# SMART CLASSROOM WITH MOTION SENSOR
### A Report for the Evaluation 3 of Project 2

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# SCHOOL OF COMPUTING AND SCIENCE AND ENGINEERING

## BONAFIDE CERTIFICATE

Certified that this project report **"SMARTC CLASSROOM WITH MOTION SENSOR"** is the BONAFIDE work of **"ANURAG YADAV (1613101168)"** who carried out the project work under my supervision.

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**ABSTRACT**

Considering the estimate of the potential system in the classroom, lights and fan control is expected to be performed in three modules. Thus, in the case of light and ventilator power, occupancy sensor is used to estimate the amount of output voltage increases in the diode while the rotational speed increases simultaneously. Motion sensors are common where safety and energy efficiency are concerned. They can be used for burglary alarms or surveillance cameras, which activate such devices when it detects nearby motion. This can be an energy saver by turning off lights in a building as it no longer detects activity and is commonly used in office buildings and toilets. The PIR is a motion sensor you might have seen while entering a bathroom or office space, normally with a white mask. They are lightweight, low powered, simple to use and low cost. The way it detects motion is by sensing the temperature differences between the surroundings PIRs are fitted with a passive sensors level of infrared radiation –all emits some low-level radiations, but a human body emits good heat. This triggers a pulse when the sensor senses a different shift between the two slots which is what it detects as 'movement' Technology is available that combines both PIR and microwave sensors to have less false alarms, a sudden increase in room temperature will cause the PIR to go off while wind will push an object and activate the microwave sensor.

# INTRODUCTION:

In several classrooms after the class is over the students and teacher leaves the class without turning OFF the electricity of the classes, the security personnel appear to shut them off at the moment the classrooms are locked. Thus electrical energy is lost during the undesirable period.

PIR sensors and LDR are used to automatically control this to solve. PIR senses the humans inside the classroom and only turns ON when there is some person inside the classroom. LDR senses ambient lighting it will turn ON the lights during the dark hour and vice versa. PIR sensor is more complex than any other sensor, since several variables influence the input and output of the sensors. There are two slots within the PIR sensor itself; each slot is made of a special material that is sensitive to IR detector. A light based detector is also known as LDR, photo-resister, photo-conductor or photo-cell is a resistor whose resistance increases or decreases depending upon amount of light. The resistance and functions of an LDR can be varied. For example when the LDR is in darkness, it can be used to turn a light on, or turn OFF a light when LDR is not in darkness. It can also operate the other way around, so that when the LDR is in light it switches on the circuit and resistance rises and disrupts the circuit when it is in the dark. Relays are switches which are electrically operated. In the normal form, when ample coil current flow a coil pull into an armature. Relays for DC or AC excitation are available, and coil voltages from 5 volts up to 110 volts are popular. The electrical relay in response to control signal provides a quick on/off switching operation. A magnetic field is created as current for flows through the wire coil. The sensors plays major role in this project. And first of all we must have to know that what are sensor. We live in sensor universe. In our homes, workplaces, vehicles and smart devices, we will find various kinds of sensors. Sensor is an input device that gives an output (signal) for specific physical quantities. Sensor makes the stuff easy to use. Different kinds of sensors are- temperature sensors, pressure sensors, humidity sensors, light sensors etc.

Two major sensors used in this project are

- PIR sensors
- Arduino

➢ PIR sensors

PIR sensors (passive infrared sensors) are an electronic system that monitors the emission of infrared lights from objects in the field of view and can be used for motion detection within 6 meters. These sensors detect the nearest movements in specific set range, so if range is not set up then several movements will occur and sensors will find it difficult to sense. To obtain a continuous function, it obtains discrete values which are connected together.
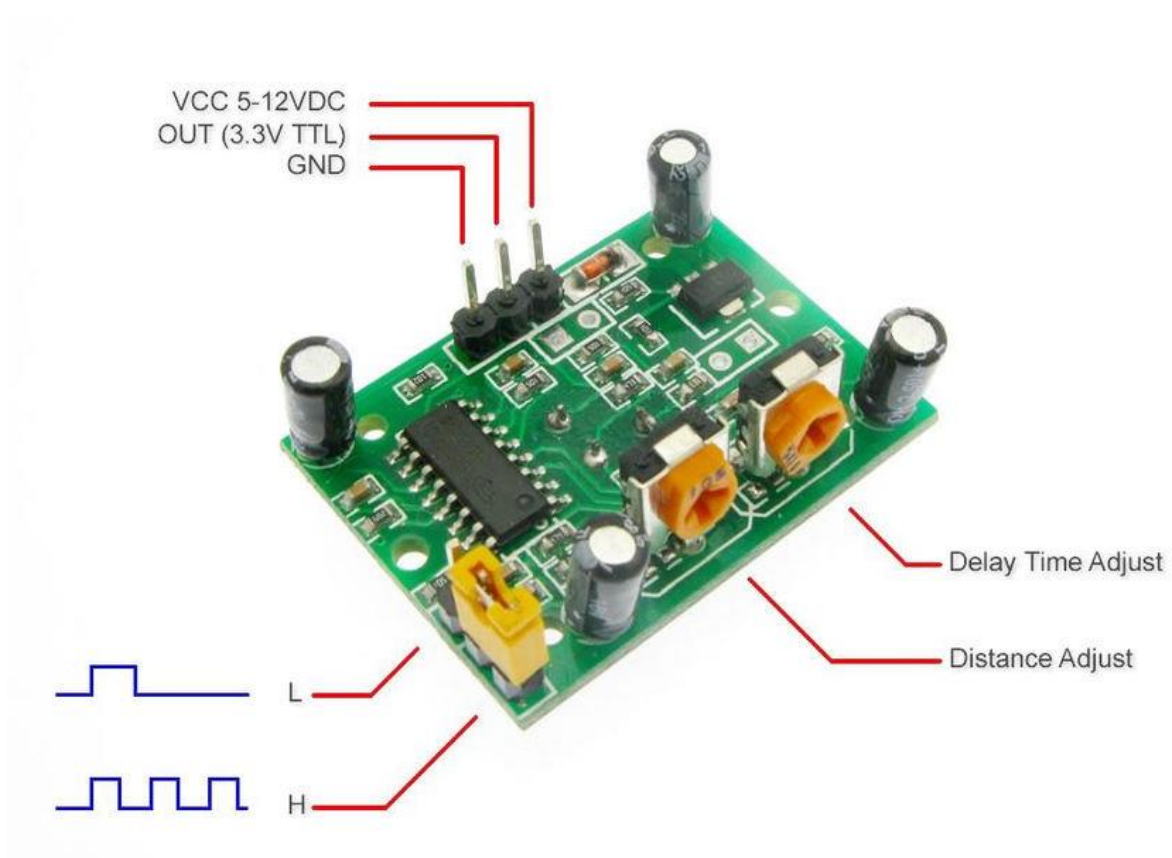
➢ Arduino

Arduino is an open source, hardware and software-based electronics platform. Arduino boards can read inputs-light on a sensor, a finger on a button, or a Twitter message and transform it into an output –trigger a motor, a switch on an LED, and publish there are numerous projects planned for different applications using Arduino sensors. Arduino is said to be used to realize a dream concept.

Example include: sensors for moisture and rain detection, sensors for soil moisture, sensors for microphones etc.

# INTERNET OF THINGS (IOT)

Internet Of Things (IOT) is a system which is widely connected to computing devices, mechanical machines by having an Unique Identifiers (UIDs) and they have ability to transfer data over network without requiring any kind of interaction neither human-to-human nor machine-to-machine. Generally IOT is everything which is connected to the internet. If there is no internet then it can be say that there is no IOT exist in this universe. IOT shares the data to the cloud server so that other computing devices connected to server can get the data through the cloud server. It's possible to change anything as small as pills to as big as buildings everything can be controlled by the IOT. It has sensor devices which can be wireless sensor devices or wired sensor devices. An IOT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to capture, transmit and act on data they acquire from their environment. IOT devices exchange sensor data that they collect while connecting to an IOT gateway r other edge system where data is either sent to the cloud for analysis or analyzed locally. Such devices often interact with other similar devices, and act on the information they obtain from each other. Much of the research is performed without human interference by the machines-for example, set them up, send them instruction or access the data. The internet of things allows people to live and work better and to take complete control of their lives. IOT is essential for business, in addition to offering smart devices to automate homes. IOT offers business a real-time look at how their process actually operate, offering insights into everything from computer efficiency to supply chain and logistics operations. IOT lets business simplify processes and reduce labour costs. This also reduces waste and increases services quality, making it less costly to produce and supply products, as well as keeping consumer purchases open. The internet of things gives companies several benefits. Many of the benefits are

unique business, and others are common across various industries. Some of IOT's common benefits require undertakings to:

1-monitor overall business processes

2-save time and money

3-generate more revenue

4-integrate and adapt business models

5-enhance employee productivity

6-make better decisions

7-improve the customer experience

## IOT HAS VARIOUS PROTOCOLS:

1-Link Layer

2-Network Layer

3-Transport Layer

4-Application Layer

## IOT ENABLING DEVICES ARE

1-WSN (wireless sensor network)

2-Cloud computing

3-Big data analytics

4-Embadded system

# MERITS AND DEMERITS

- ➤ MERITS

- Smart classroom with motion sensors enhanced the whole classroom which gives better atmosphere to the students.

- It will help in managing the whole power supply of campus. By the use of automated lights and fans in classroom.

- It will help in reducing the no. of electric faults in classes.

- By these activities it can help in electricity bill.

- Improved communication between connected electronic devices

- It has ability to access information from anywhere at any time on any type of device.

- ➤ DEMERITS

- In Smart Classroom with Motion Sensors we use lots of sensors which makes classroom smart but those sensors sometime will not be able to work properly.

- Those sensors are not for high time usage. At some time they will stop working because all sensors have their time period. Which is a difficult task to change sensors at every continuous of time period.

- Sensors have their specific range on which only they can work. If activity is performed out of that range it will not detect it.

- If there is any bug in the system then all connected devices to the system will be corrupted.

# PURPOSE:

The purpose of this project is very clear and very beneficial for our society. This project is helpful in reducing the wastage of power supply or electricity in school/ universities. As we all know very well what is the importance of electricity in our life? In colleges/school consumption of electricity is very high and wastage rate of electricity is also very high. So by this project we can sure manage the wastage of electricity in universities/schools. And by this electricity can be transferred to the areas where its need very high but its capacity is not in proper ratio. By the help of this project we can automatically handle the lights and fans of classrooms when there will be anyone in classroom then only fans and light can work otherwise they will be off automatically.

## SCOPE:

Scope of this project is very high. Smart classroom with motion sensor is a big thing which will definitely play a vital role in future time. As the ratio of universities and schools are increasing day by the. So the usage of electricity is also increasing in same ratio. To control extra and unwanted use of electricity this project is best.

It just not only helpful in universities, it is also applicable in offices and homes too. It just sense the activity of human and it operate in that conditions By this technology in universities and schools also helpful in reducing the no. of workers for electricity checking department.

# LITERATURE SURVEY:

In project "Smart classroom with motion sensor" it's shown about the new way of electrical supply in classrooms in colleges/university. Many kind of sensors are used to work on this project. 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. Many different technologies were involved in it. By use of temperature sensors in classroom, automated fans worked. Basic concept was to make classroom automated on/off electrical supply. While in this concept tracking of human activities was tracked and monitored. That concept of tracking and monitoring human activities is not manageable. Due to various activities at a same time can create difficult situation for sensors to track the activities.

So to remove this kind of problem some changes should be done to make project more efficient. So in project "smart classroom with motion sensors" added more sensors and created a range area for tracking the human activities near the classroom. By ranging the tracking area will help to reduce the tracking of unwanted activities in colleges/universities. Only main focus on classroom activities. And for this smart sensors are required and as no. of sensors increases the work of monitoring activities increases. In the project PIR sensors are used, temperature sensors

## PROPOSED MODEL:

This project model is composed of different sensor types. Those sensors can help to assess the activity occurring outside the classrooms. We use PIR sensor (passive infrared sensor) to locate

activity outside the classroom. That gives us a 0 or 1 output. If 0 occurs means that no motion is detected or if it provide 1 means that motion is detected outside the classroom. This PIR sensor operates within 6 meters. We use LDR, which is a Light Based Resistor and its resistance increases or decreases depending on the strength of light in the classroom, for the automatic light cycle in classroom. So if the weather is cloudy in the rainy season and darkness is there, the lights will be ON automatically. Whole layout on Arduino will be completed. Where Arduino is forum for open-source electronics. That is used for the software and the hardware. Arduino boards may use a sensor to read input lights, a finger on a switch. This whole project is based on the Internet Of Things (IOT). That makes for a smarter classroom. PIR sensors sense people's movements near classroom and control the fans and lights. Occupancy controls were used and are still used. An occupancy sensor is an illumination control system that senses occupancy, counts the persons inside the room and sends the signal to the Arduino. The exact individual count will be reflected in the LCD panel. Sensors are not workable at any time, so large numbers of sensors are helpful in preventing any errors.

Circuit function is very simple and self-explanatory. That fan begins running at a very slow pace when the attached ceiling ventilator is powered up. However, if a passive infrared motion sensor senses a legitimate human movement, the circuit wakes up from its standby mode, and switches the fan for a finite time to its full rpm.

## SYSTEM DESIGN

The sensors used in this project are

- IR SENSOR

The IR Sensor senses infrared light, used to turn on/off lights. The characteristics of an IR Sensor are that the object will bounce into a light sensor. The darker the object's colors, the less reflected IR light. The lighter the object's color, the more reflected the IR light.

- LDR SENSOR

The LDR-Light based Resister theory is that a photo resistor's resistance decreases with an increase in incident light intensity and helps to detect the light intensity present in the environment.

- ARDUINO

- Microcontroller board is Arduino Uno. It has 14 digit input/output pins, 6 analog inputs, an oscillation quartz crystal of 16MHz, a USB interface, a power jack, an ICSP header and a reset button.
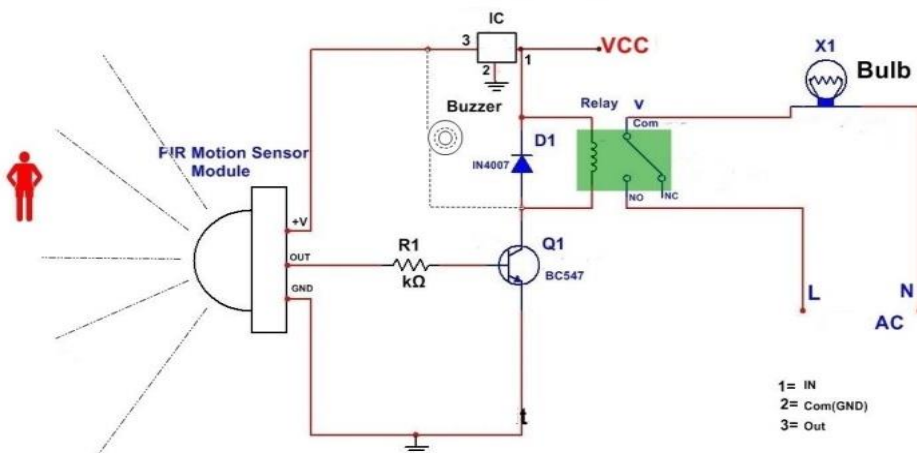
# ALGORITHM:

* sensors are connected with arduino.

* detects presence of Human.

* In range of 6-8 meters.

* sensors give output 0 or 1.

* o/p=1, presence of human.

* o/p=0, absence of human.

* o/p=1, Sensors activated.

* arduino switches ON lights and fans.

* output=0, switches OFF.

* photodiode added in circuit.

* check intensity of light.

* less intensity, lights ON.

* high intensity, lights OFF.

## IMPLEMENTATION DETAIL

An Arduino initially relates to the IR sensor which helps to detect an object's presence. The LED attached to the Arduino of 13 pin which is a digital pin. The analog pin A1 is attached to a DC motor. We have 3 pins in IR sensor; one is the digital output pin where the remaining pins are ground and one is VCC. The power we deliver to the IR sensor is 5v, so we've connected VCC to the Arduino 5v slot. When an object is present in front of the IR sensor the following setup works. When an object is detected inside the IR range it turns on both the LED and the DC

motor. When no object is present on the range of IR sensor then LED and DC motor will be switched off. When an object is present on the range of IR sensor the Arduino switches ON the LED and DC motor. We have also added a photodiode in order to obtain the strength of the light. The photodiode idea is about ensuring the space is dim. In some scenarios, we may get enough light that the person in that room needs and they does not need to switch on the light and even the climate may be cool so the does not need to switch ON the fan. To satisfy this condition we prefect photodiode that gathers the light intensity and more over photodiode can reduce the overall product cost. We continued our project by connecting the photodiode to Arduino, which helps us to get the required output that meets the every satisfied condition.
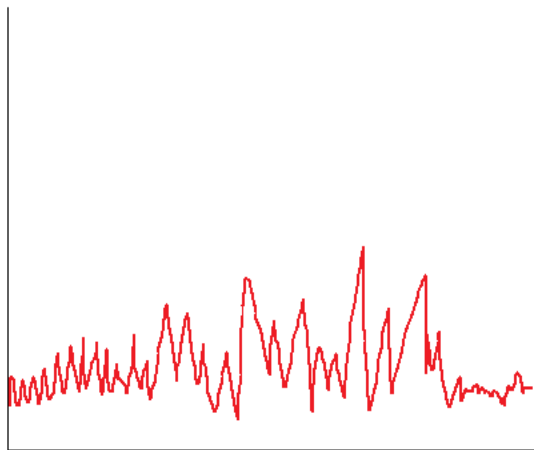


Intensity of Light

## DATA GENERATION

It generates two outputs one from IR Sensor and other from photodiode. IR sensor give digital output like HIGH or LOW and photodiode give analog output. IR sensor shows high value if it detects the presence of human in the class and if it will not detect the human presence in class it

will give low value. Photodiode collects the intensity of light present in class and according to algorithm it will switch OFF/ON the lights, fans in classroom. For suppose the minimum intensity in classroom is 340 then how conditions work. Let's see it.

| INTENSITY | IR READINGS | LED | FAN |
|-----------|-------------|-----|-----|
| <340 | HIGH | ON | ON |
| <340 | LOW | OFF | OFF |
| >340 | HIGH | OFF | ON |
| >340 | LOW | OFF | OFF |

In the table above, we have LED & FAN conditions based on the readings of the intensity and IR sensors. When the intensity is HIGH and a person enters the room meaning that the IR value is HIGH so the lights stay OFF and the fans are turned ON, the lights stay OFF because we have enough light in the room so it helps us conserve electricity.

## CONCLUSION:

In this project, we instantly refers 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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