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IOT Based Energy Saving in E &TC Department

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ABSTRACT—

The Internet of Things (IoT) has revolutionized the way we interact with devices and systems. In this paper, we present an IoT based energy-saving system for the Electrical and Telecommunication Engineering (E&TE) department. The proposed system monitors and controls the energy consumption of devices and equipment in the department, thereby reducing energy wastage and promoting sustainability. The system consists of several components including sensors, microcontrollers, and a cloud-based platform for data storage and analysis. The sensors monitor the motion of human's and send the data to the microcontrollers, through the relay light will be ON/OFF to optimize the energy usage. The cloud-based platform collects and stores the data from the sensors and provides real-time analytics and visualizations for energy management.

Keywords— IOT, ESP8266, PIR, ThingSpeak, Arduino.

I. INTRODUCTION

Recent years have seen a huge increase in the importance of energy conservation due to environmental concerns including climate change and global warming. The excessive use of energy in the creation of electricity is a major contributor to environmental problems. Reduced energy waste and effective energy utilization are therefore urgently needed. Around 20 percent of the energy used worldwide is used by lights, and of that, 50 percent is lost as waste. People use a variety of lifestyles and practices to reduce energy waste. But even so, we sometimes forget to do simple things like turn off the lights and fans during the daily rush, which results in energy waste. The proposed system will therefore automatically complete the routine tasks that are often forgotten to avoid such occurrences.

Regarding this topic, there are already a lot of systems on the market, but they are not very effective and are also very large. In order to fix this flaw in the previous systems, we tried to do so in this one. LDR sensors and IR sensors installed in the rooms are used by the current systems. Implementing these approaches just requires minor changes to the current infrastructure. To maximize efficiency, the suggested system concentrates on implementing the sensors at the micro level. Reducing the amount of electricity wasted by classroom appliances is the major goal. Lights and fans are considered "classroom appliances" in this context. Numerous times, even when nobody is in the classroom, the lights and fans are left on. In the classroom, IR and LDR sensors are utilized to detect people and light, respectively. Furthermore, the hub receives this data. In its simplest form, a hub is a location that collects data from a collection of benches. It is also possible to adjust the status of devices manually, such as lighting, and this information is then transferred to the microcontroller, which causes the system to react appropriately.

II. LITERATURE SURVEY

The study of "IoT" was thorough and included multiple relationships and limitations. The basic objective of "IoT" is to make Internet-based communications and the sending and receiving of information conventionally available when used with "electronic sensor" devices. Contrary to software development, the major goal of the IoT is to incorporate organizations, automation, and mechanization; the most commonly recycled sensors with accelerometers are embedded in camps like "MCUS, MPUs" at the beginning of the programmed. According to the initial assessment, software development in general is comparable to the "IoT phase is separated into criteria, specifications, and implementation." This section explains earlier studies that are relevant to our inquiry. Energy utilization principles are the subject of the majority of research conducted today since they offer the best chance of reducing energy use. Other possibilities include creating green universities and using renewable energy sources like solar electricity. Green universities help with overall university energy needs while reducing environmental pollutants. Walter Simpson asserts that by focusing on the supply side of the energy equation, an aggressive university energy conservation program can reduce university energy use by 30% or more. It entails switching to energy sources and technologies that are clean, renewable, and not carbon-based. The approach includes creating energy regulations for universities, managing the computer explosion, avoiding the problems of electric deregulation, purchasing green power, and applying green building design. This study suggests that one effective strategy to cut university energy use is through technology solutions. Our solution combines the solutions mentioned previously. It is a

monitoring system for the classroom as well as an energy- saving solution. Only individuals are accurately identified and the electrical gadgets are automatically controlled in the energy-saving section. The passive infrared sensor (PIR) was employed for this task. It appropriately recognizes the human body. The proposed system was created to use several types of sensors to automatically regulate the conventional manual switching mechanism.

III. PROPOSED METHODOLOGY

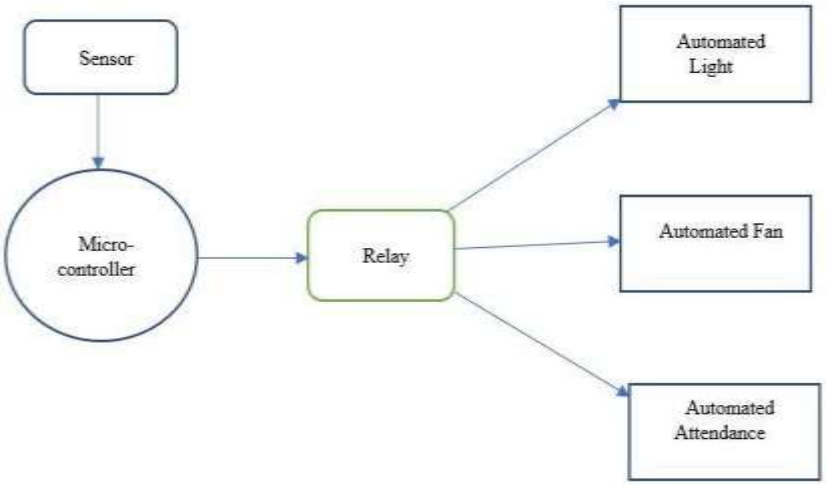
In this section, we discuss the overview of existing model, through literature reviews we have formulated some of the existing methodologies and designed our system based on the difficulties faced by the existing authors.

A. Existing Methodology

There are two methods which is being followed previously. They are.

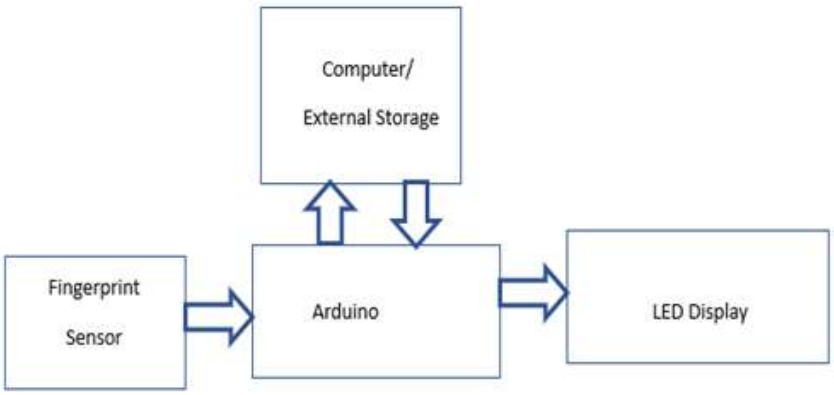
1. Manual method
2. Automation without IoT and individual costly systems.

The block diagram of Existing methodology is shown below in Fig.1

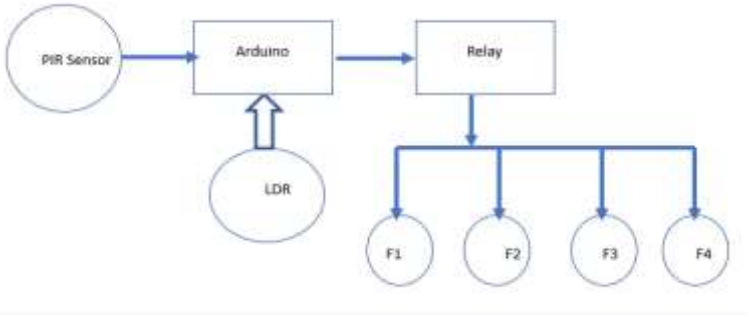


The proposed system contains the following subsystems:

1. **Automated attendance system using fingerprint sensor:** The automatic attendance management technique that integrates fingerprint authentication into the process of attendance management using Arduino and computer. It Comprises of two processes namely; enrolment of ID and authentication of ID. During enrolment, the biometrics of the Student is captured and is stored in a flash memory along with the person's id Number. The main objective of the enrolment module is to register the user using Student's id and fingerprints into a flash memory after feature Collection. During authentication, the biometrics of the Student is captured and are compared with all those that already exists in the flash memory to determine a match for marking the automated attendance. The working of Fingerprint based attendance system is given below in Fig.



2. **Automatic Fan and Light Control:** In many classrooms after the class is over the students and teachers leave the school without switching OFF them, at the time of closing the classrooms the security staffs tend to switch OFF them. Hence electrical energy is wasted during the unwanted time. To overcome this PIR sensor and LDR are used to automatically Control them. PIR detects the human presence inside the classroom and switches ON only if there is any human inside the class. LDR detects illumination of the room. During dark hours it will switch on the Lights and vice versa. The block diagram is shown below in Fig.



The main advantages of the existing system are given below.

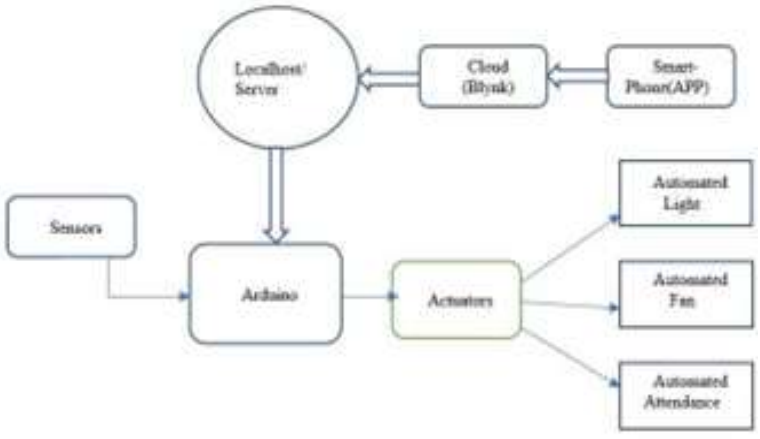
- Manual methods are used in small schools with a smaller number of students.
- Automation can be implemented for only needy systems which may reduce cost.

The main disadvantages of this existing systems are given below.

- Time consuming.
- Relatively high cost
- Contains minimum number of automated systems.
- Students and teachers will get disturbed.
- Electricity is wasted dude to carelessness.
- However, in our system these disadvantages are overcome effectively.

B. Proposed System The proposed system integrates all individual systems under one board. So that the cost of overall system will be reduced efficiently.

The block diagram of proposed system is shown in Fig 2.



Advantages of the proposed system are:

- User friendly Interface
- Easily reprogrammable
- Students and teachers can concentrate on lecture
- Improvised energy saving

- Integrated systems with Minimal Cost

The main disadvantages of this proposed systems are given below.

- Programming is more complex
- Can't be used in Intranet connections
- Electrical components must be handled with caution.

IV. CONCLUSIONS AND FUTURE SCOPE

The IoT-based smart classroom promotes a sustainable campus in the learning environment, which increases classroom productivity and effectiveness. The need for power has been expanding, thus there should be rapid effort to put low-cost electricity reduction schemes into place to meet the need. For a sustainable future, these initiatives ought to be in accordance with global energy policies. Therefore, everyone on the college campus needs to effectively manage electricity use. Since people in the college were being irresponsible, we determined that this automatic system was one of the main causes of electricity waste. This occurred because the electrical equipment cannot be managed without human involvement and the manual switching system is ineffective. As a result, having an automated system rather than a manual switching mechanism is practically required for the college system. So, to reduce energy waste, we created this system utilizing an ESP8266 controller as a server and a PIR sensor as an IOT client.

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