IOT BASED SMART CLASSROOM AUTOMATION USING ARDUINO

A PROJECT REPORT

Submitted by

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in partial fulfillment of the requirement

for the award of the degree

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in

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K.RAMAKRISHNAN COLLEGE OF TECHNOLOGY

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SAMAYAPURAM – 621 112

APRIL 2021

K.RAMAKRISHNAN COLLEGE OF TECHNOLOGY

SAMAYAPURAM – 621 112

BONAFIDE CERTIFICATE

Certified that this project report titled **"IOT BASED SMART CLASSROOM"** is the bona-fide work of **ABITHARAN.S (811718105003), BALAJI.J (811718105051)** & **PRAKASH.R (811718105030)** who carried out the project under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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Internal Examiner **External Examiner**

DECLARATION

We jointly declare that the project report on **"IOT BASED SMART CLASSROOM AUTOMATION USING ARDUINO "** is the result of original work done by us and best of our knowledge, similar work has not been submitted to **"ANNA UNIVERSITY CHENNAI"** for the requirement of Degree of Bachelor of Engineering. This project report is submitted on the partial fulfilment of the requirement of the award of Degree of Bachelor of Engineering.

Signature

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Place: Samayapuram

Date: 23.07.2021

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ABSTRACT

Smart classroom is the representative of the modern teaching. With the advent of modern technology it becomes easier for the students as well as teachers to perform their task more efficiently. With the aid of modern technology it has become easier for the students and teachers across the world to get a good grasp of the theoretical as well as practical knowledge.

Through technology it has become easier to visualize anything in 3D and therefore the technology helps us to be conversant of the nuances of any concept.

The smart classroom is rectification to various problems that teacher as well as student faces inside the classroom. This projects aims to make use of the modern technology for helping the teachers in utilizing more time for teaching and students to easily get access to the study material. In this project we are building a prototype of smart classroom in which an application would be pivotal for carrying out various operations in classroom.

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CHAPTER 1

INTRODUCTION

The quality of education is a vital demand in today's competitive setting. Technology has affected us in each facet. Intuitive categories are a progressive approach of education within the education situation in India that offer quality teaching and learning opportunities to lecturers and students by serving them to longer devotion towards the teaching, better construct formation and educational action.

In efforts to grow academically it should be considered that differentiated modalities of teaching and learning area unit necessary to implement deeper levels of growth and abstract development ICT has gone from being a communication and information technology to a system of creation and distribution of curricula for lecturers and students.

New teaching ways are introduced that are called intelligent category. It uses instructional material, 3D animated modules and videos, and every one fame instructional institutions use this idea. The idea of intelligent schoolroom has not solely created an interesting education however a chance for college kids to boost their performance.

The possibilities or blessing of good lecture rooms area unit endless. Though adopting such a brand new idea could be tricky call for several however the technology will produce new gap for the education sector.

1.1 Smart Classroom

A smart learning setting not solely permits students to access digital resources and Engage in learning systems anyplace and anytime however additionally actively provides necessary student learning, suggestions and support tools, study suggestions within the right place, atthe correct time and to the correct manner.

The smart classroom is an enhanced classroom of technology that improves teaching and learning opportunities by group action learning technologies, like computers, special software, response technology audiences, helpful listening devices, networking, and audio / visual capabilities.

1.1.1 Connected devices:

These are electrical devices that are smart, courtesy of Internet connectivity as well as sensors. The Master can control these devices from their phones from anywhere in the room.

1.1.2 Internet of Things:

It's a enchantment wand that turns the classroom into a keen classroom. In conjunction with the combination of sensors, savvy frameworks, Android apps, IOT interface every day accessible objects to a organize, which empowers these things to total errands and communicate with each other , without input commitments from the client.

After you incorporate automation within the classroom, associated gadgets and IOT you'll be able get Smart Classroom. A present day shrewd domestic can be effectively overseen through a Smartphone, tablet.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Authors: F. Chang, H. Huang and L. Chu,

Title: "Learning the Classroom Automation Preferences with Low User Intervention," *2020 IEEE 2nd Global Conference on Life Sciences and Technologies (LifeTech)*, 2020, pp. 31-34, doi: 10.1109/LifeTech48969.2020.1570616823.

Abstract: With the affordable Internet of Things (IoT) devices, the number of smart classrooms are increasing. There are researches on how to incorporate the IoT technology into the pedagogy. We put the emphasis on classroom automation which enables the teacher to flexibly configure the smart devices without coding. It is achieved by a framework on top of the physical IoT network. In the framework, the automation process is modeled as a state transition engine. The teacher only needs to signal the engine to take a few system state snapshots as the preferences. Once the preference model is derived by the learning process, an event would trigger the engine to compute the suggested system states from this model. Then the automation process invokes the predefined actions to reach the target system states. The framework allows the engineer to provide the basic functions to configure the system, while keeping the user intervention low at providing the training data. In addition to describing the example applications of the framework, a simple use case is also simulated to demonstrate how to design a learning mechanism for this framework.

Author: A. Gupta, P. Gupta and J. Chhabra,

Title: "IoT based power efficient system design using automation for classrooms," *2015 Third International Conference on Image Information Processing (ICIIP)*, 2015, pp. 285-289, doi: 10.1109/ICIIP.2015.7414782.

Abstract: The paper presents the design and implementation of an Ethernet-based intelligent automated system for conserving electrical energy using a INTEL GALILEO 2ND generation development board, which can be used in large organizations like a University or an office. The proposed system works on automation, so that the electrical devices and switches can be remotely controlled and monitored without any human intervention. It uses the available infrastructure in a classroom that includes surveillance camera and Ethernet connectivity so as to minimize the cost criteria. It is monitored and controlled remotely from a web server located at the control room using the Internet or the Intranet connectivity. The proposed outcome of the project aims as multiple benefits, saving on electricity bills of the University or any other organization it is deployed in, eliminating human involvement and manpower which is often required to manually toggle the lights and electrical device on/off, and last but most importantly, conserve the precious natural resources by reducing electrical energy consumption.

2.2 PROBLEM STATEMENT

An ideal classroom is an environment in which teachers are able to focus completely on their lectures and the students are able to concentrate on the information they are being conveyed. Unfortunately, this does not happen in most of the Indian Classrooms. During first ten minutes of every class hours, time is usually wasted in many ways such as manually recording student's attendance one after another in the attendance register. Other disruptions also occur throughout class time such as temperature and light variation in summer and winter seasons respectively.

These problems cause affected students to wander around the class guessing for the right switch and adjusting it to equilibrate the environment back to satisfying or comfortable conditions. This causes disturbances for both teachers and all the other students, and so to eliminate these irritations an automated classroom is created which allows the classroom to become more efficient, and eliminate any human assistance in controlling the atmosphere.

2.3 EXISTING SYSTEM:

There are two methods which is being followed previously. They are

1. Manual method
2. Automation without IoT and individual costly systems

2.3.1 Advantages of the existing system:

- Manual methods are used in small schools with less number of students.
- Automation can be implemented for only needy systems which may reduce cost

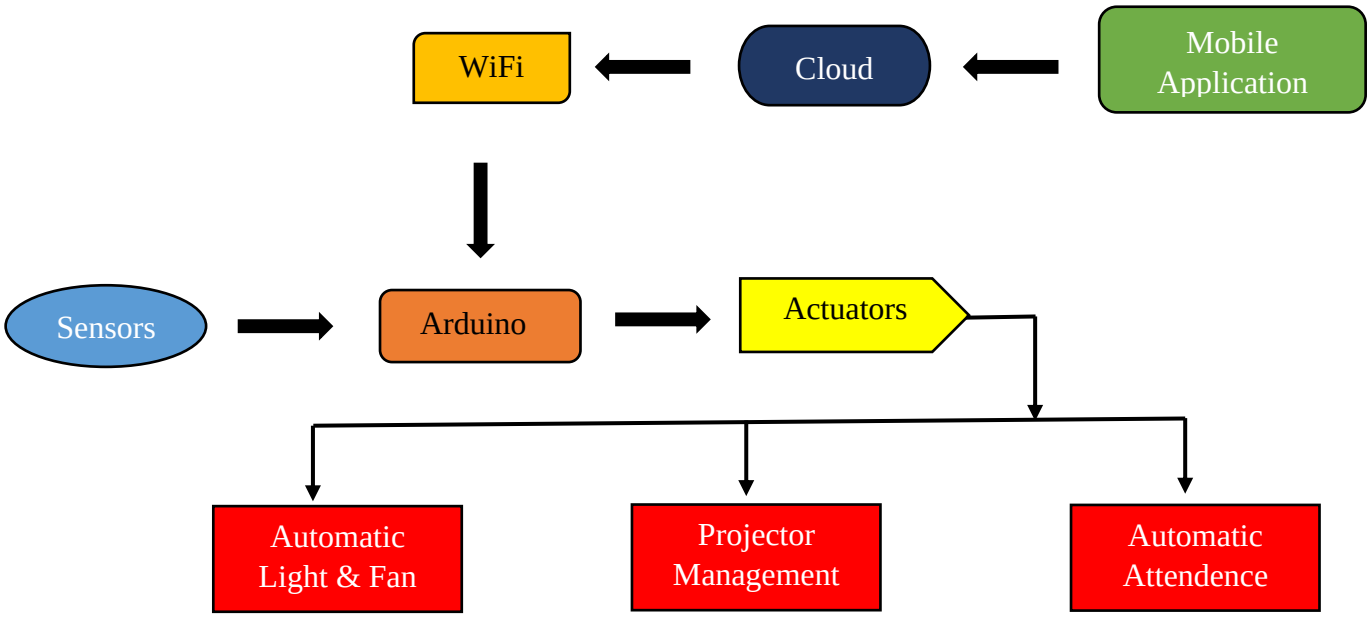
2.3.2 Main disadvantages of this existing systems:

- Time consuming
- Relatively high cost
- Contains minimum number of automated systems
- Students and teachers will get disturbed
- Electricity is wasted dude to carelessness

However in our system these disadvantages are overcome effectively.

2.4 PROPOSED SYSTEM

The proposed system integrates all individual systems under one board. So that the cost of overall system will be reduced efficiently. The block diagram of proposed system is shown in Figure.



1.1 Block Diagram Of Proposed

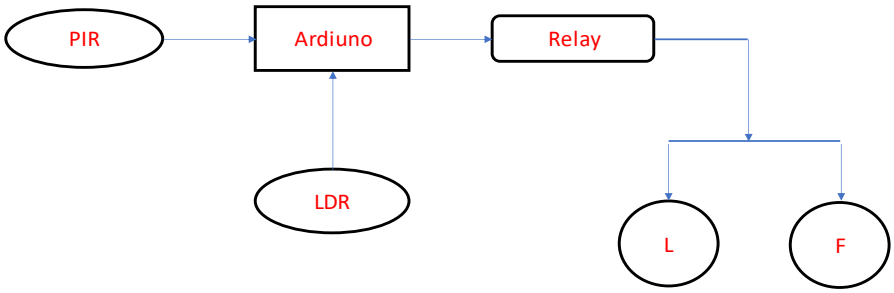
CHAPTER 3

METHODS AND MATERIALS

3.1 METHODOLOGY

3.1.1 Automatic Fan and Light Control:

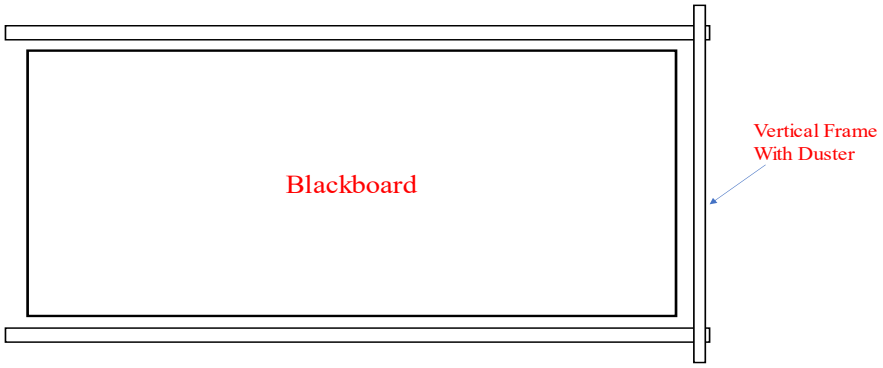
In many classrooms after the class is over the students and teachers leave the school without switching OFF them, at the time of closing the classrooms the security staffs tend to switch OFF them. Hence electrical energy is wasted during the unwanted time. To overcome this PIR sensor and LDR are used to automatically Control them. PIR detects the human presence inside the classroom and switches ON only if there is any human inside the class. LDR detects illumination of the room. During dark hours it will switch on the Lights and vice versa. The block diagram is shown below in Fig



1.2 Automatic Fan and Light Control

3.1.2 Automatic black board erasing system:

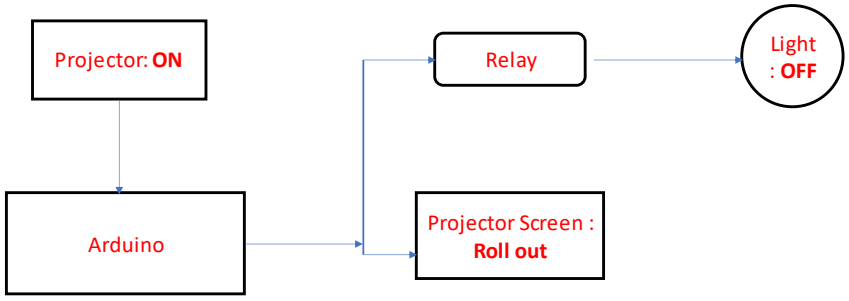
After every lecture is over one has to erase the blackboard manually. This takes more time and the dust particles affects breathing of the person who is erasing the board. So In order to overcome this, automatically black board is erased by simply pushing a button ON/OFF.A vertically fixed framed powered by electric motor slides through a guide way in a manner to erase the contents in the black board. The sample Board cleaning system is
shown in below Fig.



1.3 Automatic black board erasing

3.1.3 Projector Control System:

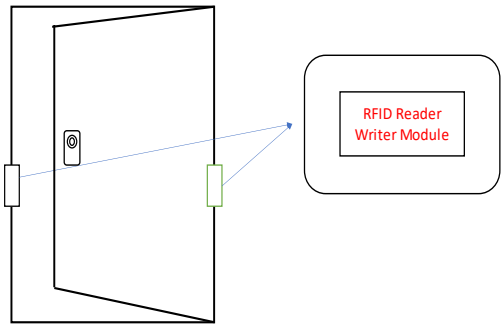
In flipped classroom teaching methods projectors are often used in the lecture. While changing the classroom to projector adapting environment we have to manually roll the curtains down , open the projector screen and switch off the lights This is automatically done with the a android application. By simply enabling a button in the application all these things are done automatically with less time consumption. The overall function of Projector management system is shown in Fig.



1.4 Automatic Projector Control

3.1.4 Automatic attendance system using RFID:

In this project, we are going to build an RFID based attendance system using Arduino. An RFID based Attendance Management System is based on some simple concepts. We store a set of RFID card data in our system, say 3 or 10 RFID card data. When the person with the right RFID card (compatible to data preloaded in our program/system) come and swipes his RFID tag, his arrival time will be stored on the system. When the same person swipes his RFID tag again, the system will save it as his leaving time and add it to his total working hours.



1.5 Automatic Attendance System

3.2 COMPONENTS:

3.2.1 Arduino UNO

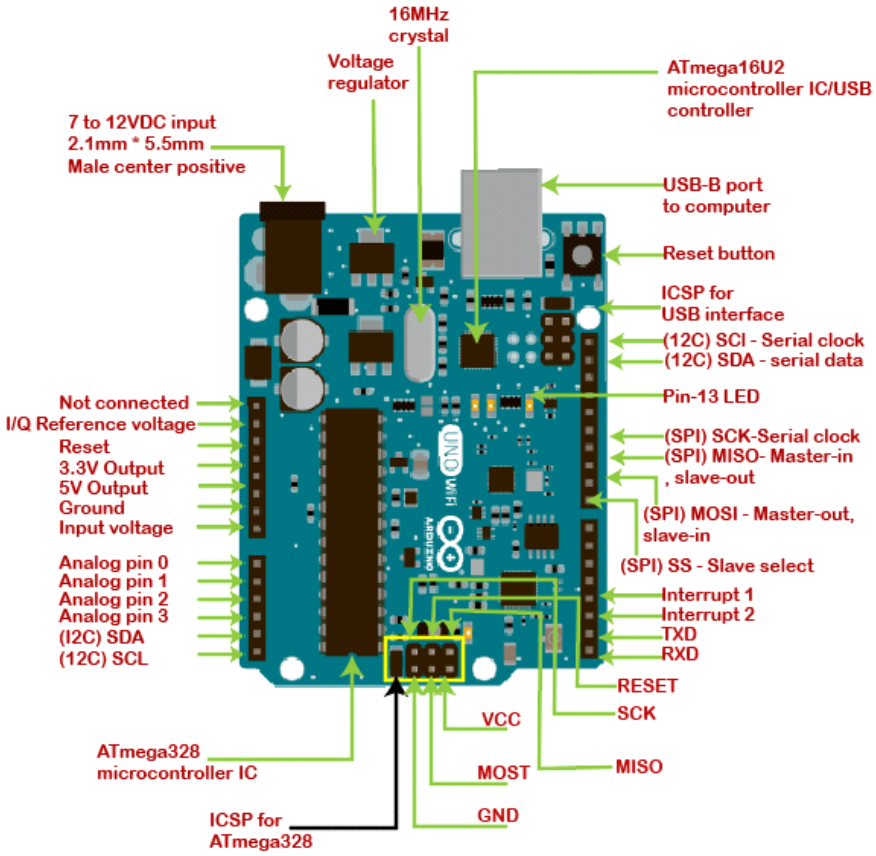
Arduino is a development board that integrates a microcontroller and its support circuitry with digital and analog inputs and outputs. It has an open source computing development platform based on an environment for programs creation.

3.2.1.1 SPECIFICATIONS:

Arduino Board	Microcontroller	Input Voltage	Operating Voltage	Output Current	Clock Frequency	Flash Memory	SRAM	EEPROM	Digital Inputs	PWM Outputs	Analog Inputs
UNO	*ATmega a328P*	*7-12 V*	*5V*	*20mV*	*16MHz*	*32 KB*	*2KB*	*1KB*	*14*	*06*	*06*

2.1 Specification of Arduino UNO

3.2.1.2 PINS AND PARTS:

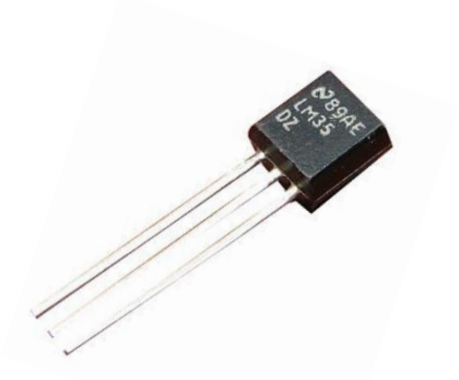


1.6 Parts and Pins of Arduino UNO

3.2.2 Sensors

3.2.2.1 LM35 temperature sensor

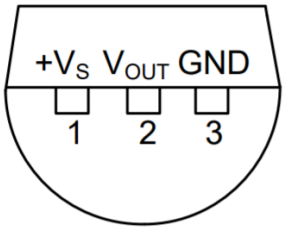
Integrated circuit temperature sensor with linear analog output proportional to the Centigrade temperature. It has low input impedance and an accurate calibration. The most common encapsulation is TO-92, used in low-power transistors.



1.7 Temperature Sensor (LM35)

3.2.2.1.1 Main characteristics:

- Supply voltage: 4 – 30 V
- Current drain: less than 60 μA
- Linear scale factor: 10 mV/ºC
- Range: -55 – 150 ºC
- Accuracy: ±1/4



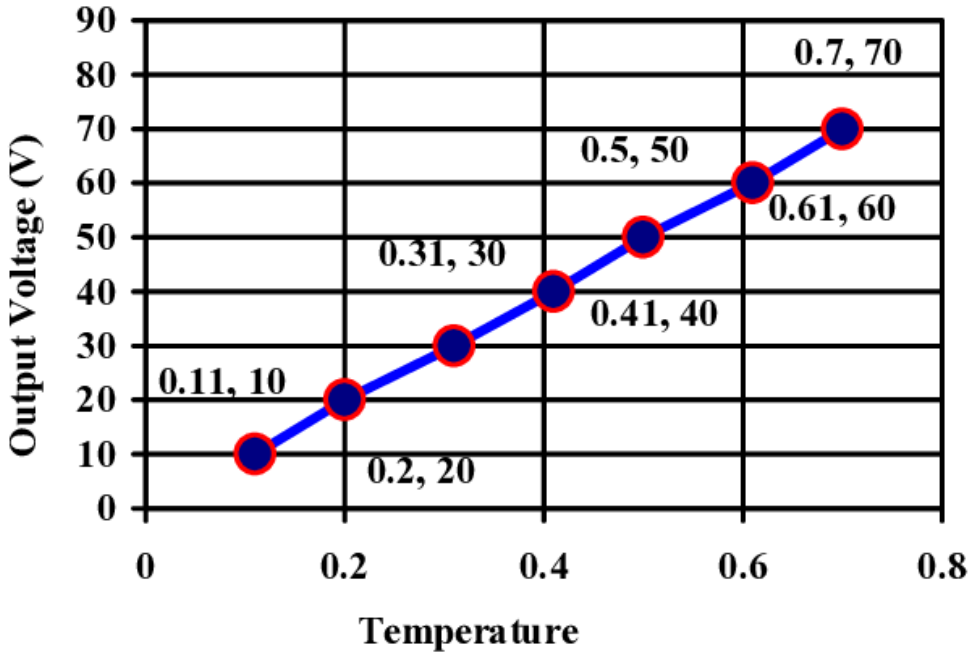
1.8 Pins of LM35

3.2.2.2 LDR lighting sensor

LDR is a resistor which value changes depending on the light received, although its resistance value also changes depending on the infrared and ultraviolet lights. These sensors are made of cadmium that reacts to light, allowing electrons to move freely and the current to pass through it, the resistance value can pass from MΩ with total absence of light to a few Ω when receives direct light, in less than a second.

1.9 LDR Sensors

3.2.2.2.1 Voltage vs Temperature Characteristics:



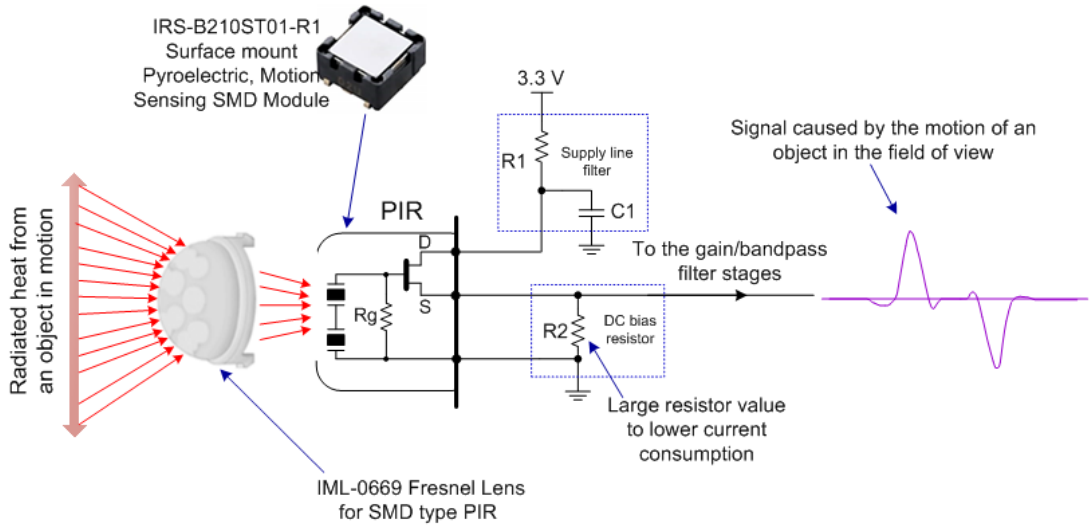
1.10 Vo vs Temp Characteristics

3.2.2.3 PIR Motion Sensor

Motion PIR sensor reacts only to certain energy sources like head released by the human or animal bodies. Its operation is based on perceiving the difference of infrared radiation in the surrounding area.
PIR movement sensor.
It is constituted by a crystalline material which generates a surface electric charge when it is exposed to head in form of infrared radiation, when the quantity of radiation perceived changes, it contains a Fresnel filter which changes output in order to indicate movement in surroundings.
It also contains an amplifier, which behaves as an active filter rejecting the high frequency noise, followed by a comparator which responds to a positive and negative transitions from output sensor signal. This sensor includes detection elements configured to cancel signals caused by vibration, temperature changes or sunlight. It has two variable calibration resistors: one is for establish the time that its output is kept, the other is to vary detection distance between 3 and 7 meters.

1.11 PIR Motion Sensor

3.2.2.3.1 Parts And Woking of PIR:



1.12 Parts of PIR Motion Sensor

3.2.2.3.2 Main characteristics:

Supply voltage: 4,5 – 20 V
Controller: PIR BISS0001
Detection range: 3-7 m
Fresnel lens: 19 zones, angle < 100º
Configurable output timer by trimmer (Tx)
Configurable retrigger by jumper

3.2.3 Actuators

3.2.3.1 DC Fan:

Cooling fan which transmits energy to generate the necessary pressure with which a continuous flow of air is maintained. It is axial type, which means that the air inlet and outlet follow a path according to coaxial cylindrical surfaces. In this case, its brushless DC motor will be energized when the NPN transistor to which is connected saturates.

1.13 5V Dc Fan

3.2.3.1.1 Main characteristics:

Supply voltage: 3,5 - 6 V

Current rating: 0,215 A

Operating temperature: -10 – 10 ºC

Fan type: axial

Propulsion: brushless DC motor

3.2.3.2 LED

Light Emitting Diode. Unlike diodes, LED does not use silicon crystals as a semiconductor element. It uses a combination of other semiconductor materials that emit photons of different colours when a current pass through it. It is formed by two polarities, one positive or anode and the other negative or cathode. At the junction between both a potential barrier is formed to prevent

the exchange of electrons between the two regions. When voltage is applied and LED is directly polarized, the electrons from source flows through it and whenever an excess electron negatively charged overcomes the potential barrier resistance, crosses it and it combined with a positive gap in excess. The energy acquired by the electron to cross the barrier, becomes electromagnetic energy that releases as a light photon.

1.14 LED

3.2.3.3 DC Motor:

DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances

1.15 Dc Motor

3.2.3.2 Specifications:

- Shaft length: 7 mm
- Shaft Diameter: 5.5 mm
- Size: 55 x 48 x 23 mm.
- Operating Voltage: 3 to 12V.
- Current (without loading): 40-180mA.
- RPM: 60 rpm.
- Output Torque: 1 kg cm.

3.2.3.4 Servo Motor :

A servomotor is a rotary actuator or linear actuator. It can precisely control angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

1.16 Servo Motor

3.2.3.4.1 Specification:-

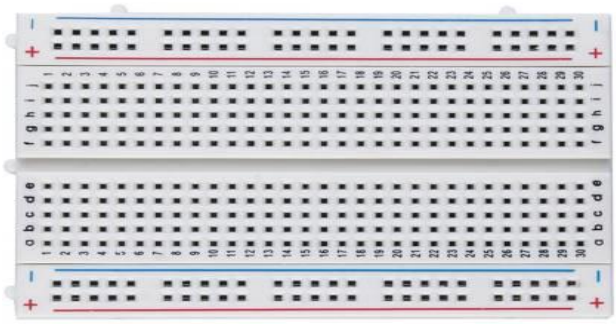
- 3 pole ferrite, all nylon gear
- Top ball bearing
- Operating Voltage: 4.8V~6.0V
- Operating speed: 0.12sec/60 degree
- Output torque: 1.6kg/cm 4.8V
- Dimension: 21.5 x 11.8 x 22.7mm
- Weight: 9g

3.2.4 Others :

3.2.4.1 Breadboard:

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can

be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate



1.17 Breadboard

3.2.4.2 Wires :

Element that allows closing an electrical circuit. It has to be combined with soldering.

1.18 Wires

3.2.4.3 RFID READER WRITTER MODULE & TAG :

RC522 - RFID Reader / Writer 13.56MHz with Cards Kit includes a13.56MHz RF reader cum writer module that uses an RC522 IC and two S50 RFID cards. The MF RC522 is a highly integrated transmission module for contact-less communication at 13.56 MHz. RC522 supports ISO 14443A/MIFARE mode. RC522 - RFID Reader features an outstanding modulation and demodulation algorithm to serve effortless RF communication at 13.56 MHz. The S50 RFID Cards will ease up the process helping you to learn and add the 13.56 MHz RF transition to your project.

The module uses SPI to communicate with microcontrollers. The open-hardware community already has a lot of projects exploiting the RC522 – RFID Communication, using Arduino.

1.19 RFID Module

1.20RFID Card

1.21 RFID Tag

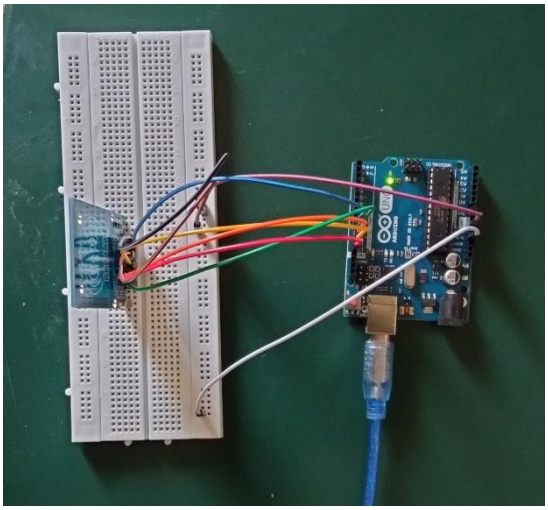
CHAPTER 4

EXPERIMENTAL SETUP AND PROCEDURE

4.1 AUTOMATIC ATTENDANCE SYSTEM USING RFID:

This project has four objectives that will be explained in details in the further.

The first objective of the project is to automatically take attendance from students using RFID and record attendance. Students information is recorded, saved in a RFID Tag, and if the data is utilized and transmitted to a computer via EXCEL , the attendance can be recorded with greater efficiency.



1.22 RFID RC522 Interface with ARDUINO

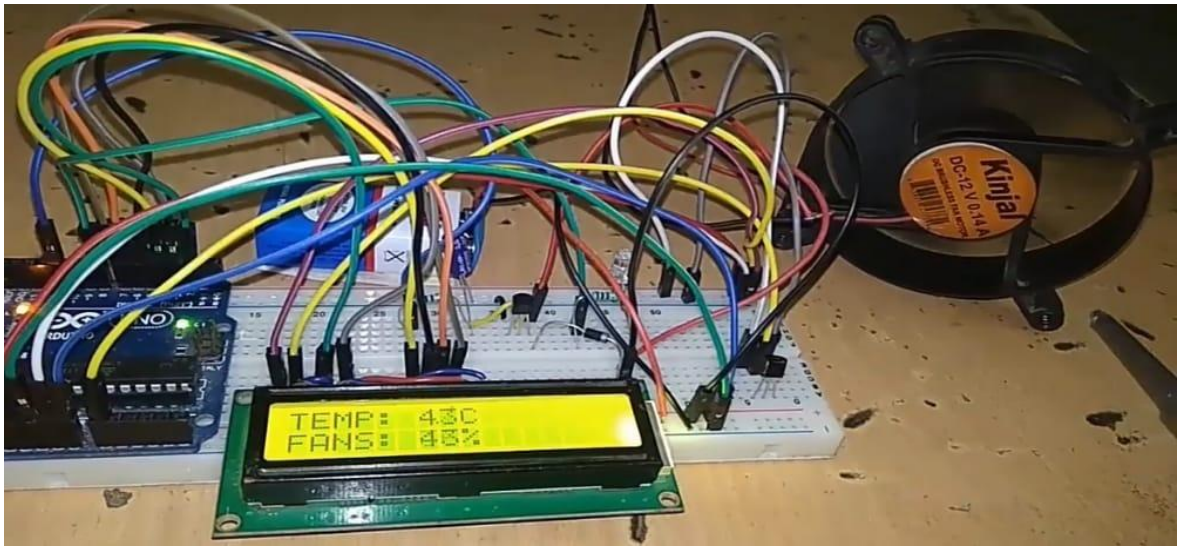
1.23 RFID Module

Arduino UNO	RFID RC522
PIN 10	SDA
PIN 13	SCK
PIN 11	MOSI
PIN 12	MISO
NC	IRQ
GND	GND
PIN 9	RST
3.3 V	3.3 V

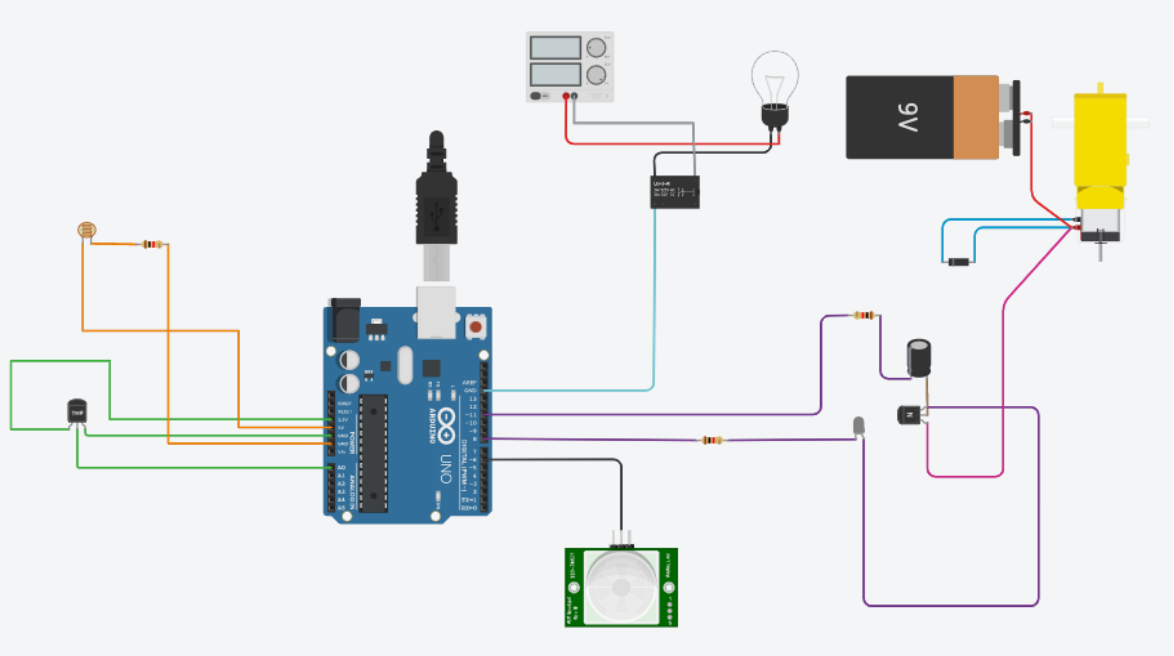
2.2 Connection of RFID RC522 Interface with ARDUINO UNO

4.2 AUTOMATIC LIGHT AND FAN CONTROLLING USING LM35 AND LDR:

The second objective is to automatically control the fan and lights. The idea is to plant several sensors around the classroom and give a calculated feedback to the response these sensors receive. An
example would be having PIR sensors around the class room that would detect the presence of human and turns the fan ON or OFF. For light control, there will be LDR and if the illumination in the classroom and turns the light ON/OFF according to the room's lighting changes from high to low.



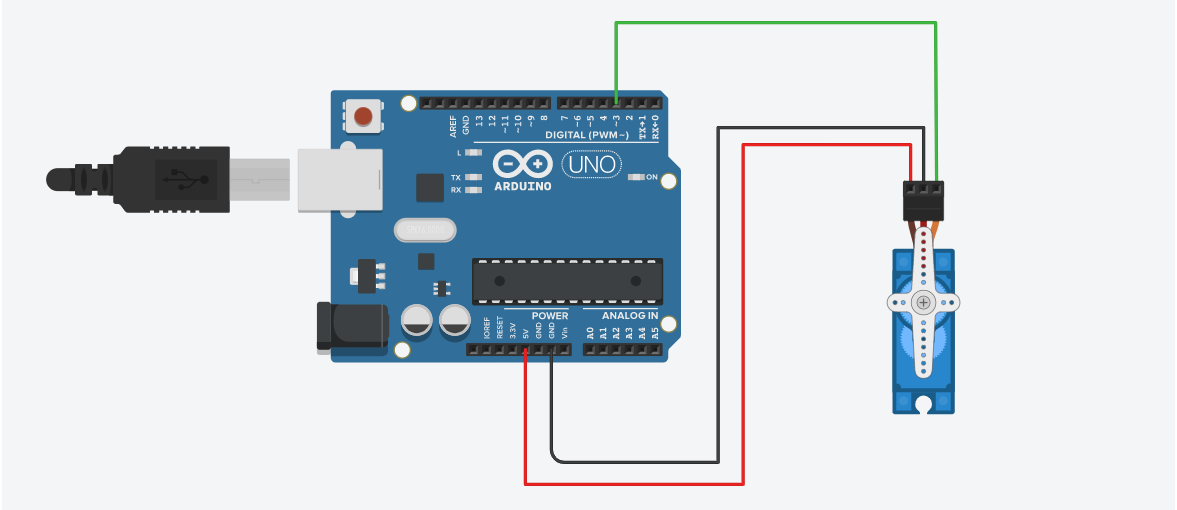
1.24 Automatic Fan And Light Control



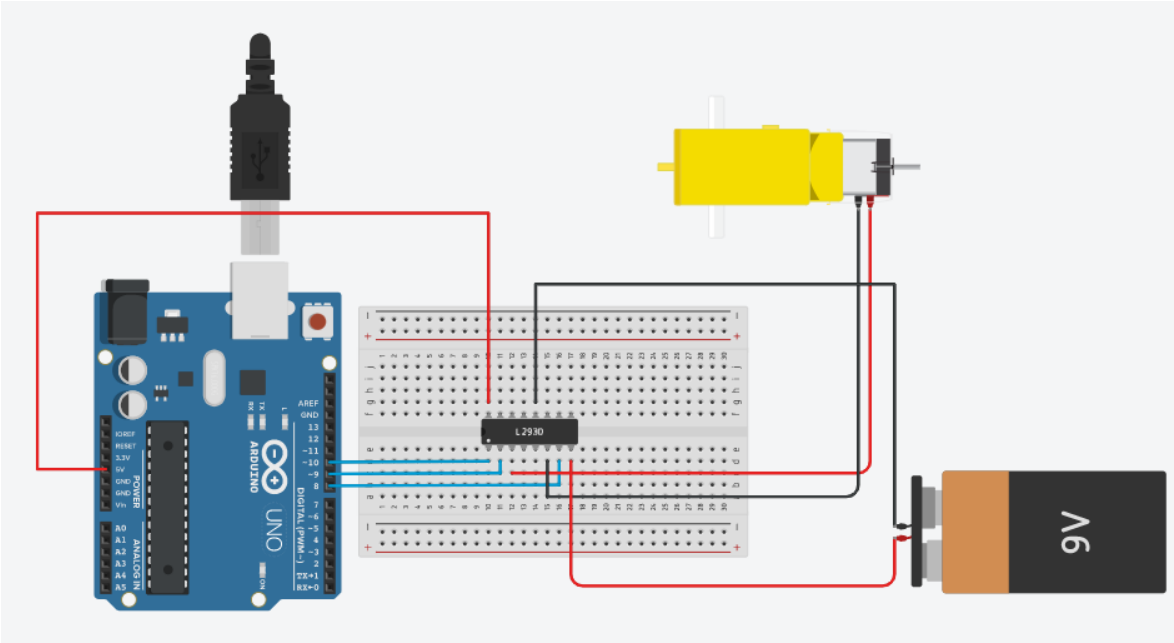
1.25 Circuit Diagram for Automatic Fan And Light Control

4.3 AUTOMATIC BLACKBOARD ERASING AND PROJECTOR SCREEN ROLLED OUT :

The second objective is to automatically control the fan and lights. The idea is to plant several sensors around the classroom and give a calculated feedback to the response these sensors receive. An
example would be having PIR sensors around the class room that would detect the presence of human and turns the fan ON or OFF. For light control, there will be LDR and if the illumination in the classroom and turns the light ON/OFF according to the room's lighting changes from high to low.



1.26 Automatic Board Erasing System

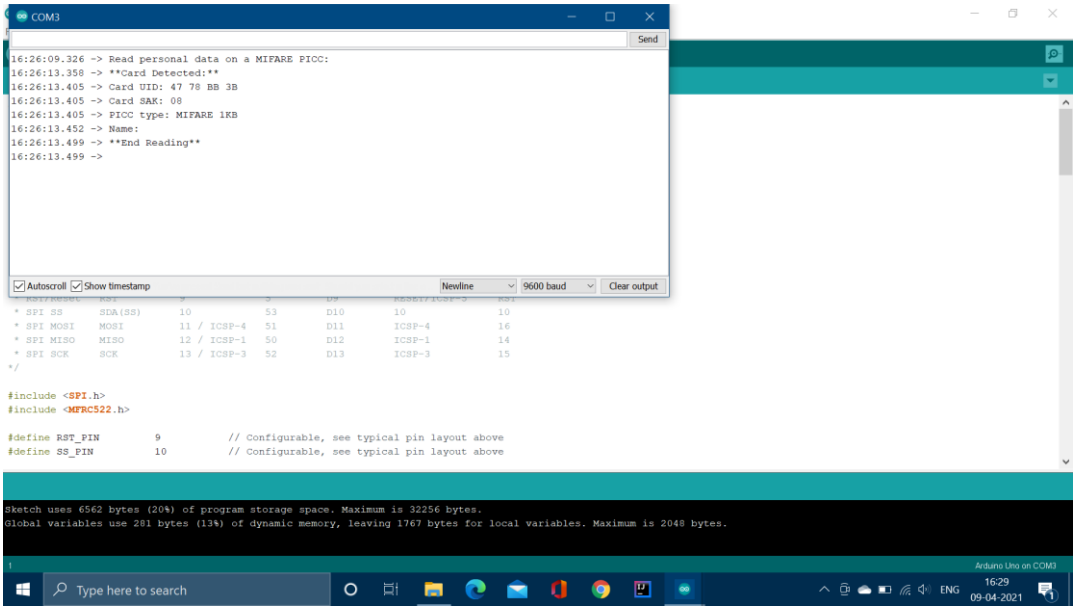


1.27 Projector Management System

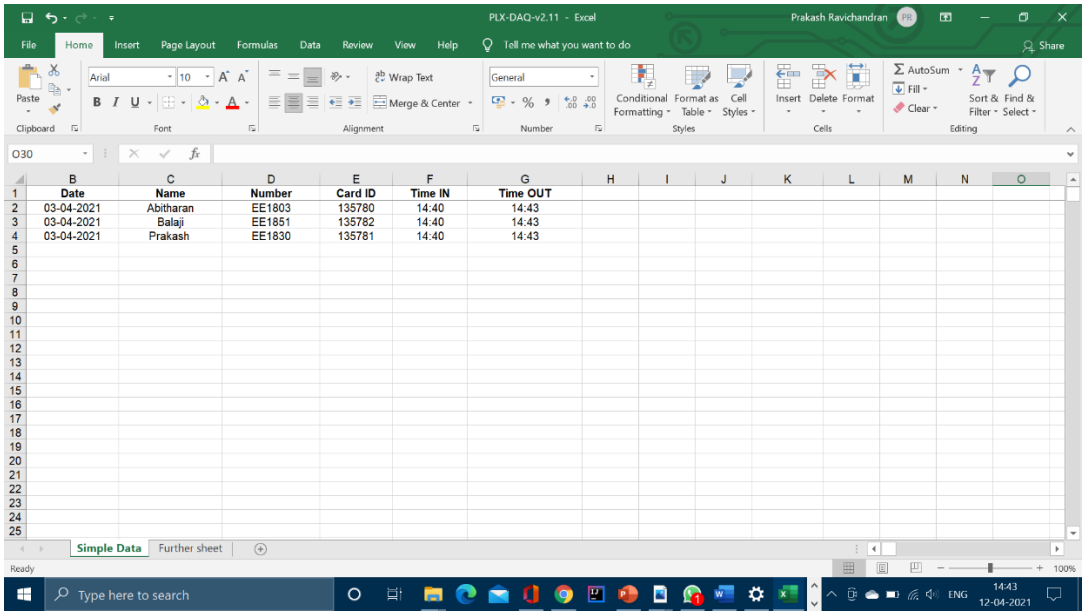
The last objective is to be overall cost effective. While the idea to improve classroom is the priority of this project work, importance is made to ensure that this system is affordable to all those who need it. The setup cost may initially be a bit high, but in the long run it is expected that there will be a reduction in both electricity and paper cost.

CHAPTER 5

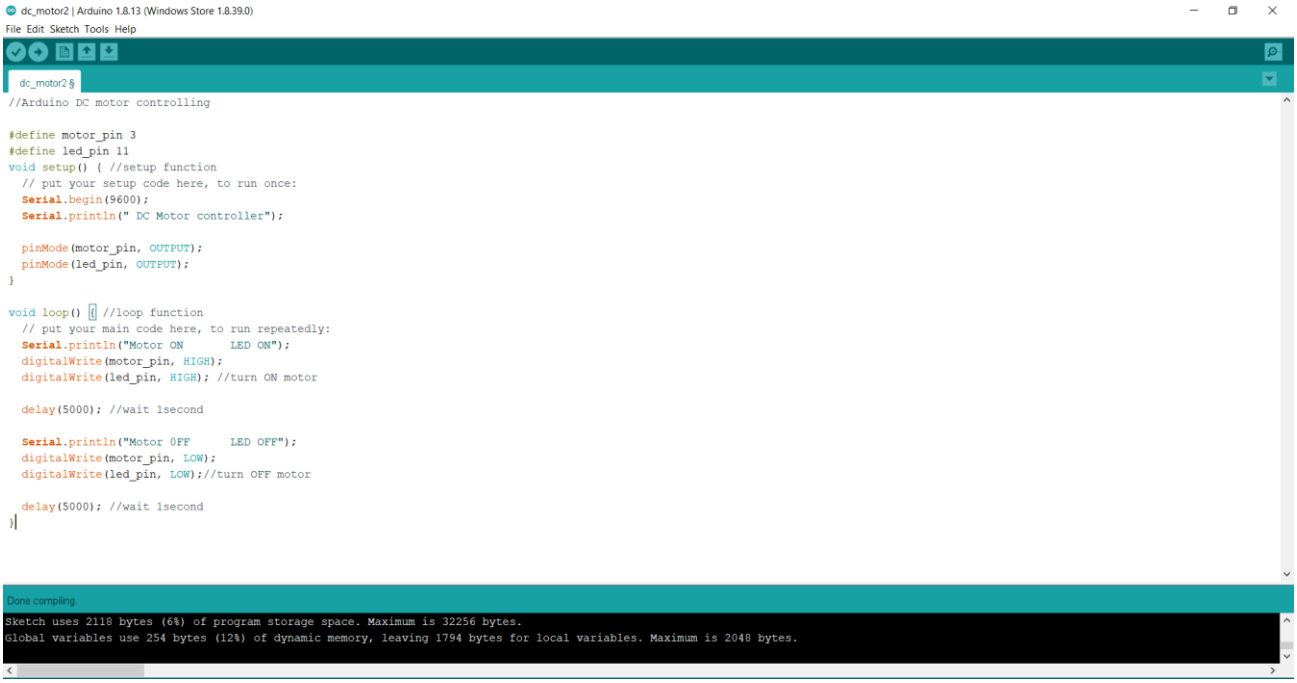
RESULTS AND DISCUSSION



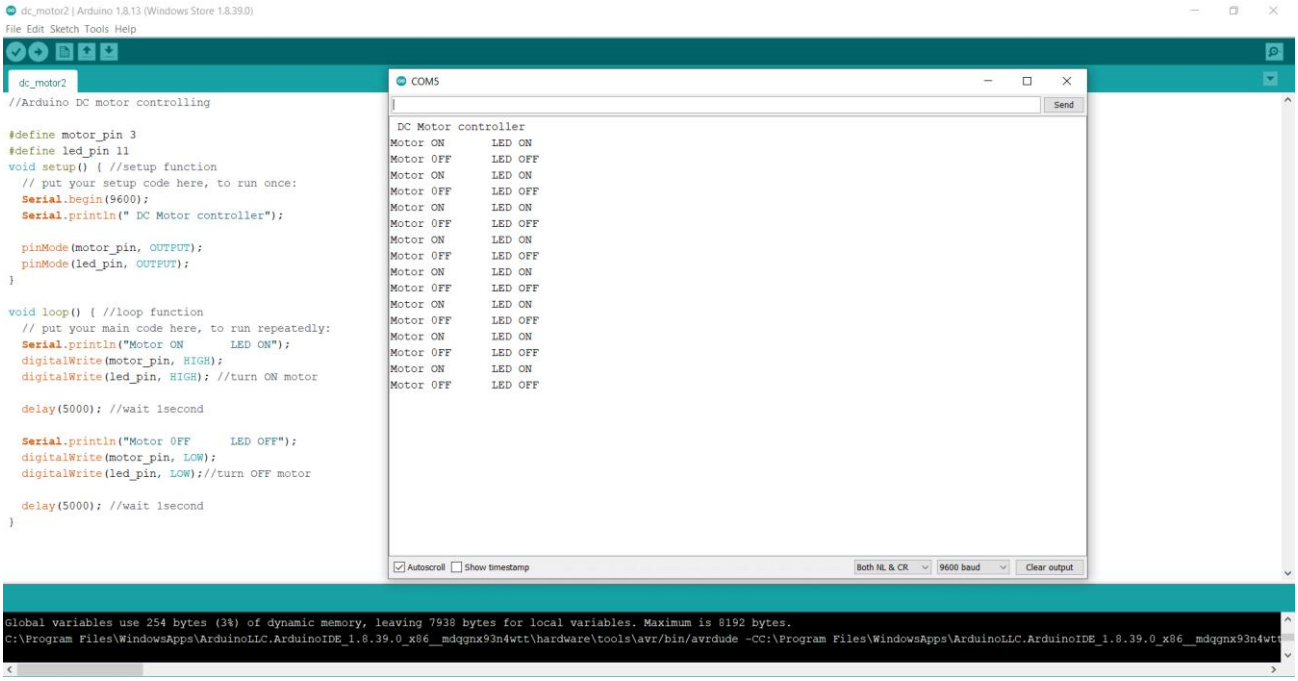
1.28 Output for Attendance System using ARDUINO IDE



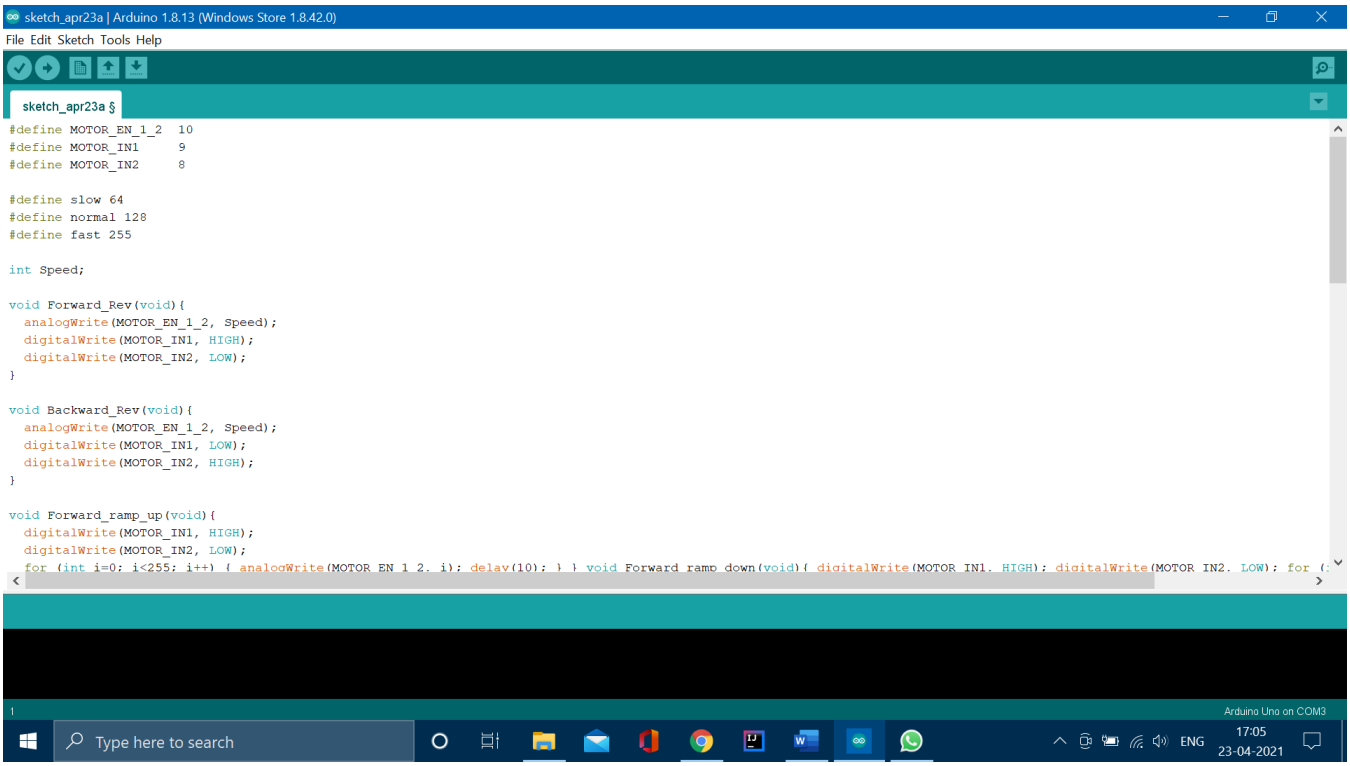
1.29 Output via Excel



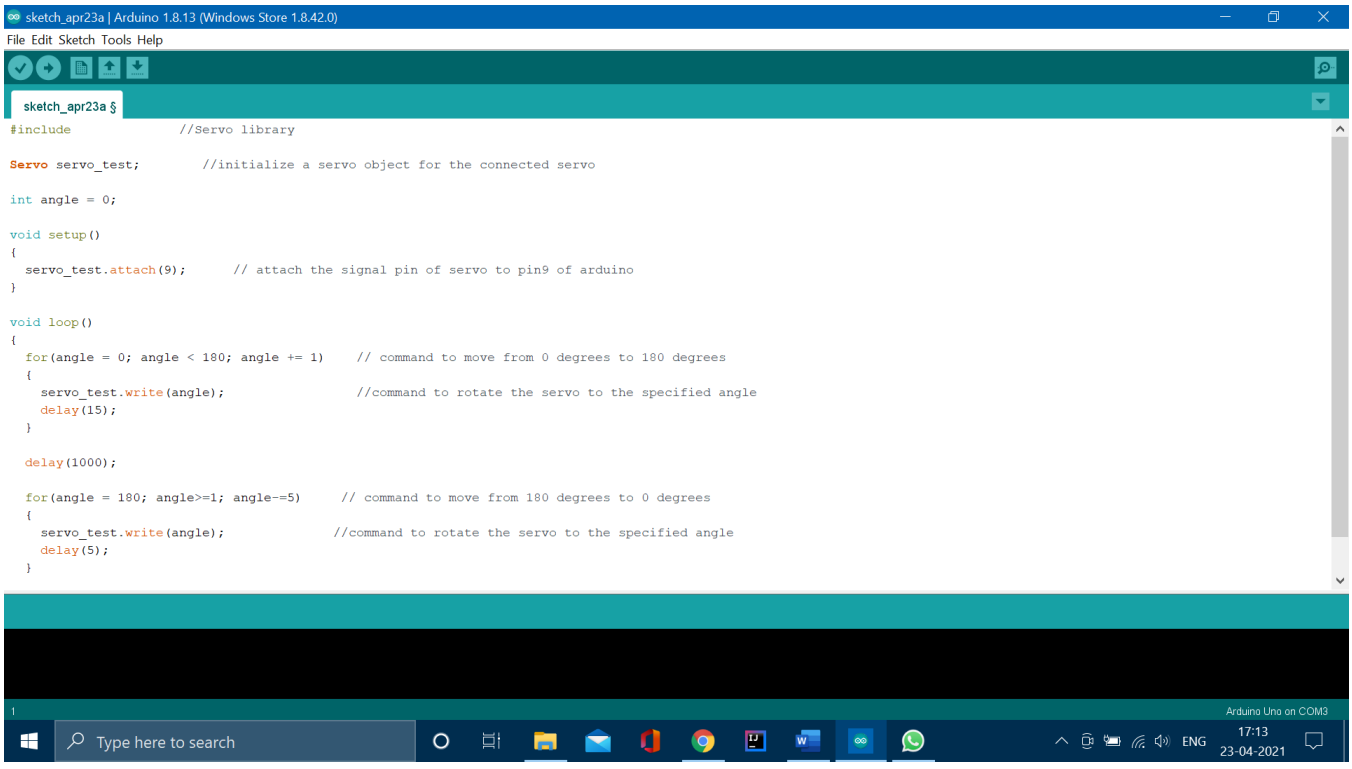
1.30 Code for Automatic Fan And Light Control System



1.31 Output for Automatic Fan And Light Control System



1.32 Code for DC Motor Control using ARDUINO IDE



Code for Servo Motor Control using ARDUINO IDE

CHAPTER 6

CONCLUSION

It has a very simple and an effective user interface. It eases the user to control the device effortlessly and effectively. As mentioned in the beginning the focus is on classroom automation , a classroom automation is what future technology should look like. The project will reach most of the people expectation as it is controlled only via voice where we don’t even have to touch things. We found designing and developing this interactive project very interesting and a good learning experience. Here we are integrating Blynk SDK(Software Development Kit) with using any third party application by manipulating source code.

LIST OF PUBLICATIONS

JAYALAKSHMI INSTITUTE OF TECHNOLOGY

(APPROVED BY AICTE,NEW DELHI ANNA UNIVERSITY, CHENNAI)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINERRING

TECHNOKRATZ-2K21

CERTIFICATE of MERIT

This Is To Certify That Mr / Ms PRAKASH R
From K RAMAKRISHNAN COLLEGE OF TECHNOLOGY Has
Secured 1ST PRIZE In The Event Of PAPER PRESENTATION - IOT BASSED SMART CLASSROOM
In The 10th National Level Technical Symposium"TECHNOKRATZ-2K21"
Held On 3rd May 2021.

CO-ORDINATOR HEAD OF DEPARTMENT PRINCIPAL

NATIONAL LEVEL VIRTUAL TECHNICAL SYMPOSIUM

Techplex '20

Certificate of Merit

New Prince Shri Bhavani
College of Engineering and Technology

Affiliated to Anna University | ISO 9001:2015 Certified | Accredited by NAAC
Tambaram-Velachery Main Road, Santhosapuram, Chennai-600 073

Certificate of Merit

This is to certify that Mr./Ms. PRAKASH R
of K Ramakrishnan College of Technology, Samayapuram
has been awarded the First prize in the Paper Presentation
of FAMSCA '20, a National Level Virtual Technical Symposium conducted by the **Department of Electrical and Electronics Engineering** on 29-10-2020. The title of his/her paper is given below. (applicable for Paper Presentation only)

Bloom Energy

COORDINATOR H.O.D. / EEE PRINCIPAL

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KONGU ENGINEERING COLLEGE
(Autonomous)
Perundurai , Erode - 638 060
Estd : 1984

Department of Computer Technology - PG

CERTIFICATE OF APPRECIATION

This is to certify that
Mr./Ms. PRAKASH R
of K RAMAKRISHNAN COLLEGE has won IIIRD
place in the event TECH THOUGHTS in Mescia 2k21, a
National Level Symposium held on 10th April 2021 organised
by the Department of Computer Technology - PG of
Kongu Engineering College, Perundurai, Erode.

Mescia 2021

Staff Co-ordinator

KONGU Assuring the Best

Head of the Department

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Estd : 1984
KONGU
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(Autonomous)
Perundurai, Erode - 638 060

Certificate of Participation

This is to certify that
Ms/Mr PRAKASH RAVICHANDRAN has presented a paper at
Zreyas'21,a national level intercollege symposium conducted by the
Gender Equality Club of Kongu Engineering College in the month of
February,2021

Faculty Coordinator

KONGU ENGINEERING COLLEGE GENDER EQUALITY CLUB

Faculty Coordinator

LIST OF PUBLICATIONS

International Research Journal of Modernization in Engineering Technology and Science

IoT BASED SMART CLASSROOM USING AUTOMATION USING ARDUINO

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*1,*2,*3 - Student, Department of Electrical and Electronics Engineering, K.Ramakrishnan College Of Technology, Trichy

*4 - Professor, Department of Electrical and Electronics Engineering , K.Ramakrishnan College Of Technology, Trichy.

I.ABSTRACT

The Internet has become a daily necessity to utmost of the effective participants in which we interact and communicate among ourselves by switching data and information sensed about the environment and atmosphere. From this IoT they relate autonomously to the real world events and offer us with services with or without direct human interference. In this project we use IoT for energy efficient Environmental Conditions recognizing and supervising in our Classroom. This gives a vast advantage on the smart Classroom systems using Internet of Things. This project will help the teacher present in the classroom to allow them to control the classroom using android application in the Android smartphone. The overall system design is mainly based on Arduino UNO R3. The appliances are to be controlled by the Android Application. The android application is developed using Blynk software or Blynk android application. We can supervise the state of sensors connected in the Arduino board and we can control the modules by simply enabling some options in the android application in our smart phone.

Keywords: IoT, Classroom automation, Blynk, Automation, Arduino.

II.INTRODUCTION

This project has four objectives that will be explained in details in the further. The first objective of the project is to automatically take attendance from students using their Fingerprint ID and record attendance. Students Fingerprint

is recorded, saved in a database, and if the data is utilized and transmitted to a computer via scanner, the attendance can be
recorded with greater efficiency. The second objective is to automatically control the fan, lights and projector. The idea is to plant several sensors around the classroom and give a calculated feedback to the response these sensors receive. An example would be having PIR sensors around the class room that would detect the presence of human and turns the fan ON or OFF. For light control, there will be LDR and if the illumination in the classroom and turns the light ON/OFF according to the room's lighting changes from high to low. automatically. The idea is to reduce the discomforts experienced by the teacher while erasing the black board. By switching a button the board will be automatically erased by the help of dusters fixed in a way to erase the black board efficiently. The last objective is to be overall cost effective. While the idea to improve classroom is the priority of this project work, importance is made to ensure that this system is affordable to all those who need it. The setup cost may initially be a bit high, but in the long run it is expected that there will be a reduction in both electricity and paper cost.

III.PROBLEM IDENTIFICATION

An ideal classroom is an environment in which teachers are able to focus completely on their lectures and the students are able to concentrate on the information they are being conveyed. Unfortunately, this does not happen in most of the Indian Classrooms. During first ten minutes of every class hours, time is usually wasted in many ways such as manually recording student's attendance one after another in the attendance register. Other disruptions also occur throughout class time such as temperature and light variation in summer and winter seasons respectively. These problems cause affected students to wander around the class guessing for the right switch and adjusting it to equilibrate the environment back to satisfying or comfortable conditions. This causes disturbances for both teachers and all the other students, and so to eliminate these irritations an automated classroom is created which allows the classroom to become more efficient, and eliminate any human assistance in controlling the atmosphere.

IV.EXISTING SYSTEM METHODOLOGY

There are two methods which is being followed previously. They are
1. Manual method
2. Automation without IoT and individual costly systems

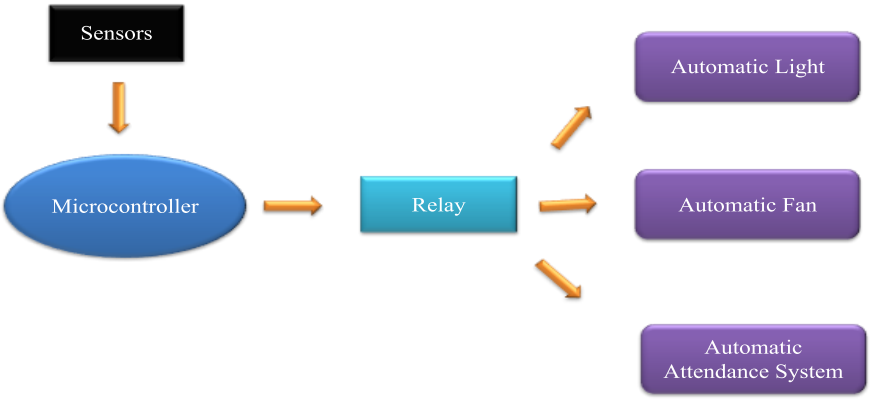


Fig.1. Block diagram of Existing Methodology

Advantages of the existing system are given below

- ✓ Manual methods are used in small schools with less number of students
- ✓ Automation can be implemented for only needy systems which may reduce cost

The main disadvantages of this existing systems are given below

- ✓ Time consuming
- ✓ Relatively high cost
- ✓ Contains minimum number of automated systems
- ✓ Students and teachers will get disturbed
- ✓ Electricity is wasted dude to carelessness
- ✓ However in our system these disadvantages are overcome effectively.

V.PROPOSED SYSTEM METHODOLOGY

The proposed system integrates all individual system sunder one board. So that the cost of overall system will be reduced efficiently. The block diagram of proposed system is shown in Fig 2.

The proposed system contains the following Subsystems.

- ✓ Automatic Attendance System
- ✓ Automatic Fan & Light Controlling System
- ✓ Automatic Blackboard Erasing System
- ✓ Projector Screen control

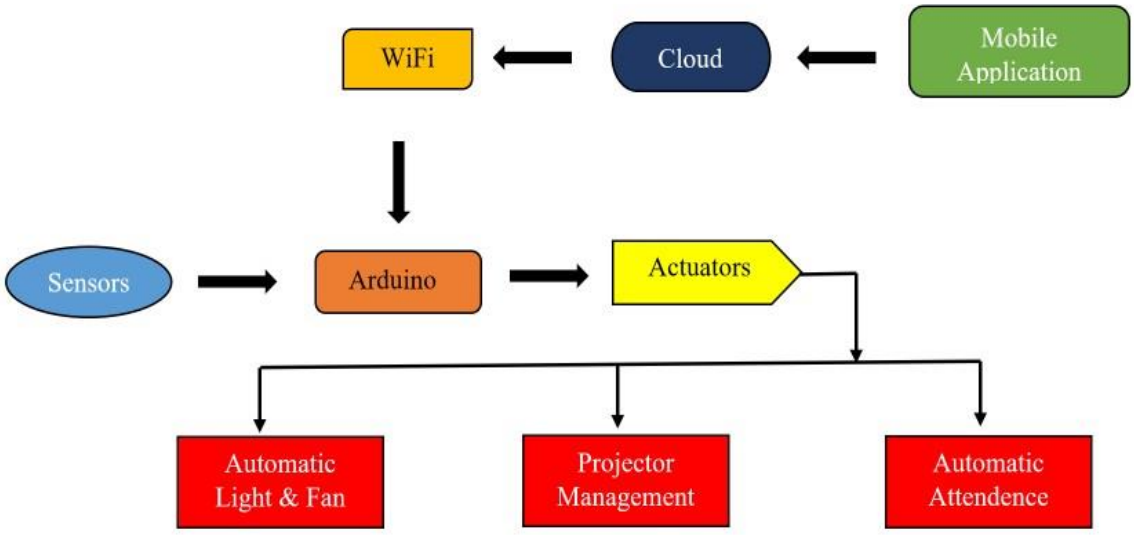


Fig 2. Block Diagram Of Proposed System

VI.OBJECTIVE

The first objective of the project is to automatically take attendance from students using RFID and record attendance. Students information is recorded, saved in a RFID Tag, and if the data is utilized and transmitted to a computer via EXCEL , the attendance can be recorded with greater efficiency.

The second objective is to automatically control the fan and lights. The idea is to plant several sensors around the classroom and give a calculated feedback to the response these sensors receive. Anexample would be having PIR sensors around the class room that would detect the presence of human and turns the fan ON or OFF. For light control, there will be LDR and if the illumination in the classroom and turns the light ON/OFF according to the room's lighting changes from high to low.

The third objective is to erase the blackboard automatically. The idea is to reduce the discomforts experienced by the teacher while erasing the black board. By switching a button the board will be automatically erased by the help of dusters fixed in a way to erase the black board efficiently. The last objective is to be overall cost effective. While the idea to improve classroom is the priority of this project work, importance is made to ensure that this system is affordable to all those who need it. The setup cost may initially be a bit high, but in the long run it is expected that there will be a reduction in both electricity and paper cost.

VII. PROCEDURE FLOW

The system follows three steps in automating the classroom.
They are

- Sensing
- Transmission of data
- Monitoring and Controlling

The sensor is the starting point of the process. Once the data is received the microcontroller does its work according to the program stored in it. The Flow diagram is shown in Fig 3.

Fig 3. Procedure Flow

VIII.COMPONENTS

The selection of materials involves the study of their Characteristics, advantages, availability, cost, user friendly property of components that we want to use.

In our project, we select each and every components by study thoroughly about them. By proceeding like that only, we had done our selection.

- ✓ The software and device chosen to programming the execution of our idea is Arduino IDE and Arduino UNO Board.
- ✓ The Software used to interface user and smartphone is Blynk software
- ✓ The device chosen to interface Blynk software and Arduino board is ESP8266.

ARDUINO UNO

The Arduino UNO R3 is a microcontroller board based on the ATmega328p chip. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Arduino Board is shown in Figure.

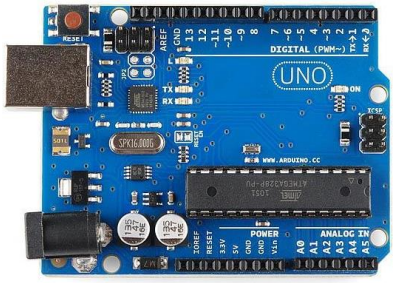


Fig 4. Arduino UNO R3

WIFI MODULE

The ESP 01 ESP8266 is a small-sized ESP 01-based development board produced by Espressif.
Developers can connect these pins to peripherals as needed. The Module is shown in Fig.

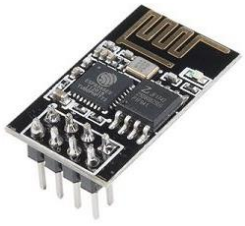


Fig 5. WIFI Module

BLYNK SOFTWARE

Blynk is a smart platform with iOS and Android apps to control Arduino, Raspberry Pi and the other IoT modules over the Internet. It's a digital dashboard in your smartphone where you can build a graphic interface for your project by simply dragging and dropping widgets. It's really simple to set everything up and you'll start learning in less than 5 minutes. Blynk is not tied to some specific board or shield. Blynk was designed for the Internet of Things. It can control hardware remotely from any part of the world, it can display sensor data, and it can store data, visualize it and do many other cool things.

PIR SENSOR

PIR sensor is more complicated than any other sensors because there are multiple variables that affect the sensors input and output. The PIR sensor itself has two slots in it; each slot is made of a special material that is sensitive to IR detectors. The PIR Sensor
working is shown in Fig.

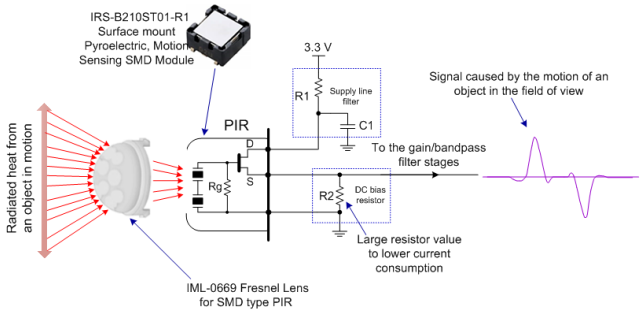


Fig 6. PIR Sensor

LIGHT DEPENDANT RESISTER

A light dependant resistor also known as a LDR, photo resistor, photoconductor or photocell, is a resistor whose resistance increases or decreases depending on the amount of light intensity A LDRs can have a variety of resistance and functions. For example it can be used to turn on a light when the LDR is in darkness or to turn o¬ a light when the LDR is in light. It can also work the other way around so when the LDR is in light it turns on the circuit and when it's in darkness the resistance increase and disrupts the circuit.

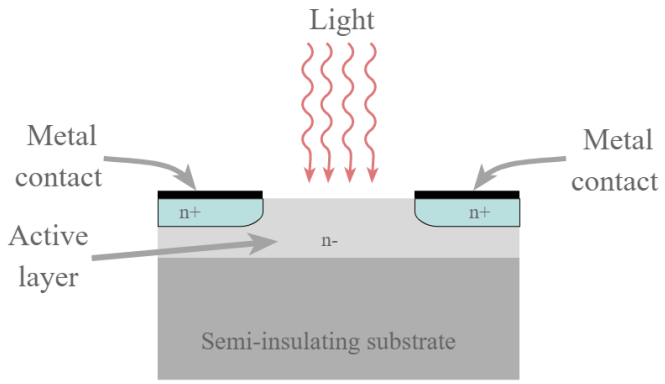


Fig 7. LDR Sensor

SERVO MOTOR

A servo motor is a self-contained electrical device, that rotate parts of a machine with high efficiency and with great precision.The output shaft of this motor can be moved to a particular angle, position and velocity that a regular motor does not have.The Servo Motor utilizes a regular motor and couples it with a sensor for positional feedback.The controller is the most important part of the Servo Motor designed and used specifically for this purpose.

Fig 8. Servo Motor

RFID

This is RFID Reader/Writer RC522 SPI S50 CARD AND KEYCHAIN which works on non-contact 13.56mhz communication, is designed by NXP as low power consumption, low cost and compact size read and write chip, is the best choice in the development of smart meters and portable hand-held devices.

It uses the advanced modulation system, fully integrated at 13.56MHz with all kinds of positive non-contact communication protocols. Support 14443A compatible answer signal. DSP deal with ISO14443A frames and error correction.

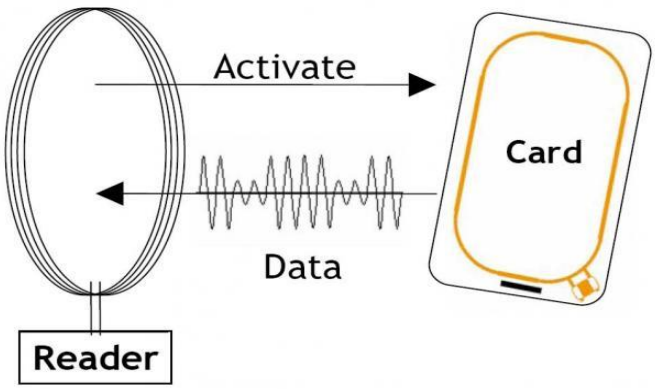


Fig 9. RFID Module & Card

IX.PROGRAMMING

The programming is done in Arduino IDE software. During programming we have to keep in mind that all the systems should be automated and they should not get affected by the other parts of program.

The Sample coding is give n the future section.

PIR & LDR

```
If (analogRead(photosensor) >= 850)
{// dark if the value of photosensor is bigger than 850
Serial.print("Dark");
PIRState = digitalRead(PIR);
// then get the value of the PIR sensor
//if detect move the PIR State is HIGH if not move
then is LOW
if(PIRState == HIGH) {
digitalWrite(relayfloor, LOW);
// open the relay floor to give power on
leds delay(5000);
// delay to stay on the leds
Serial.print("Motion PIR");
// debugging show in serial monitor
PIRState == LOW;
// set the PIR State low no motion-movement
} else {
// if have not movement-motion close the
Serial.print("No motion");
digitalWrite(relayfloor, HIGH); }
} else {
// the photosensor take value for day and the relay
close
// we not check the PIR sensore
digitalWrite(relayfloor, HIGH);
Serial.print("Day No light need"); }
if (strcmp(packetBuffer, "Ledon") == 0) {
digitalWrite(relaydesk, LOW); replay = "leds desk
on"; }
else if (strcmp(packetBuffer, "Ledoff") == 0) {
digitalWrite(relaydesk, HIGH); replay = "leds desk
off"; }
```

Stepper Motor Control

```
int sensorReading = analogRead(A0);
int motorSpeed = map(sensorReading, 0, 1023, 0,
100);
If (motorSpeed > 0) {
myStepper.setSpeed(motorSpeed);
myStepper.step(stepsPerRevolution / 100); }
```

LED Matrix

```
void setup() {
// set up the LCD's number of columns and rows:
lcd.begin(16, 2);
}

void loop() {
// set the cursor to (0,0):
lcd.setCursor(0, 0);
// print from 0 to 9:
for (int thisChar = 0; thisChar < 10; thisChar++) {
lcd.print(thisChar);
delay(500);
}
// set the cursor to (16,1):
lcd.setCursor(16, 1);
// set the display to automatically scroll:
lcd.autoscroll();
// print from 0 to 9:
for (int thisChar = 0; thisChar < 10; thisChar++) {
lcd.print(thisChar);
delay(500);
}
// turn off automatic scrolling
lcd.noAutoscroll();
// clear screen for the next loop:
lcd.clear();
}
```

X.OUTCOME EXPECTED

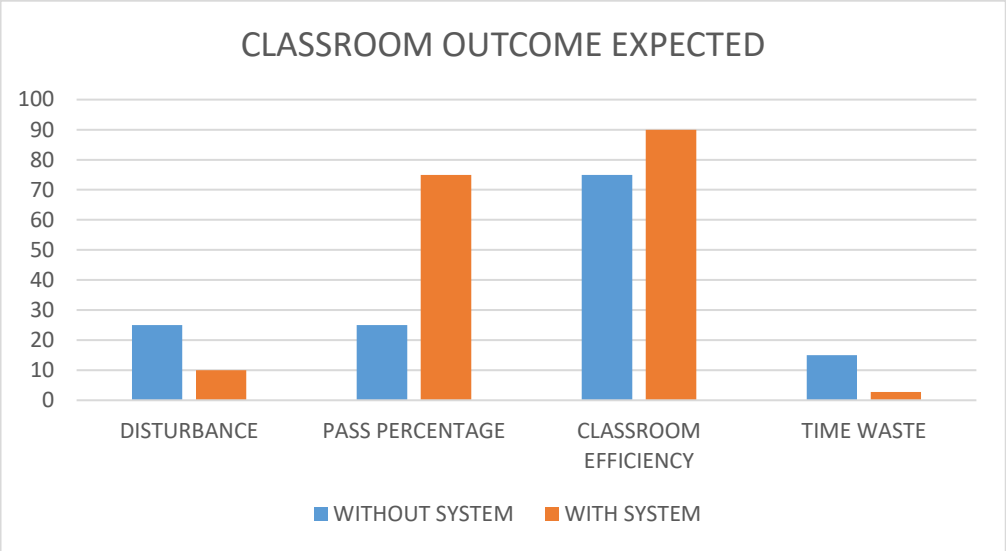
There are two types of outcomes expected from this project. We have collected some data from college electric department and our department to achieve the required results.

ENERGY SAVED

The data from the electric department which controls the power house of the college. The data is then compared with our assumption.

CLASSROOM OUTCOME EXPECTED

The data from our department are sorted out and the required data are plotted in the below Graph.



XI. ACKNOWLEDGEMENT

We take immense pleasure in expressing our humble note of gratitude to our project guide **MR.V. SURESHKUMAR**, Assistant Professor Department of Electrical and Electronics Engineering for his remarkable guidance in doing our project.

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