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IOT based Smart Switches

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Abstract

Unattended electrical appliances are a major source of electricity wastage; sometimes the appliances are kept switched on for an entire night even when nobody is in the house or a building due to sheer negligence of individuals. Smart home not only refers to reducing human efforts but also energy efficiency and time savings. Devices when remotely monitored and controlled to a central system via internet, are an important constituent of the Internet of things. The researchers have tried to implement the Internet of Things (IoT) technology to monitor and control the electrical equipments of the Sonopant Dandekar College library using Wi-Fi and a Smartphone app. The current paper analyses the objectives, problems, requirements and future implementation of IoT led systems.

Keywords: remotely, efficiency, Wi-Fi

Objectives of Study

The objectives of present study are:

1. To analyze the electricity consumption patterns in the organizations and suggest measures to monitor electricity
2. Implement IoT systems to control the electricity wastage, and to reduce electricity bills.

Research Methodology:

The researcher has used primary as well as secondary data that has been collected from various articles, journals, books, websites etc. The data is been used to study the electricity consumption of an organization. All the data included have proper references wherever necessary.

Electricity Wastage Issues

Electricity is one of the basic needs of an organization. The overall process of an organization depends on the availability of electricity. The organization has to shell out a chunk of its profit for paying the electricity bills. If the electricity consumption pattern is managed properly, we could save lots of money. Most of the electricity of an organization is consumed by the I.T department. The whole organization uses power at all the time. If we could understand how much power we require, how the power is been used then it will be very easy to conserve the power by altering our power supply requirements. Energy efficiency is very important when you want to save money. The Electricity wastage problem will be very crucial in near future, as the sources of Power generation will be depleted sooner or later.

Power Wastage in Organizations

The wastage of electricity is greater in an organization rather than a common household, as there are more electrical equipments, more people to consume the power, I.T department where most of the energy is consumed. The policy and practices of any organization, affects the power consumption heavily. In some organizations, the work is done in shifts; that means the air conditioners, computers and other equipments are running 24*7 utilizing much more energy.

The employees may not be bothered to save electricity and the result would be heavy electricity bills at the end of the month, turning profits into expenses.

Internet of Things (IoT)

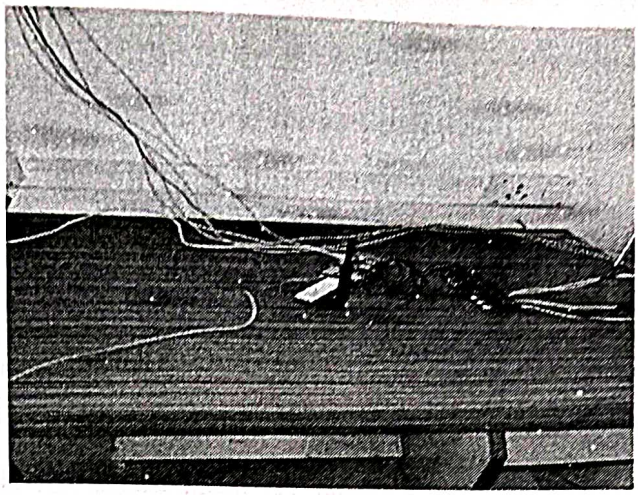
IoT is a system of connected devices, which exchange information with each other. That information is generated from various sensors and devices. The information is further processed and categorized in a different form, as a whole making our lives easier. IoT is viewed as a smart technology as it requires minimum or no human interference to perform the tasks.

Application: Iot allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer based systems, and resulting in improved efficiency and economic benefit.

Problems in Library

1. Our library's electrical appliances (fans, lights) are unnecessarily switched on.
2. Since there are only two librarians it's quite complicate for them to do library's work and switch on and off the electrical appliances simultaneously.

IoT System implementation in Library



Requirements

The system can be implemented with minimum requirements as:

i. Raspberry pie
ii. Relays
iii. SD Card
iv. 5 Volt power supply
v. Wires

Costing

Approximately:

2 rasberry pie=6000

3 rellays=1500

2 Sd card=500

Wires=500

Apx. Total = 8500

Advantages

1. Reduces the consumption of electricity.
2. Switches can be controlled wirelessly.
3. The range to control switches are infinite.

Disadvantages

1. Working internet connections are required.
2. The implementation is a bit complex.
3. 10 watt of additional power is consumed.

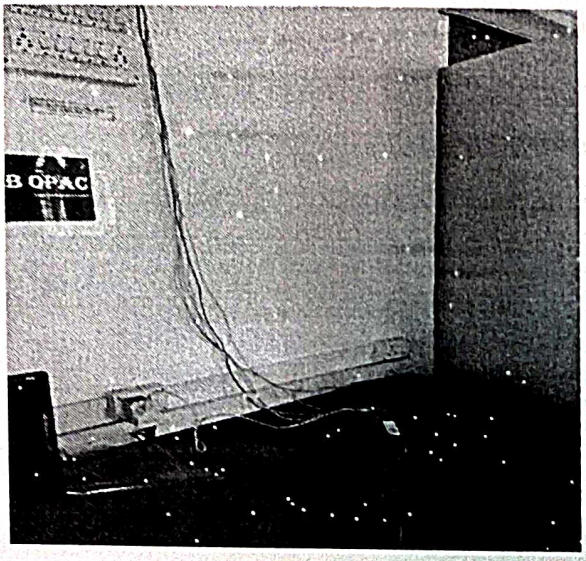
Problems in Implementation

1. Availability of compatible equipments was difficult.
2. The existing wiring in the electrical switch board had to be re-wired.
3. Every device needed an internet connection, thus the smart phones and the library needed Wi-Fi connections, which were available fortunately.

Future applications in college premises

1. If the lab doors contain sensors and cameras then the students and teachers can simply show there ID and the door will be automatically opened.
2. The college auditorium, seminar halls, IT labs, classrooms can also be controlled using this smart systems as same as the library.
3. It could be used as a security measure for students, as small sensors could be attached to the bags, or wore as the wrist band and they will pinpoint the exact location of the individual using Global Positioning Systems(GPS).
4. Using smart sensors we will be able to control the water overflow from the tanks. Whenever the Water tanks are overfilled, a sensor will start beeping indicating that it's the time to switch the motor off.

Images of Assembling the system



Findings/Conclusion

The IoT technology is very efficient and can be implemented in an organization at a reasonable cost to conserve electricity, water and security aspects. The system was implemented in the College Library on an experimental basis. The testing was conducted by actually rewiring the electricity switch board and connecting the IoT kit with the system. One volunteer was sent outside the library, in the college campus with a smart phone equipped with Internet Connection.

The volunteer was able to switch on/off the fans and tube lights by simply using an app. The researchers plan to implement the system in other college buildings after conducting a proper survey of the college campus and the buildings inside the campus. As the technology can be implemented with minimum requirements it can be very effectively used and managed by the staff.

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