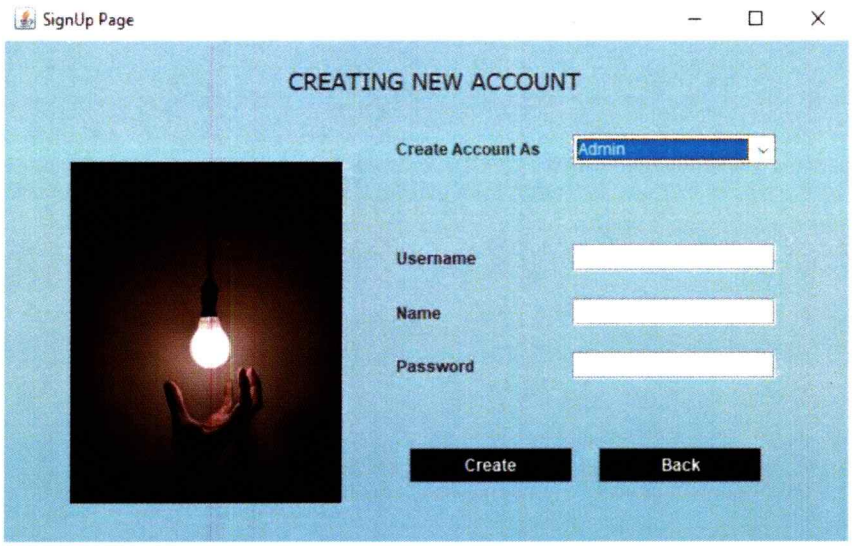
Conclusion: Deposit Bill Details testing passed

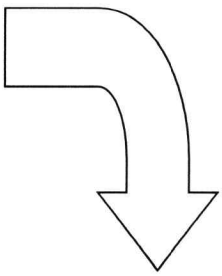
6.2 User Documentation

Admin :

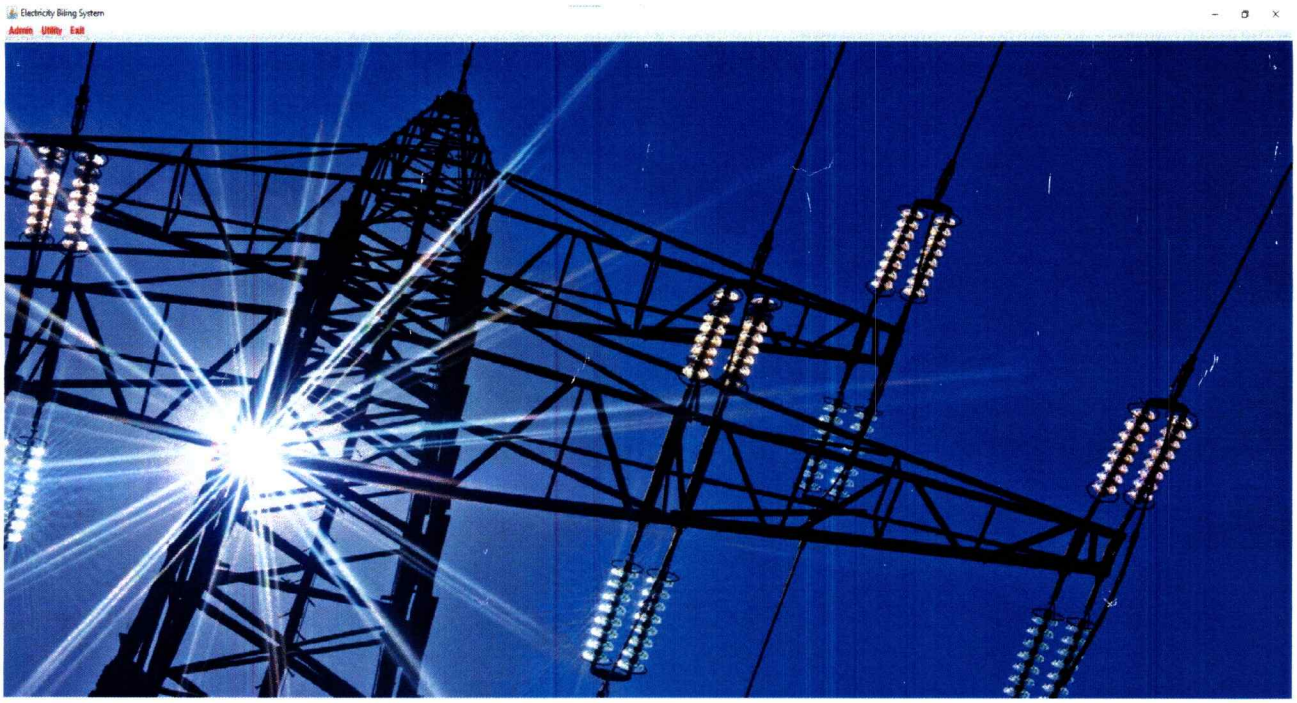




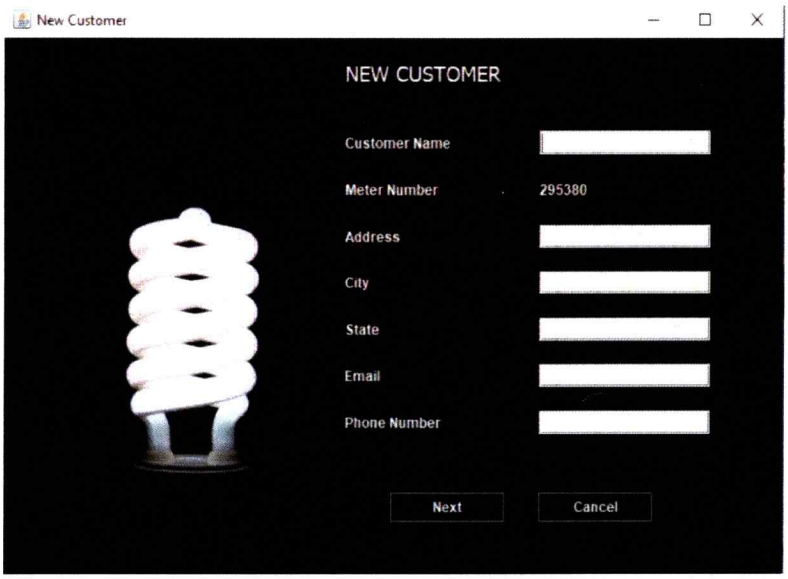




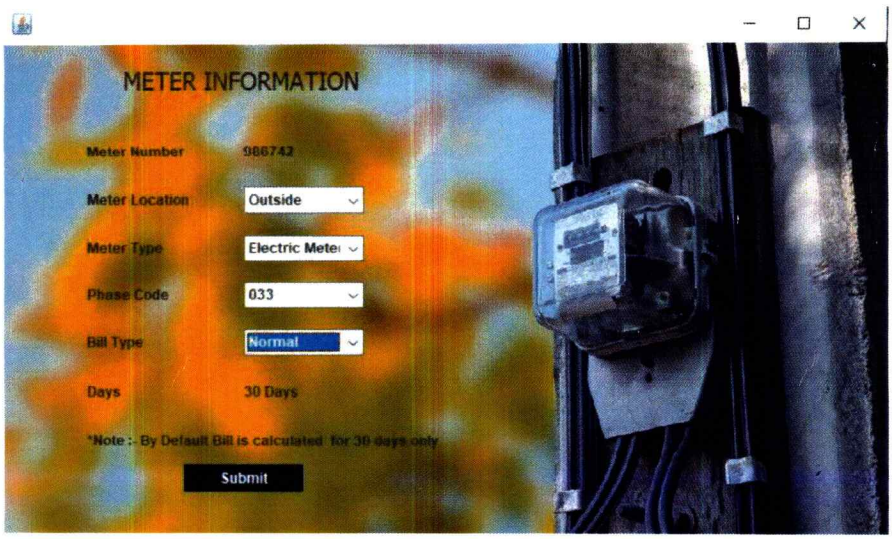
After Signup admin will be redirected again to login page



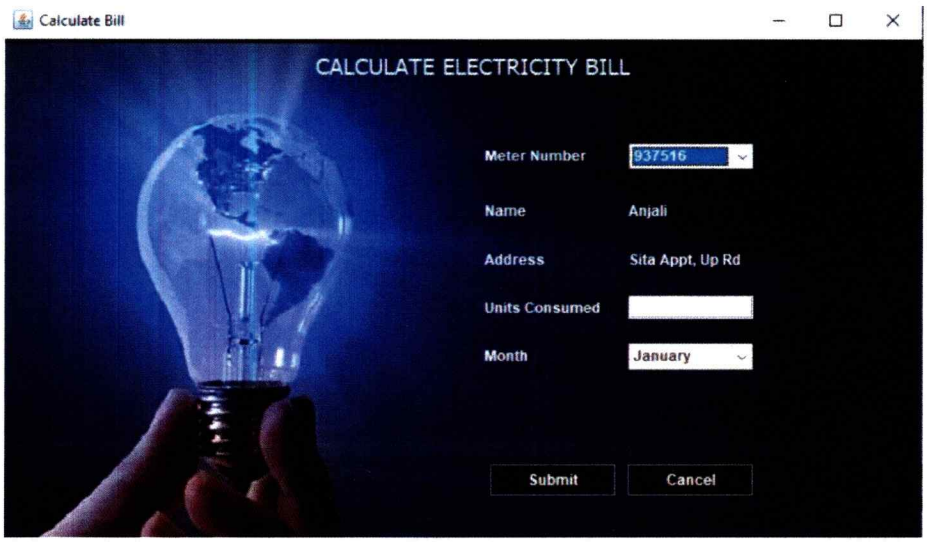
After Login admin will be redirect to the above main window



Admin will create a customer who is pursuing meter.

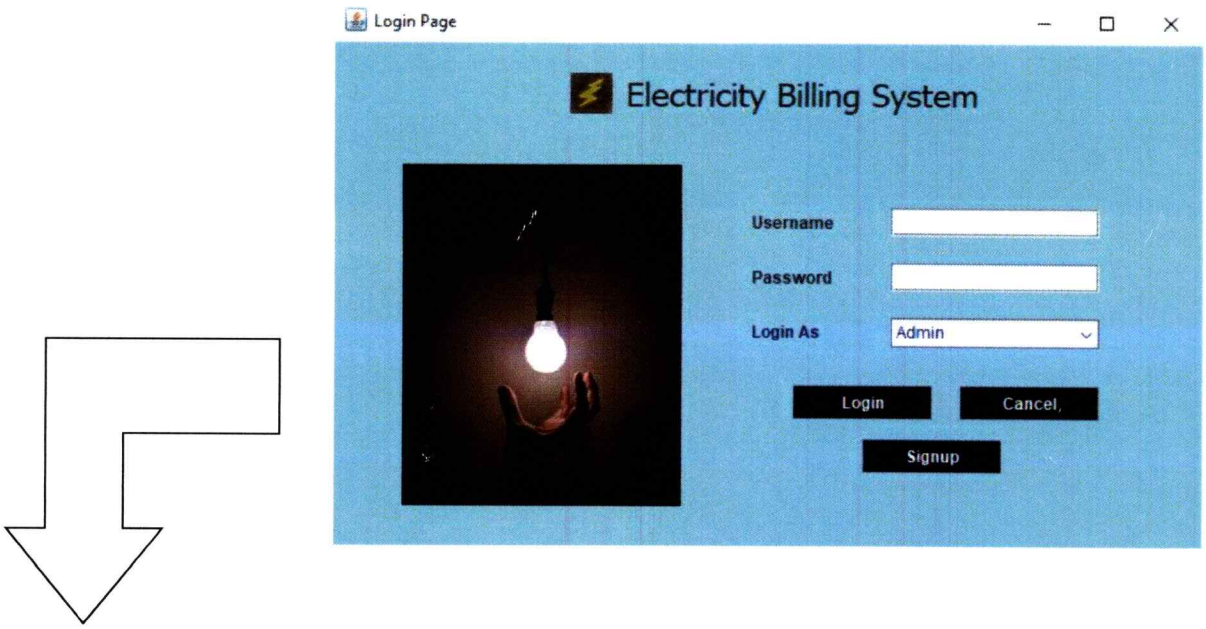


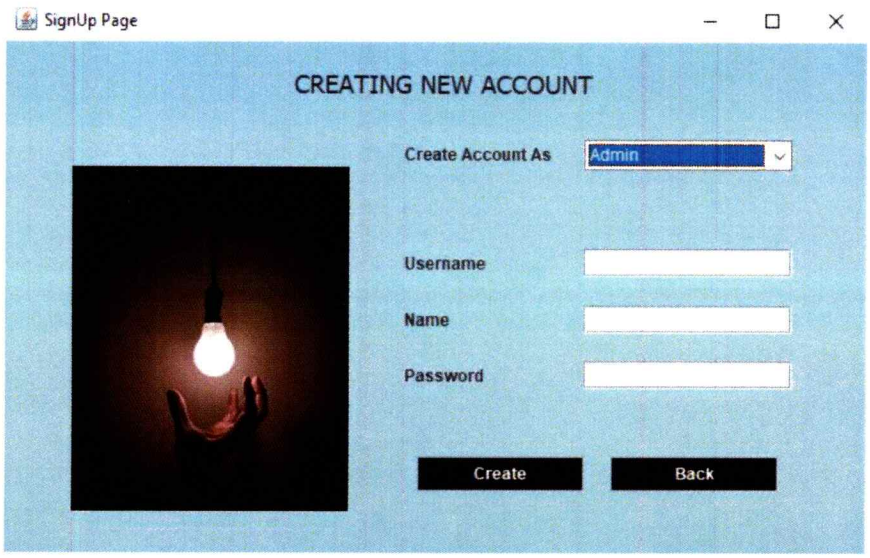
Adding meter information



Admin will add the unit consumed by the customer .

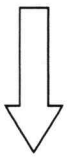
Customer :

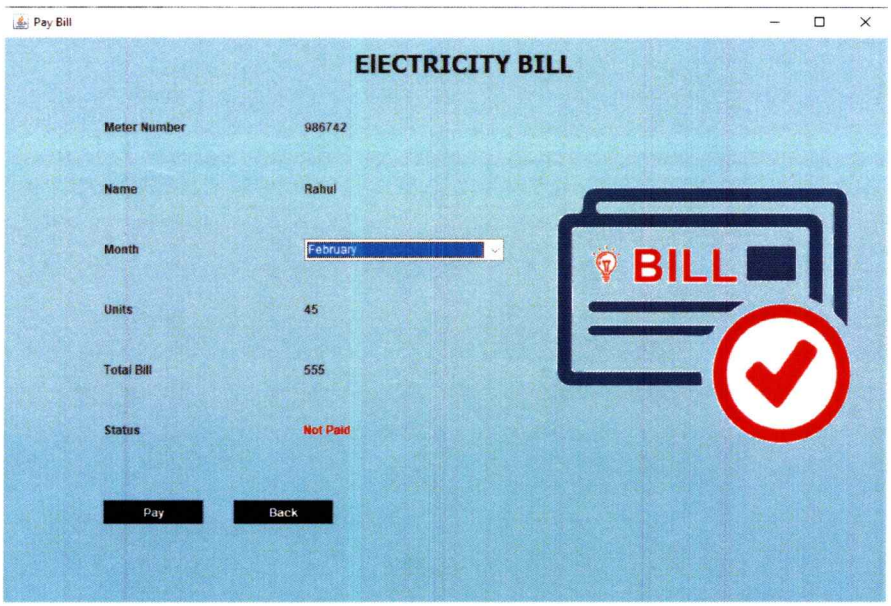




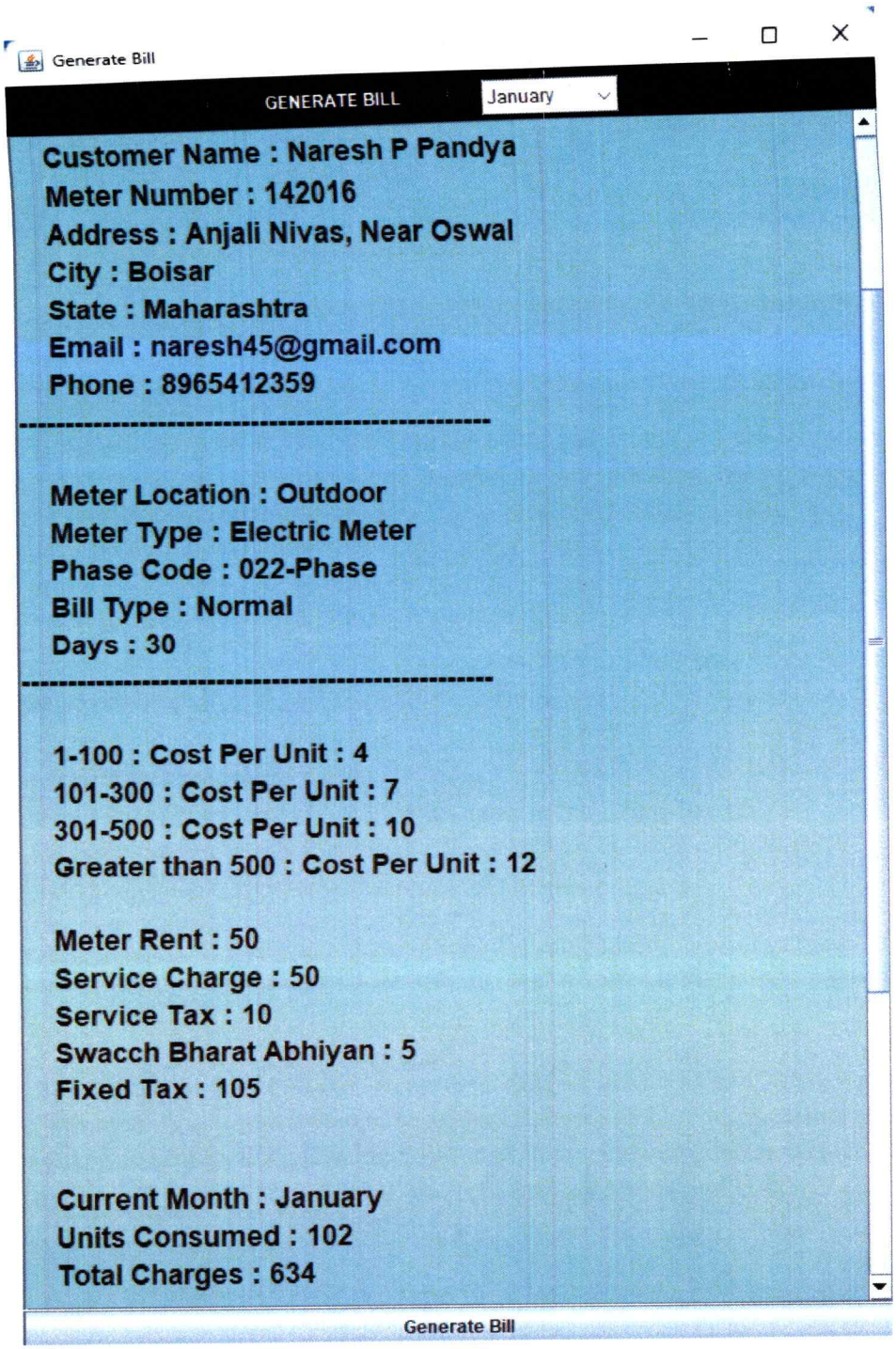
After Signup admin will be redirected again to login page

After Login customer gets redirected to customer main window.





Customer will check for the amount to be paid.



Generate Bill is the last process of the customer after paying the bill.