Smart Classroom

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Abstract: **This paper instantly infers the power consumption in the classrooms. The knowledge about the power wastage is used to suggest the smart classroom in which the operation of the electrical and electronic devices are automated. In this method it is first estimated what are all the devices a classroom consist (i.e.) fan, light. Some existing method had already control this kind of devices using infrared remotes. Though the infraredremotes are used, power wastage due to human negligence is possible. Hence by replacing the infrared remote with wireless sensor effective automation can be achieved in the classroom. The smart classroom system controls automatic ON/OFF of fan and light system based on the presence and absence of the human inside the room and based on the temperatures of the room. The system is developed with the help of ARDUINO board which can be used to control the speed of an electric fan based on the changes in temperature of its surrounding using Thermistor.**

INTRODUCTION

With the help of Power Saver System, the power can be saved and the economy increases. The sensing of human is done with the help of magnetic switches, which is interfaced to the time delay circuit. Dawn and Dusk is detected with the help of LDR. It can be implemented in classrooms for lighting purpose. The Lights are ON as soon asstudents enter the cabin or classroom, this is sensed with the help of IR Tx and IR Rx. Similarly it can be employed in laboratories to make the experiment table OFF during absence of the students near the experiment table.

LITERATURE REVIEW

The study of sensing human motion and temperature in classroom settings is vital for enhancing the learning environment, improving student comfort, and ensuring health and safety. This literature review explores the current technologies and methodologies used for sensing human motion and temperature in classrooms, their applications, and the implications for educational settings. Human Motion Sensing in Classrooms
Human motion sensing in classrooms focuses on understanding student behavior, engagement, and movement patterns.

METHODOLOGY

Ligting and Speed control of fan

Two sensors are used for the automation process. whena person crosses the PIR sensor it will sense the person, fan and light will switch on automatically as soon as the person isdetected by both the sensors. Thermistor works on the common fact that as the temperature increases the output voltage across the diode increases whereas the rotational speed of fan will simultaneously increase.
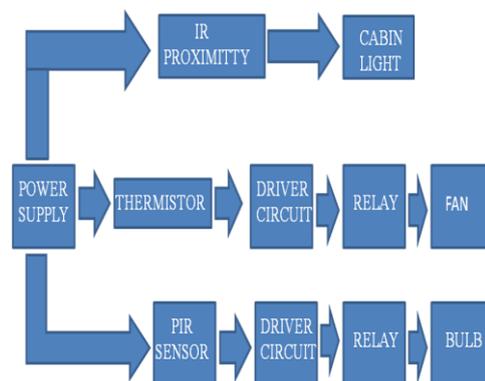

Fig 1.Block Diagram

Cabin lighting system is used to save the power in various places like office, college. With the help of IR Proximity circuit, if a person enters the room cabin lights getsON automatically, and if he exits the lights will get turned OFF. Similarly, PIR sensor used for big halls, government offices etc. Thermistor is used for temperature sensing whichis connected to driver circuit to operate the FAN. Depending on the temperature Fan speed is operated which is also called as temperature-controlled fan

Human motion sensing and temperature sensors are two distinct types of sensors commonly used in various applications, including smart homes, security systems, industrial automation, and environmental monitoring.
Detection Sensors detect changes in their respective

fields (infrared, ultrasonic waves, microwave reflections, or visual data) Processing Signal processing algorithms analyze sensor data to determine if human motion is detected.Output Typically triggers an event (e.g., turning on lights, activating alarms) based on the detected motion.

HARDWARES

1.PIR SENSOR

Fig 2.PIR sensor[7]

A Passive Infrared Sensor is an electronic sensor that measures infrared(IR) light radiating from objects in its fieldof view. They are most often used in PIR based motion detectors. PIR is used to sense the movement of people by detecting the heat energy radiated from the body. Usually this radiation is invisible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose.

2.TEMPERATURE SENSOR

(LM35)[7]
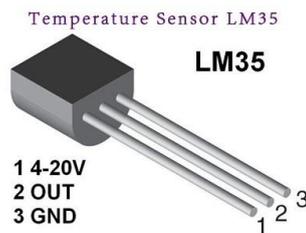

Fig 3.Temerature sensor

Temperature sensor is a device, typically in Arduino, LM35 temperature sensor is used for sensing Environment temperature which gives 1 degree temperature on every 10mv changes it output pin. LM35 sensor works on the basis of thecommon fact, as temperature increases, the voltage across a diode increases at a known rate. Based on the program, the driver circuit will rotate the fan. The room temperature will displayed using LCD.

3.LCD MODULE

module[7]

Fig 4.LCD

LCD-Liquid Crystal Display is an electronic device for displaying text or references. The LCD display is interfaced with Arduino to display the count of persons and temperaturevalues. 16x2 LCD display that means 2 rows, each of 16 characters. LCD's are economical and easily programmable and can easily display special and conventional cases. LCD makes the system user-friendly.

4. FEATURES OF ARDUINO

The operating voltage of ATMEGA 328 is 5V. The recommended input voltage is 7-12V and limited input voltage is 6-20V. There are 14 digital input output pins and 6analog input pins. DC current per I/O pins is about 40mA, DCcurrent for 3.3V pin is about 50mA. Flash memory is 16KB for ATMEGA168 and for ATMEGA328 is 32KB of which 2KB used by boot loader. SRAM for ATMEGA168 is 1KB and for ATMEGA328 is 2KB. EEPROM is about 512 bytes for ATMEGA168, and 1KB for ATMEGA328. The clock speed is 16MHz.

5. RELAY

Fig 5.Relay

Relays are electrically controlled switches. In usual type, a coil pulls in an armature when sufficient coil current flows. Relays are available for dc or ac excitation, and coil voltages from 5 volts up to 110 volts are common. The electrical relay offers a simple on / off switching action in response to a control signal. When a current flows through the coil of wire a magnetic field is produced.

RESULTS AND DISCUSSION

As per the power consumption in classroom, we came toknow that with PIR we can save overall electricity cost about86% per tube light as shown in table below.

Sl no	Considerations	Without PIR	With PIR
1.	Cost of electricity per kw	5.6	5.6
2.	Operational hours of classroom tub lights	12	3
3.	Power capacity of tube light in watts	57	57
4.	Total consumption in watts	684	171
5.	Number of days	30	30
6.	Total power used by one tube light in kw	20.5	5.13
7.	Amount per month	115	29
8.	Savings per month per tube light	-	86

Table 1.Result analysis

In this work it has been studied and implemented complete working model using micro-controller. This work induces the study of energy saving in much application. By using or implementing this we are looking for more power conversion and high security.

ADVANTAGES AND DISADVANTAGES

Advantages

1. Saves power by making some of the lights ON, during night time and makes other lights ON, when train enters to the station and makes all lights OFF during day.
2. Man power is decreased.
3. Economy of Railway department can be increased.
4. Electrical bill payment is reduced.
5. Smart Homes: Automating lighting, HVAC systems, and security alarms based on occupancy.
6. Security Systems: Intrusion detection and monitoring in restricted areas.
7. Industrial Automation: Monitoring worker activity, optimizing workflow efficiency.

Disadvantages

1. In this project there are no such disadvantages, only the initial Investment will be more and the return on investment within 4 years.
2. The proximity sensor may be affected by sunlight it has to covered with black tape.

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CONCLUSION

In this we instantly infers the power wastage in the

class rooms. The knowledge derived from our estimation can enable many variable applications for social good such as effective utilization of the available power and we consider our paper as a contribution for developing smart city. Thus we address the problem by establishing a smart class room. By observing the above details, we conclude that this techniquescan also be implemented at collage level, Institute level.Which we will going to design a new project that is "SMARTCLASSROOM".

AUTHORS DETAILS

Mr.Gourish Kattimani is born on 29th July, 1991 at Guledagudda, Karnataka state, India. He received BE in Electronics and Communication Engineering in BLDE College of Engineering, Bijapur, Karnataka, & M.Tech in Digital Communication in BEC Engineering College Bagalkot. His research interests includes Adavanced analysis and Development of Hierarchical Roting Protocols.

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