CLASSROOM AUTOMATION AND MONITORING SYSTEM USING RFID TECHNOLOGY

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ABSTRACT
Advancement in Information and Communication Technology (ICT) are mainly focused Internet Of Things (IOT). Most of the systems were controlled in a manual way based on switch monitoring. Thus, in order to achieve the classroom automation, a special attention has given to the classroom automation problems using sensors; especially when it comes to operating things with the help of mobile applications. The proposed classroom maintenance is done automatically with the help of microcontrollers. The system works on RFID based attendance system and has a storage system that store the unique identification number of the student. It is a smart automatic way of classroom automation which consumes low electricity. The following sensors are used in the system: Temperature sensor and LDR. The temperature sensor detects heat level of classroom and also switching fan to reduce heat nature automatically. The LDR sensor detects intensity level of classroom and also switching light to reduce dark nature automatically. Sensor values are displayed in LCD module. Classroom automation gives a significant change in the institution. The working model of a proposed solution is developed as a prototype and explained as a working model.

KEYWORDS: Arduino, IoT, Android, Classroom Automation

I. INTRODUCTION
Automation represents the controlling and monitoring of electronic devices. The automation brought many changes in the existing technologies[1]. These had greater importance than any other technologies due to its user-friendly nature[7]. Due to the advancement of wireless technology, there are several different technologies were introduced such as RFID, ZIGBEE, Bluetooth, and GSM [8]. Each technology has their own unique specifications and its applications. Considering the advantages of RFID an advanced automation system was developed to control the appliances in the classroom. The Internet of Things is the interconnection of the various computing devices embedded in the daily appliances of the internet thus enabling them to communicate with each other. It is the process of automating the various features inside a class room thus converting it into a smart class room. It involves the automation of temperature, lighting and door control. Another major characteristic of class room automation is the monitoring control and access of the automated features inside the class room. With the evolution of smart phones and tablets and the development of various communication technologies. Automation is the ability to schedule events for the devices connected to the local network or the internet. From large industries to small offices, everywhere the concept of automation are being implemented to reduce human intervention and to improve energy efficiency and productivity. Classroom automation like Wi-Fi, Bluetooth have gained the ability to connect to the class room network by an authorized person of an organization. In this paper we described about controlling all the Classroom devices using android.
application. All the appliances were controlled by Arduino UNO and Node MCU Module. In this we are using Node MCU Module to receive the commands from smart phones and processed by Arduino UNO. In this design android application has developed by Android SDK[13]. This proposed system can monitor and control all the Classroom devices.

II. EXISTING SYSTEM

Most of the Authors designed home automation systems by using different technologies. By using WIFI based classroom automation System we need to connect over an internet and make a call /message to control class room devices. It was more time delay and complex system. By using Bluetooth classroom automation system also we can control all the class room devices. But the main disadvantage is range over connecting the devices. Some authors designed classroom automation using Wi-Fi as well as Bluetooth. But in those designs they have implemented only ON/OFF functionalities. In our design we have implemented ON/OFF functionality along with the voltage variations and all the classroom devices are controlled by using android applications.

III. PROPOSED SYSTEM

The below figure 1 shows Proposed Classroom Automation and Monitoring System using Android Application. In this System we are using Arduino UNO, PIR Sensor, Temperature Sensor, LDR, Node MCU module, Relays, LCD display, DC Motor and bulb.

A Light Dependent Resistor (LDR) is a device in which it senses the light intensity level of a Classroom. It is a function of the incident electromagnetic radiation. Hence, they are a light sensitive devices. They are also called as an photo conductors, photo conductive cells or simply photocells. They are made up of semiconductor materials which is having a high resistance.

Temperature is the most-measured process in which this sensor senses the temperature in an automatic way. Most commonly, a temperature sensor is used to convert the temperature value to an electrical value.
Temperature Sensors are mainly used to read temperatures correctly and to control temperature of Classroom.

![LM35 Temperature Sensor](image)

**Fig 2.** LM35 Temperature Sensor

RFID is abbreviation of Radio Frequency Identification. RFID denotes to a tiny electronic gadget that comprises of a small chip and an antenna. This small chip is of accumulating approx 2000 bytes of data or information. RFID Tag – The actual data carrying tool of an RFID structure, in general comprise of an antenna and an electronic micro-chip. In which it is a card like structure that is distributed to each and individual student with an unique identification number.

An Arduino UNO is a microcontroller based kit which can be either used directly by purchasing from vendor or it can be made at home using the components, it has an open source hardware feature. The Arduino Uno is a microcontroller board. It has 14 digital input and output pins, 6 analog input, a 16 MHz crystal oscillator, a USB connection, a power supply, and a reset button. In which the analog pins are connected to the sensors and the digital pins are connected to the LCD and LED display.

![Arduino UNO](image)

**Fig 3.** Arduino UNO

Node MCU is an open source IoT platform. It uses the Lua scripting language. It builds on the ESP8266 SDK 0.9.5. It uses many open source projects, such as lua-cjson, and spiffs and mainly used in IOT related projects. It includes firmware which runs on the ESP8266 Wi-Fi SoC, and hardware which is based on the ESP-12E module.

![Node MCU](image)

**Fig 4.** Node MCU
Active tags comprise of same components that exist in passive tags. They too comprise of a micro-chip and an antenna but the only comparison between the two is that the size of the micro-chip in active tags is larger than passive tags’ chip. An active tag is incorporated with a built-in power supply. The inbuilt power system facilitates the tag which is to be used as an independent reader that is competent of transferring information devoid of outer assistance.

Passive RFID tags are the sensors that operate in the radio frequency power radiated from antennas attached to RFID readers. RFID tags which communicate with RFID readers using the radio frequency waves transmitted to them.

A Passive Infrared sensor (PIR sensor) is an electromagnetic device that measures infrared (IR) light radiating from objects in its field of view. PIR sensors are often used in the construction of detecting a unique identity of a person. The PIR Sensor has three pins: GND, OUT, VCC pin which is connected for power supply, OUT pin is connected for the output result detection from PIR Sensor and third pin of PIR sensor which is connected to the GND.

![Fig 5. PIR sensor](image)

The Arduino board is interfaced with the temperature sensor, LDR, PIR Sensor and in order to control the fan speed, light intensity and attendance of a student entry into the classroom. We can vary the speed of fan depending on the temperature in the class room. Temperature is measured by using LM35 sensor. Similarly the intensity of light is varied depending on the necessity by using LDR. We can detect the presence of student entry using the PIR Sensor and status is displayed in the LCD display and android mobile. The fan and light behavior is also displayed according to the person handles in a classroom. The Wi-Fi module and the Arduino board are connected through MAX232. The relay which connects Arduino board as a switch to fan and light. All these appliances are controlled using an Android application that is installed in our Android mobiles[11].

Android is a mobile operating system. It is based on a modified version of the Linux kernel which was designed primarily for touch screen mobile devices such as Smartphone and tablets and now for mobile phones. There are many development tools in android, some of them: ADB (Android Debug Bridge), AVD Manager, Eclipse, Flowup, Instabug etc. The Android SDK includes various emulators to develop an android application through library files and source code. Android SDK which provides a selection of tools required to build Android apps which goes on a smooth process. SDK which can be downloaded independently of free cost which help the users to save time and cost. SDK programs can be run using Integrated Development Environment (IDE) Android which provides various ways to develop an richer application. SDK which is a constant app for developing an android application. Andriod SDK which compiles the code into an android package name .apk file extension. The code in the single .apk file is executed which is considered to be an one application. Android powered devices which is used to install the application based on class room automation.
EXPERIMENTAL ANALYSIS:

The proposed system main objective is to control class room status using android mobile through Wi-Fi. The class room monitoring is done through by logging into the page displayed by using the app developed. The login page consists of username and password which is recognized by an valid authenticator who controls the developed app.

The network connection is established after the valid authenticator login the page. Once the connection is established the class room can be monitored by the valid authenticator which appears on another window. The valid authenticator controls the speed of the fan, intensity of the light and the students attends based on their entry into classroom.

The low intensity light level can be done by decreasing the intensity level when the light is not necessary for the class room. The intensity level of the light in the classroom is displayed on the LCD Module. The fan controlling system which is done based on the temperature available in the class room and also the students presence inside the class room. The controlling temperature sensor used is LM35 to monitor the temperature in the class room. The fan speed detection is done by the intensity level of the sensor.

The classroom Kit contains the following components: LCD, LDR, Relay, Motor driver, Wifi. These kit are used to control the classroom through temperature and intensity level. The relay switch which connects to the arduino board develops an android application for smart class room monitoring system.

This kit which controls the intensity and fan speed using LDR and LM35 sensors respectively which makes a normal class room into a smart classroom system.

The output segmentation which is implemented in the hardware model for the first phase and later implemented in the software model which completes the project.

Output segment implemented in hardware phase using proteus 8 professional software in which the techniques are required to drive the schematic capture module in Proteus (ISIS).

To create a schematic capture the new project must be created and followed by a editing window appears with many object selector components, some of the object selector components are: adrduino board, LCD display. Automatic LCD display (blue), Automatic
LCDdisplay(green), Automatic LCD display(yellow), Automatic LCD display(white)
Connection wires etc…
After editing the components the project is saved in the particular folder and the code is executed for each component where the result is displayed on the LCD display by indicating the color of the LCD display (ON/OFF).

CONCLUSION:
The class room automation is improved by considering a Wireless sensor node. A smart class room integrates various sensors in the class room and automates them with less amount of electricity. The smart class room keeps track of different features in the classroom present and work according to the control of the authorized person in an organisation. Not only sensors, but also RFID based attendance system is used which has a storage system that store the unique identification number of the student/employee. The attendance system is very user friendly for commercial purpose. By considering the above features, we have developed the prototype and tested. The system achieved the development of Smart class room automation by using the Internet of Things technologies. From the experiment, it was found that the system manages to make low cost. The smart classroom is proposed with many features including the attendance of a person to be determined using RFID tag which has the card reader that reads the tag of a unique student identity.

REFERENCES: