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SMART CLASSROOM AUTOMATION

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Abstract

The adaptability of technology sets it apart. By introducing technology there, we can modernise conventional classrooms and make them better for both students and teachers. The most important and commonly used controlling device for automated smart classrooms is the Arduino or Raspberry Pi. This technology shuts off the lights and fans when no ones around to save electricity. Face recognition attendance approach reduces the amount of class time. This SAS lowers energy use and disruptions to classes. As a result, this article will discuss Arduino-based Smart Class Automation.

Keywords: Smart classroom, Energy efficient, IOT, Arduino, Automation, Sensors, Control Systems

I.Introduction

Using PIR motion detecting sensors, which can detect motion within their range and trigger relaysusing an Arduino board, smart classroom automation automates the classroom and controlsthe fans and lights without the need for human intervention. This saves energy. Additionally, in order to make the classroom more digital, we replaced the manual attendance system with a Face Recognition Attendance system using Python.

The automation of the classroom will be the main focus of this system. It has been noted that maintaining track of attendance in institutions that take attendance is a big problem.

Even though there is some automation, we still take attendance using the conventional pen and paper approach. For the system to function, there must be a number of add-on modules. Companies and corporate offices employ card swipe systems, which are to some extent quite helpful. But nothing

has changed in terms of students' attendance in class. There are applications available now that use RFIDs to control various devices. However, we usually use a raspberry pi to set up a system that can do the essential operations of taking class attendance. This cuts down on class time and unneeded interruptions in between lessons.

II.Literature Survey

- ✓ Ganesh Kakade1, Prathamesh Shivpuje2, Sanket Awale3, Shubham Published in Dec 2019, International Research Journal of Engineering and Technology (IRJET)

  The application of the Internet of Things in the modern world has been the center of interest of many researchers and standardization bodies for several years. The Internet of things mainly consists of two parts automations and analysis. Automation is an important topic which is more and more covered by various actors in the intelligent transportation systems, home automations field via many proposed solutions.

- ✓ Siti Aisah Mohd Noor; Norliza Zaini; Mohd Fuad Abdul Latip; Nabilah Hamzah, Bandar Sunway, Malaysia, 2015 IEEE Conference on Systems, Process and Control (ICSPC)

Most professors at universities still take attendance of their students using the traditional ways, either by calling out students' names or by handing around an attendance sheet that students must sign to indicate they were present. Along with being time-consuming, this approach increases the likelihood that students would falsify their attendance, especially in a large classroom. Therefore, a technique of recording attendance using an Android platform application is suggested in this study.

With the use of an Android app on a smartphone running Android, this project will assist the instructor who is physically present in the classroom in controlling the environment.

This technique lowers power usage, conserves energy, and prevents unneeded disruptions for the teacher and students in the classroom.This technique lowers power usage, conserves energy, and prevents unneeded disruptions for the teacher and students in the classroom.

- ✓ Pritam Roy Jui Saha Sayani Chandra; Microcontroller based automated room light and fan controller(EDCT)

We demonstrate an enhanced version of our microcontroller-based system as well as some of the outcomes of its practical application. A hardware component called a microcontroller has undergone the most advances.

- ✓ Danijel Mijic; An Improved Version of Student Attendance Management System Based on RFID ;IEEE Transaction (2019)

We demonstrate an enhanced version of our RFID-based technology as well as some practical applications and outcomes. The hardware RFID reader and a web-based application utilised by the faculty staff have seen the most benefits.

- ✓ Siti Aisah Mohd Noor; Android-based attendance management system; IJERT (2016)

This paper suggests a technique for taking attendance that makes use of an Android-based application. Once installed, this programme can be used to retrieve the list of students from a certain web server.

III.Existing System

When instructors or students arrive for class, they turn on all the lights and fans even if they are not needed, and they also frequently forget to turn them off when class is done. Therefore, this actually results in significant electrical and financial waste.

Nevertheless, some studies indicate that the rise of smart classrooms has led to the discovery that the use of biometric systems has reduced the effectiveness of attendance tracking systems.Systems like these can waste time in places like schools and colleges where attendance is strictly enforced. Therefore, an automatic identification of a specific student is primarily utilised to demonstrate correct time management and no data loss. The additional applications mentioned in the study, such as those for device control and position mapping, have been discovered to be more recent, simpler, and superior to other systems already in place.

IV.Proposed System

PIR motion detection sensors were used in this project to completely automate everything. When motion is detected

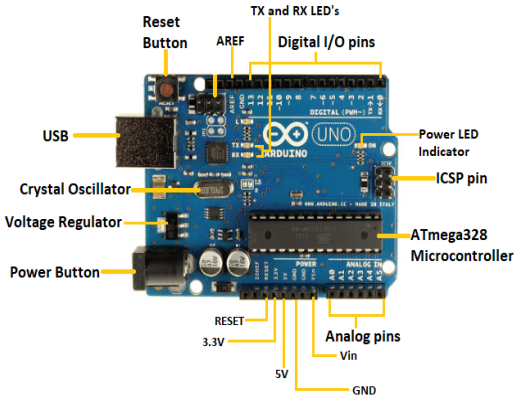
within their range, the switch will automatically turn on, and when there is no motion, it will turn off. Also used is a facial recognition attendance system.

The system is made up of an automatic device control system that uses an Arduino and a PIR sensor to control the lights. The Arduino Uno, PIR sensor, and relay module are the parts of this system. Here, the PIR sensor, which aids in detecting human presence, is the essential component of the system. The Relay Module enables large electrical loads to be controlled by Arduino, Raspberry Pi, or other Microcontrollers.

V.Modules of the Project:

i.Arduino uno:

- A microcontroller board called Arduino UNO is based on the Atmega328p microcontroller.
- It contains 6 analogue inputs, 14 digital input/output pins, a USB port, a power jack, an ICSP header, and a reset button.
- Start the software by inserting a USB cable into a computer and powering it with an AC-to-DC adapter or battery.

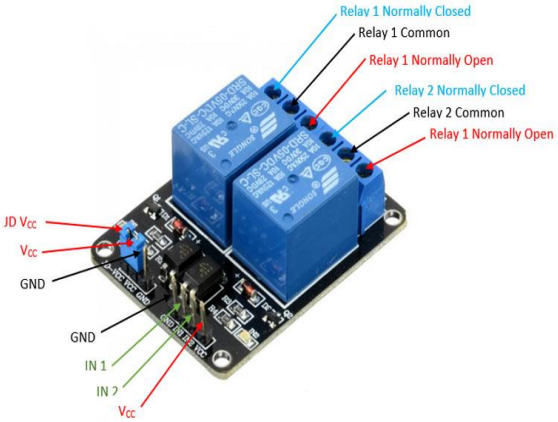


ii. PIR Sensor:

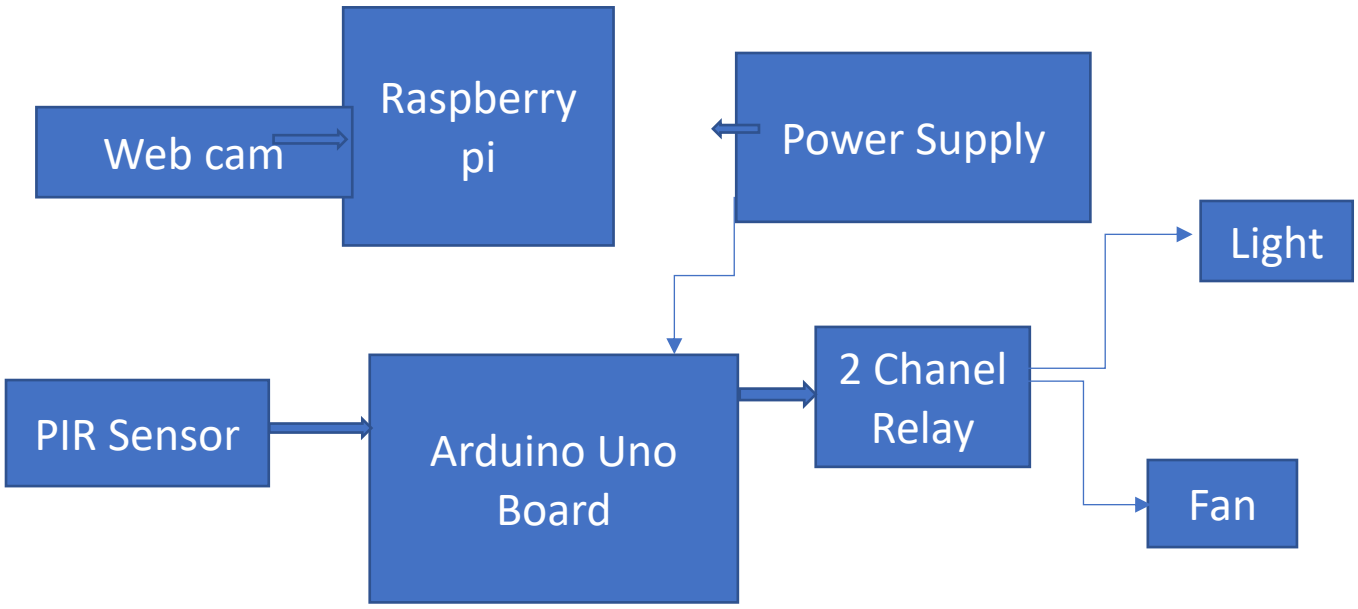
- PIR stands for passive infrared sensor, and it is capable of detecting the presence of people or animals.
- There are three output pins on this HC-SR501 PIR sensor module: Vcc, Output, and Ground.
- It has two working modes and can distinguish between movement of objects and movement of people. Repetition and Non-Repetition
- Wide input voltage range of 4.V to 12V and coverage of approximately 120° and 7 metres
- These go into automatic street, garage, warehouse, or garden lights.

iii. 2-Channel Relay:

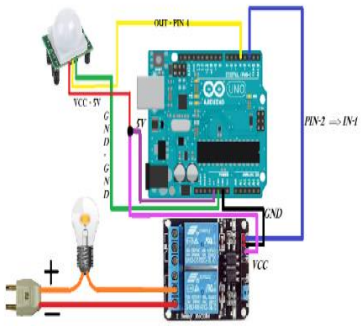
- A broad variety of microcontrollers, including Arduino and others, may operate the 2-Channel 5V Relay Module directly. It employs a low level triggered control signal (3.3-5VDC) to control the relay.
- It is an automatic switch that uses a low-current signal to regulate a high-current circuit.
- A relay normally has five pins, of which three (NC, COM, and NO) are high voltage terminals that connect to the object being controlled.



VI.Block Diagram:



CIRCUIT DIAGRAM



Hardware Requirements

- Arduino Uno Board
- PIR sensors
- 2 channel Relays
- Jumper wires
- Power supply

Software Requirements

- Python
- Database
- Arduino CC

VII.Results And Discussions:

Working of the project:

Step 1: If a pir sensor within range of it detects any thermal or human motion.

Step 2: After that, it communicates with the Arduino board.

Step 3: The Arduino Uno then turns on the power supply relay..

Step 4: The fan or light will turn on.

Step 5: Lights and fans will automatically turn off if there is no thermal body motion.

Advantages:

- Automated jobs can help you save time.
- Reduces energy waste (energy efficient) and increases productivity
- Both students and professors can focus on the lecture.

Limitations:

- Even though it is not required, if any human motion is detected within the sensor's range, the light will turn on.
- If a human is there but in an ideal state, the switch won't turn on until the human motion is detected.

Applications:

- This can be employed in sizable operational warehouses.
- This is utilised in hospitals as well as schools, colleges, and universities.

VIII.Conclusion

The idea of a "smart classroom" is presented from an entirely new angle, emphasising real-time input on environmental activity utilising the Internet of Things (IOT). The primary contribution of this suggested system is an original strategy for an interdisciplinary research topic and smart classroom setting. This viewpoint necessitates comprehension of the problem statement in order to set parameters with the further goal of producing a better preface for the system implementation. The major goal of our proposed system is to use monitoring and sensing technology to reduce energy consumption.

This concept can be applied to a variety of locations, including banks, hospitals, labs, and other high-tech automated systems that significantly lower the risk of unwanted entrance.It is more practical than a face recognition system based on a PC since the Raspberry Pi face recognition system can be made to be lighter, smaller, and consume less power. Python software development is free thanks to the open source code. The system's effectiveness was evaluated in terms of face detection rate. The investigation showed that the current method has great performance efficiency and can be used to identify faces in photos of any quality.

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