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Implementation of automated smart classroom using sensors

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Abstract: **This paper instantly infers the power consumption in the class rooms. The knowledge about the power wastage is used to suggest the smart class room in which the operation of the electrical and electronic devices are automated. In our method we first estimated what are all the devices a classroom consist (i.e.) fan, light, projector. Some existing method had already control this kind of devices using infrared remotes. Though the infrared remotes 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 class room. 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.**

Keywords: **Power wastage, Atmega328, automation, smart class room, sensor node. Subject descriptions includes Embedded systems and Wireless Sensor Networks.**

I. INTRODUCTION

Considering the estimation of the possible device in the class room, three modules were planned to be executed (1) projector and window screen automation, (2) light and fan control (3) temperature sensing. Thus in case of light and fan control, occupancy sensor is used to estimate the number of people present and with that, only the required devices are made ON & OFF automatically.

II. EXISTING AND PROPOSED METHOD

In the existing method, projector and window screens are operated using infrared remote, but by using WSN all the operations of the screens are performed automatically once the circuit is powered. Use of Embedded technology makes this closed loop feedback control system efficient and reliable. Micro controller allows Dynamic and faster control. Liquid crystal display (LCD) makes the system user-friendly. The student count, sensed temperature and fan speed values are simultaneously displayed on the LCD panel. Micro controller is the heart of the circuit as it controls all the functions.

III. METHODOLOGY

There are three sensors used for the automation process. when a person crosses the PIR sensor it will sense the person and occupancy sensor will starts the counting. This is displayed in the LCD using Arduino program. After that, the fan and light will switch on automatically as soon as the persons are detected by both the sensors. Thermistor works on the common fact as the temperature increases the

output voltage across the diode increases whereas the rotational speed will be simultaneously increases. When the system is placed on LDR, the place will appear dark. Then the signal will be send to Arduino which is connected to the gear motor through the L293D bridge. Gear motor will help the screens to move in both forward and reverse direction.

Figure 1.Block diagram

1. PIR SENSOR

A Passive Infrared Sensor is an electronic sensor that measures infrared(IR) light radiating from objects in its field of 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 .OCCUPANCY SENSOR

An occupancy sensor is a lighting control device that detects occupancy and count the persons inside the room and send the signal to the Arduino. The exact count of the persons will displayed in the LCD module.

3. TEMPERATURE 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.

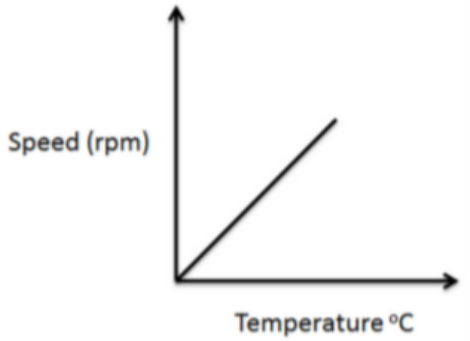

Figure 2. Characteristics

LM35 sensor works on the basis of the common fact, as temperature increases, the voltage across a diode increases at a known rate. The IC has output of 10mv/degree centigrade. In theoretical experimentation when the temperature is 45 degree then the output of sensor will be 450mv or 0.45v .The sensed temperature will be the input for the microcontroller ATMEGA328 such that microcontroller is programmed using ARDUINO software. Based on the program, the driver circuit will rotate the fan. The room temperature will displayed using LCD.

4. LCD MODULE

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 temperature values. 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.

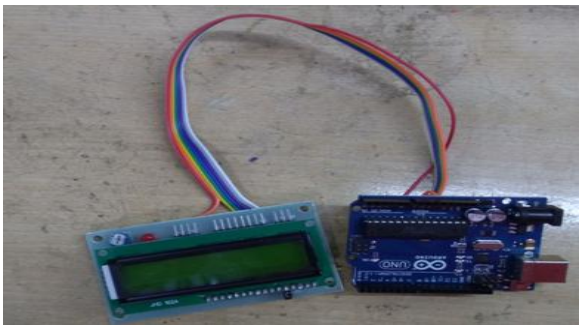

Figure 3.Arduino interfacing with LCD

5 .LDR

It is a passive device working with the principle of photo conductivity. The resistance of the photo-resistor decreases

with increasing incident light intensity. When the system is placed on LDR, the place will appear dark. Then the signal will be send to Arduino which is connecte d to the gear motor through the L293D bridge. Gear motor will help the screens to move in both forward and reverse direction.

6. 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 6 analog input pins. DC current per I/O pins is about 40mA, DC current for 3.3V pin is about 50mA. Flash memory is 16KB for ATMEGA168 and for ATMEGA328 is 32KB of which 2KB used by bootloader. 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.

7. 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.

8. L293D(H-BRIDGE)

The H-bridge is an electronic circuit that enables a voltage to be applied across a load in either direction. These circuits are often used in robotics and other applications to allow DC motors to run forwards and backwards. Most DC-to-AC converters, most AC-to-AC converters, DC-to-DC push pull converter, most motor controllers, and many other kinds of power electronics use H bridges. Here, H-bridge is used as a bridge between Arduino and Gear motor. The signal will be send to arduino which is connected to the gear motor through the L293D bridge. This will allow the motor to rotate in forward and reverse directions.

IV. CONCLUSION

In this project, 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 project 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 techniques can also be implemented at collage level, Institute level. Which we will going to design a new project that is "SMART CLASSROOM".

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