Smart Classroom

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Abstract— **The Smart Classroom project investigates the difficulties and opportunities of the Intelligent Environment, with energy conservation being the primary issue. We hope to provide teachers with a hassle-free and paperless attendance by developing an intelligent classroom for attendance collecting and monitoring the number of students within the range, and then activating the lights and fan inside the classroom accordingly. From the clock in time until the clock out time, the Smart Classroom may actively observe the duration of students in the classroom. This paper discusses the system's benefits and key underlying technology.**

Index Terms: **PIR; Node MCU; IR; Arduino; MySQL; IoT; Finger Print Sensor; LED;**

I.INTRODUCTION

Smart Classroom is a modern way to capture student's attendance as they enter in class using the fingerprint sensor outside the classroom and the process completes when the same student press it again and the attendance cycle get captured with the time duration he/she attended. Saving energy is the importance of hour. Negligence has become the part of our lives. In this rushing world everyone is running from one place to other [1-2]. This is very important to switch off the fans and light before leaving a room. So, in the Smart Classroom project with the help of IR and PIR sensor we have tried to implement a smart way to detect motion within certain range and only the light and fans will be activated, here we have shown this with the help of a LED.

The motive behind this project is to create a tech environment for teachers as well as students for a smooth attendance system [3-4], where no manual work is required and hence less chances of any faults. Along with it we are also trying to conserve energy as much as possible for our future generation. We are the youth and one good step taken by us will create a great future for tomorrow.

II. MATERIALS REQUIRED

1. HARDWARE USED:

1.1. Power Supply:

This is the primary requirement for the work. For our project, we are using a DC 5V/1.5 A power bank. This supply can be used for the Node MCU and Arduino.

1.2. Node MCU:

Node MCU is a low-cost open-source IoT platform. It is based on the eLua project and built on the Espressif Non- OS SDK for ESP8266. It uses many open-source projects, such as lua-cjson and SPIFFS. It can be programmed through a USB port using the Arduino IDE. It is a tool that is employed for Wi-Fi networking.

The specification on a Node MCU board are as follows: Microcontroller: ESP8266.

1. Operating voltage: 3to 3.3v
2. Input voltage: 4.5v to 10v
3. Digital I/O pins: 11
4. Analog input pins: 1
5. Flash memory: It has 128KB RAM and 4MB of Flash memory to store data and programs.
6. Frequency: 80MHZ

Fig 2. NodeMCU Board

1.3. Arduino UNO:

The Arduino Uno [5] is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.
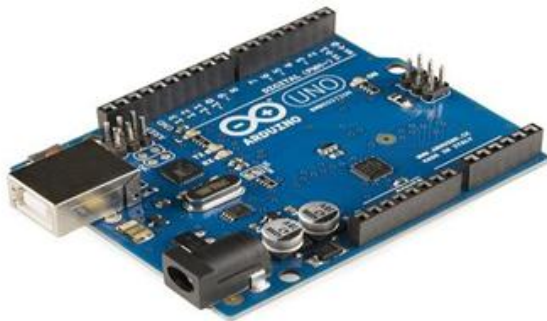

1.4. Finger Print Sensor:

Fingerprint sensor modules, like the one in the following figure, made fingerprint recognition more accessible and easier to add to your projects. This means that is super easy to make fingerprint collection, registration, comparison and search.

These modules come with FLASH memory [6] to store the fingerprints and work with any microcontroller or system with TTL serial. These modules can be added to security systems, door locks, time attendance systems, and much more.
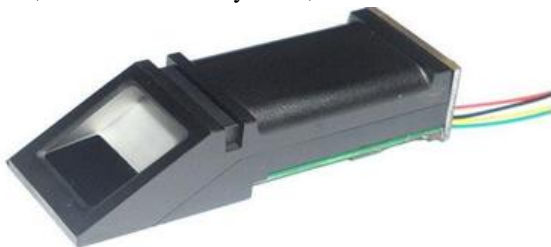
1.5. LED:

A light-emitting diode (LED) is a semiconductor device that emits light when an electric current flows through it. When current passes through an LED, the electrons recombine with holes emitting light in the process. LEDs allow the current to flow in the forward direction and blocks the current in the reverse direction.
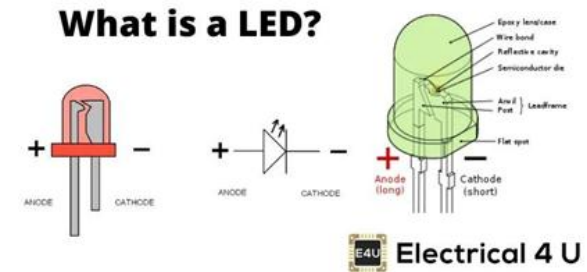
2. SOFTWARE USED:

2.1. XAMPP Server

XAMPP is a free and open-source cross- platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, interpreters for scripts written in the PHP and Perl programming languages. Since most actual web server deployments use the same components as XAMPP, it makes transitioning from a local test server to a live server possible.

2.1.1. PHP

PHP is a general- purpose scripting language geared toward web development. It was originally created by Danish-Canadian programmer Rasmus Lerdorf in 1994. The PHP reference implementation is now produced by The PHP Group. PHP originally stood for Personal Home Page, but it now stands for the recursive initialism PHP: Hypertext Pre-processor. PHP code is usually processed on a web server by a PHP interpreter implemented as a module, a daemon or as a Common Gateway Interface (CGI) executable. On a web server, the result of the interpreted and executed PHP code – which may be any type of data, such as generated HTML or binary image data – would form the whole or part of an HTTP response. Various web template systems, web content management systems, and web frameworks exist which can be employed to orchestrate or facilitate the generation of that response. Additionally, PHP can be used for many programming tasks outside the web context, such as

standalone graphical applications and robotic drone control. PHP code can also be directly executed from the command line.

2.1.2. MySQL

MySQL is an open-source relational database management system (RDBMS). Its name is a combination of "My", the name of co-founder Michael Widenius's daughter, and "SQL", the abbreviation for Structured Query Language. A relational database organizes data into one or more data tables in which data may be related to each other; these relations help structure the data. SQL is a language programmers use to create, modify and extract data from the relational database, as well as control user access to the database. In addition to relational databases and SQL, an RDBMS like MySQL [6] works with an operating system to implement a relational database in a computer's storage system, manages users, allows for network access and facilitates testing database integrity and creation of backups.

III. ADVANTAGES

- Cost-Efficient
- Easy to implement
- Reduce manual work
- Save energy
- Can be customized

IV. CONCLUSION

We have successfully created a model where we can improvise both the attendance monitoring and smart classroom features inside a single project. This project helps us supervise the attendance of the students in a much efficient way, which is cost cutting. This project also helps in minimizing the power consumption, which in turn will help the institutions to reduce the cost for electricity.

V. SCOPE

This project can be made more advanced in the following ways:
1 We can implement avoiding false attendance.

2 We can further implement a feature where the main switch of a classroom is activated, whenever the first person entering the classroom steps in it.
3 The same feature can be implemented like all the switches get deactivated when the last person exits the classroom.

VI. ACKNOWLEDGEMENT

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