

Fan Automation Using PIR Sensor

T. E. Information Technology

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CERTIFICATE

This is to certify that the project entitled "**Fan Automation Using PIR Sensor**"
is a bonafide work of "**HIMANSHU CHAURASIYA, VIKAS
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submitted to the University of Mumbai towards completion of mini project
work for the subject of **Sensor Lab (Course Code: ITL603)**.

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2.-----

Date:

DECLARATION

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

(Name of student and Signature)

ABSTRACT

The world is moving fastly towards automation. People have less time to handle any work so automation is a simple way to handle any device or machine that will work to our desire. We as a team aim to develop and design a Home automation system using Arduinos and Bluetooth modules. Home automation systems are simple and reliable technology. Home appliances like fan, Bulb, AC, automatic door locks can be controlled by Home automation systems . The system built is a wireless system which implements two arduino and two bluetooth modules. This system is simple to construct and inexpensive. With some more modification the system can also be used for heavy appliances at our homes.

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INTRODUCTION

1.1 Introduction to Domain/Area and Motivation

The recent development in sensor networks has lead to high uses of sensors for home automation purposes.

- This project develops an automatic fan switching system by sensing the presence of human beings.
- The project aims to save electricity and the manual need of fan switching ON and OFF.

1.2 Problem Statement and Objectives

This project aims to develop an automated fan system using PIR sensor and HC-05 bluetooth module. It will work depending on the human presence in the room.

- To build a wireless fan system using HC-05 module and PIR sensor.
- To switch the fan ON if a person is present in the room.

1.3 Proposed Solution

Our proposed system would work without any manual intervention. We are going to build a system with two bluetooth modules where each of the modules will act as a master and receiver. The master would sense the human presence with the help of PIR sensor and the receiver will implement the output which is turning ON the Fan.

1.4 Organization of the Report

The material report is organized into six chapters After this introductory chapter, chapter 2 describes the literature survey on our topic. We have read 3 research papers related to our project.

Chapter 3 gives an overview of the system design of our project and a circuit diagram for the connection of our system. We have also listed the essential hardware and software requirements.

Chapter 4 contains the flowchart which shows the actual flow of our project and the code required for running the project.

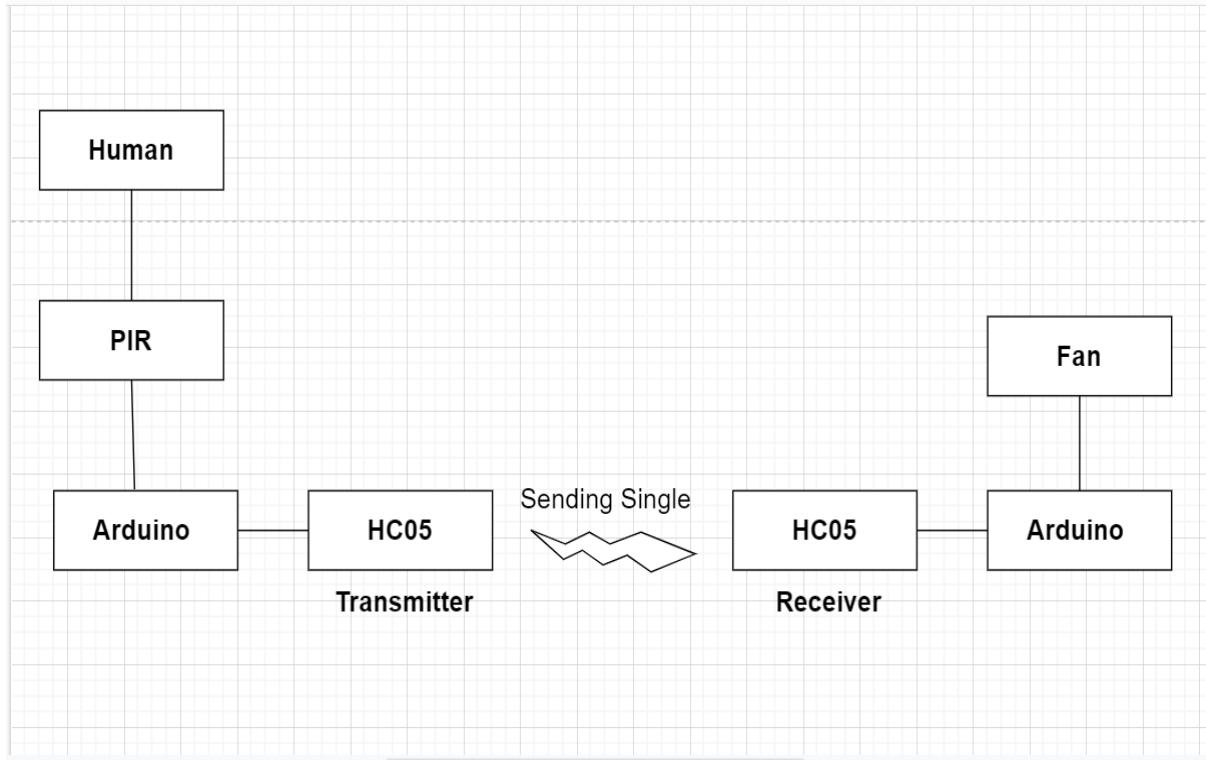
Chapter 5 summarizes the important points as the conclusion and it is beneficial and versatile in many real-time applications.

In chapter 6 we have mentioned all the references and research papers that we have referred for the project.

LITERATURE REVIEW

Sr no	Title	Methodology	Future scope/ gap
1	Development of Automatic Mini Fan with Human Detector by Using PIR Sensor.	The automatic mini fan with human detection system developed in the research paper consists of a combination of sensors such as PIR and LM35, a controller, a motor, and two types of power supplies, AC and DC, all of which are controlled by Arduino UNO as the main controller.	The system developed here has the potential to be commercialized in the future.
2	Home Automation using Arduino and Bluetooth	At the receiver end, a Bluetooth module is linked to the Arduino board, while at the transmitter end, a GUI application on the mobile phone transmits ON/OFF commands to the receiver where loads are connected. When a key on the smartphone is touched, the Bluetooth module receives the corresponding data and instantly communicates it to Arduino. The Arduino then checks the received data to the data written in the code and turns on the load accordingly.	There must always be a connection between the mobile app and the HC-05 module for the system to function.
3	Communication Concept Between Bluetooth As a Master and Slave To Exchange Digital Information	Using two hc-05 modules to connect master and slave with the help of an arduino.	Wireless automated systems can be created using this technology.
4	Automatic Room Light Controller using Arduino and PIR Sensor	The suggested system is an automatic room light controller that makes use of an Arduino, a PIR sensor, and a relay module.	It can be used in college labs, schools , bathroom ,staircases in the house etc.

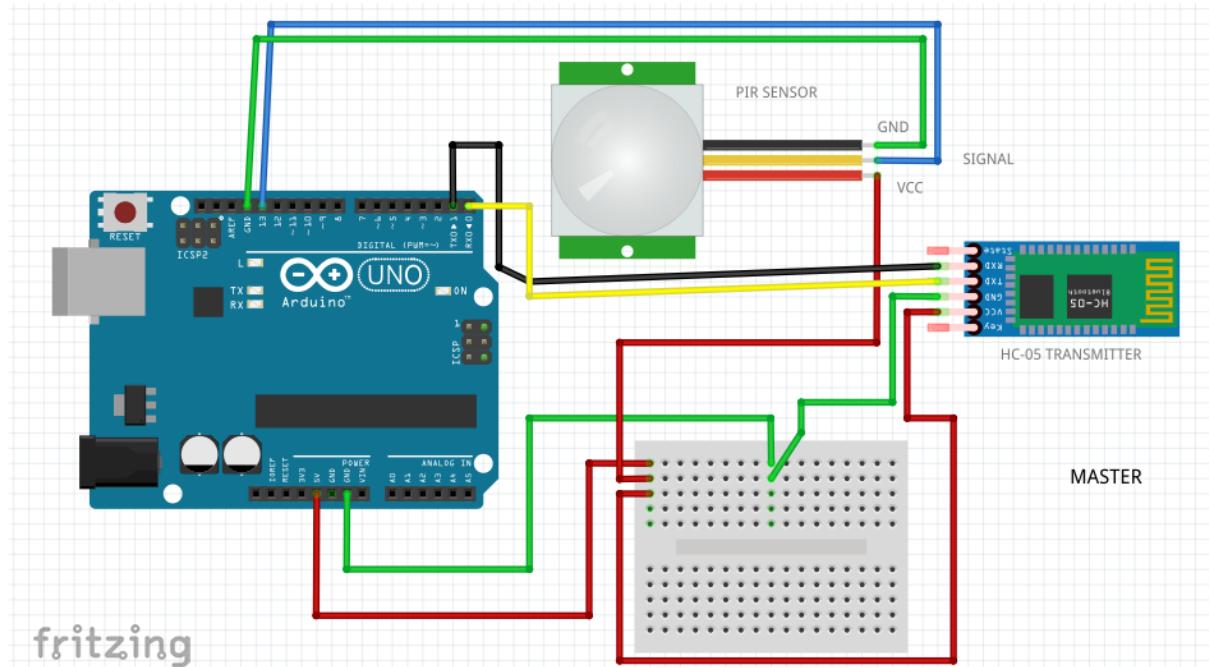
SYSTEM DESIGN



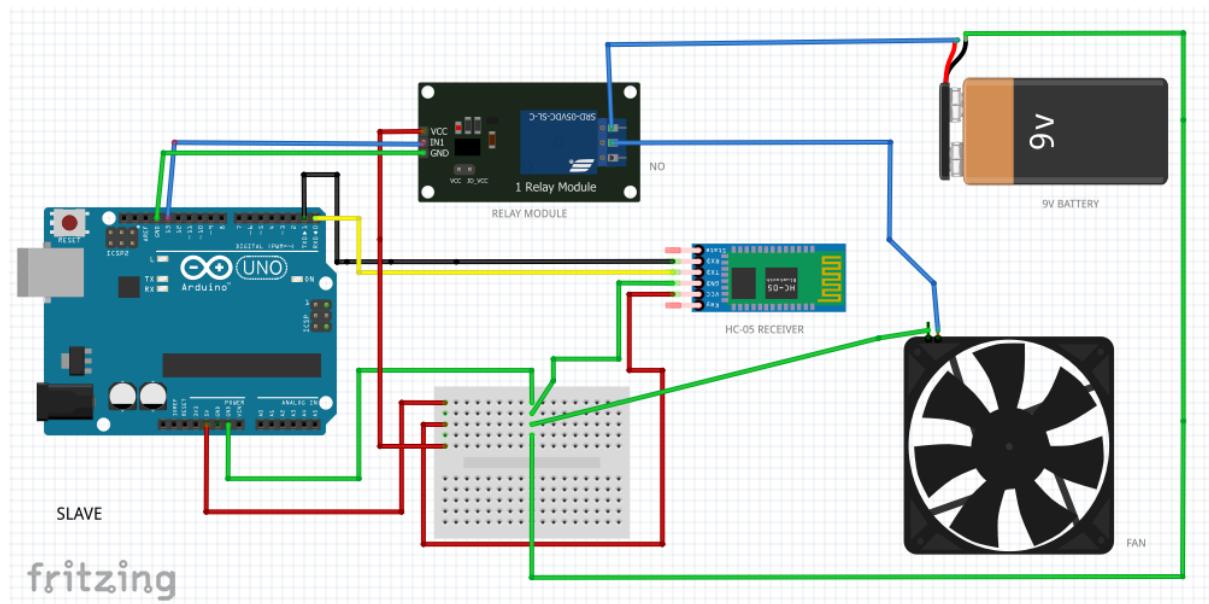
3.1 System Diagram

The transmitter and receiver are the two components of our project. The signal will be sent by the transmitter, and the signal will be received by the receiver, yielding the resultant output of the fan turning on. The transmitter is made up of three parts: a PIR sensor, an Arduino, and an HC05 Bluetooth transmitter module. A Dc fan, Arduino, and HC05 Bluetooth module would make up the receiver.

Circuit Diagram



3.2.1 Circuit diagram of Transmitter



3.2.2 Circuit diagram of Receiver

Hardware and software requirements

Hardware Requirements:

Arduino Uno R3 - It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded on to it from the easy-to-use Arduino computer program.

Price - 550/-



fig 3.3.1 Arduino Uno R3

PIR Sensor - PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses.

price - 70/-



fig 3.3.2 PIR Sensor

HC 05 Bluetooth Module - Designed to replace cable connections HC-05 uses serial communication to communicate with the electronics. Usually, it is used to connect small devices like mobile phones using a short-range wireless connection to exchange files. It uses the 2.45GHz frequency band.

Price - 600/-

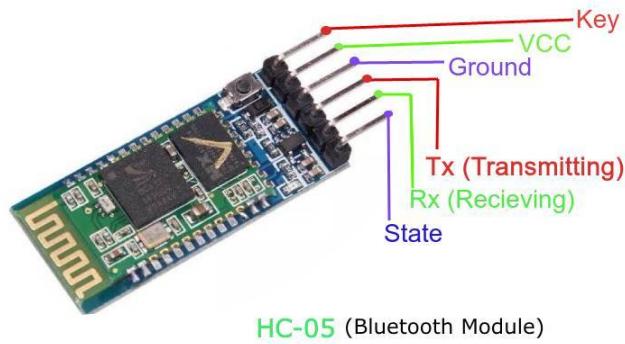


fig 3.3.3 HC 05 Bluetooth Module

DC Fan - DC axial fans are widely used in the air-vent exhaust, electronic device cooling, computer ventilation, etc.

Price - 95/-



fig 3.3.4 DC Fan

Relay Module -A power relay module is an electrical switch that is operated by an electromagnet. The electromagnet is activated by a separate low-power signal from a micro controller. When activated, the electromagnet pulls to either open or close an electrical circuit.

Price - 50/-

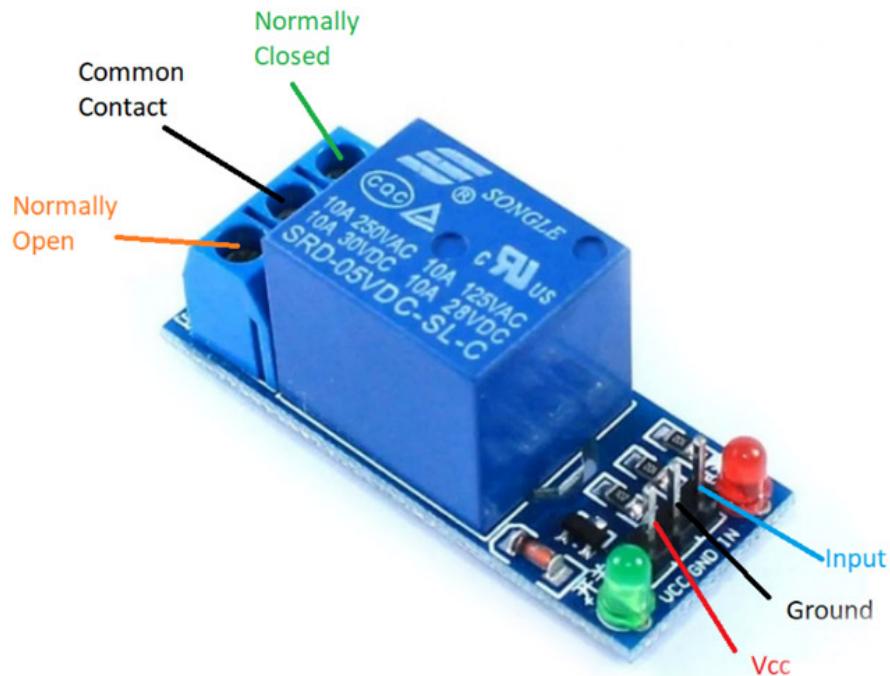


fig 3.3.5 Relay Module

Battery - A nine-volt battery, either disposable or rechargeable, is usually used in smoke alarms, smoke detectors, walkie-talkies, transistor radios, test and instrumentation devices, medical batteries, LCD displays, and other small portable appliances.

Price- Rs-30/-

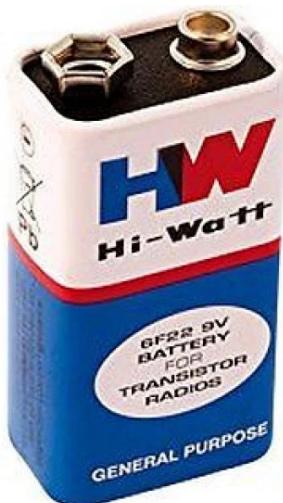


fig 3.3.6 Battery

BreadBoard - A breadboard allows for easy and quick creation of temporary electronic circuits or to carry out experiments with circuit design. Breadboards enable developers to easily connect components or wires thanks to the rows and columns of internally connected spring clips underneath the perforated plastic enclosure.

Price- Rs-65/-



fig 3.3.7 BreadBoard

Hardware Cost

Sr.No.	Components	Cost
1	Arduino Uno R3 sensor (X2)	1100/-
2	PIR Sensor	65/-
3	HC-05 module	560/-
4	DC Fan 12V	95/-
5	12V Battery	80/-
6	Relay Module	50/-
7	Bradboard (X2)	200/-
	Total Cost	2150/-

Software Requirement :

- Windows 7 or above operating system.
- Arduino IDE

Arduino IDE: The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

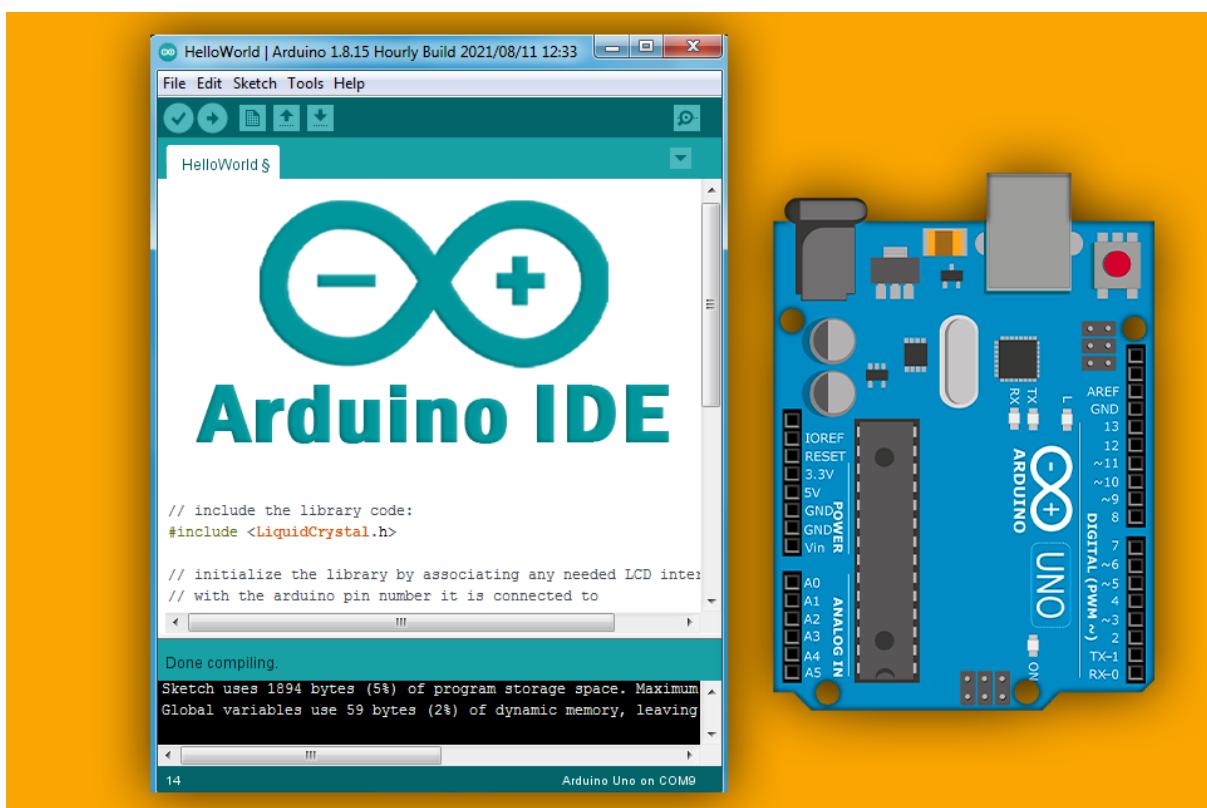


fig 3.3.8 Arduino IDE interface

IMPLEMENTATION AND RESULTS

4.1 Flowchart:

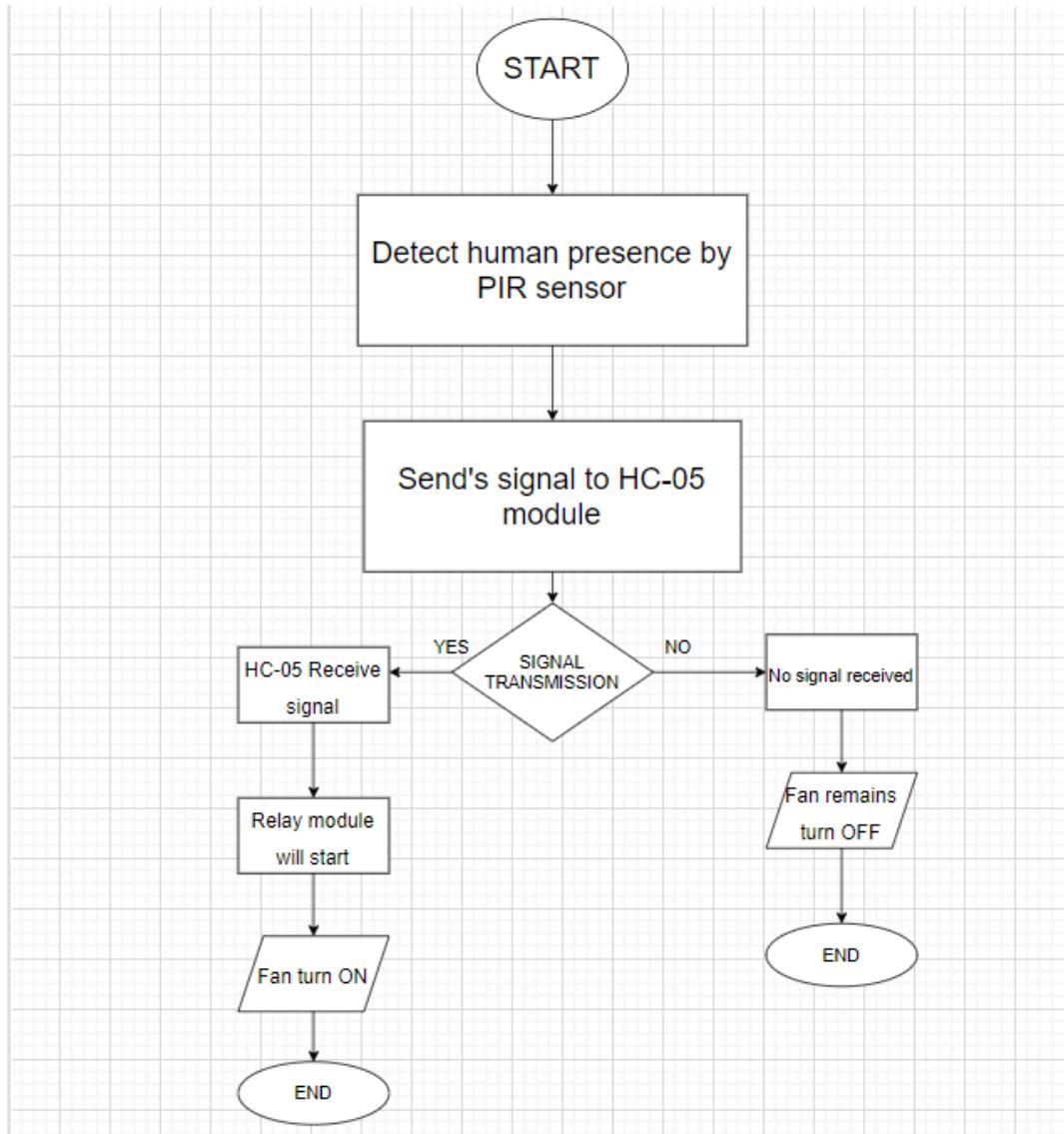


figure 4.1.1 Flowchart for Master/Slave

The above image shows the flowchart for the function of an automated fan using PIR sensor. The PIR sensor would detect human presence, send the signal Yes or No. If the value is Yes the relay module will switch the circuit Off which will cause the fan to turn On. If the value is No then there will be no transmission of signal and the relay module will remain On, making the circuit remain disconnected. The fan stop function when the power source is turned OFF.

4.2 Snapshots:

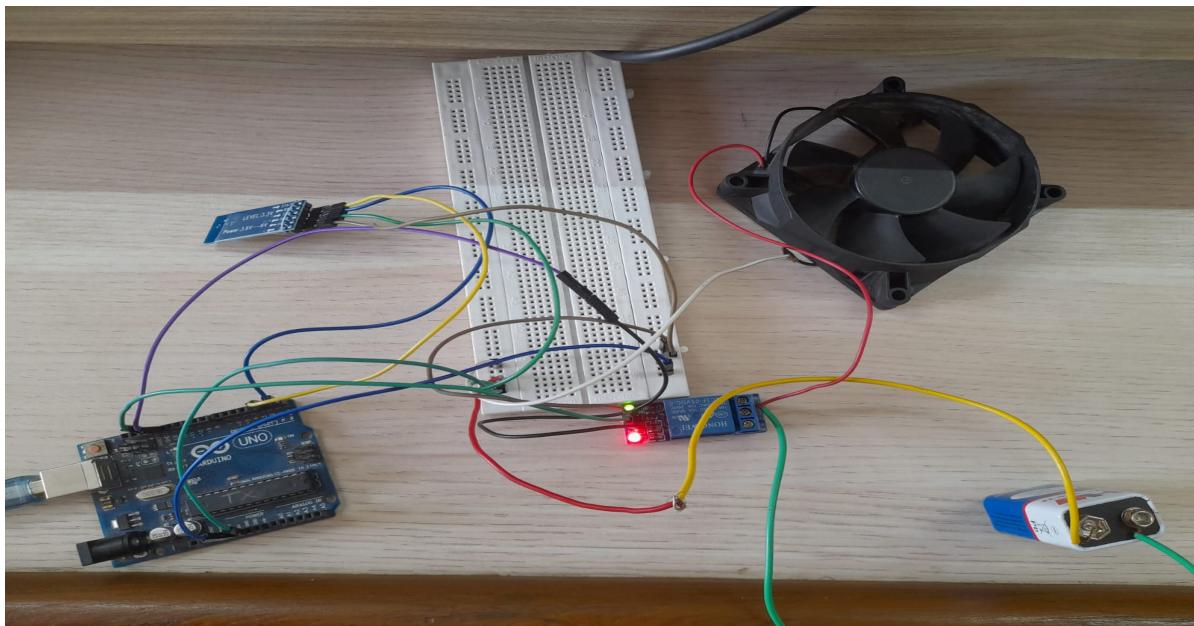


figure 4.2.1 Connection of Slave/Receiver

In the above image the GND and the 13V of the arduino are connected with IN and GND of the relay module respectively. The VCC of the relay module is connected with the 5V of the arduino. Here HC-05 module acts as a receiver. The RDX and TDX of HC-05 module is connected with TDX and RDX of arduino. The GND and VCC of HC-05 module are connected GND and 5V of arduino. The NC and Common of relay module connected 9V battery and Fan respectively. The negative part of the battery and positive side of fan is connected with 5V of arduino.

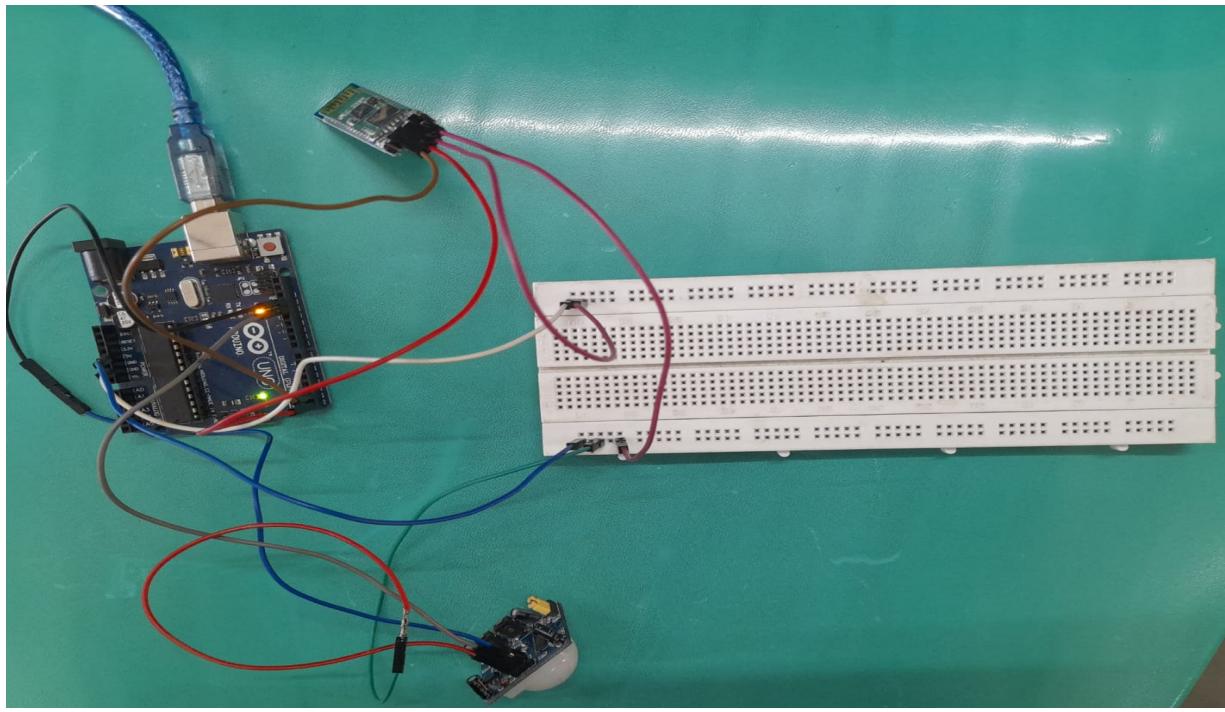


figure 4.2.2 Connection of Master/Transmitter

In the above image the GND and OUT of PIR sensor connected with GND and 13V of arduino respectively. The VCC of PIR sensor is connected with ground with arduino.

We also used HC-05 bluetooth module which act as a transmitter. The RDX and TDX of HC-05 bluetooth module is connected with TX and RX of arduino respectively. The GND and VCC of HC-05 bluetooth module is connected with GND and 5V arduino respectively.

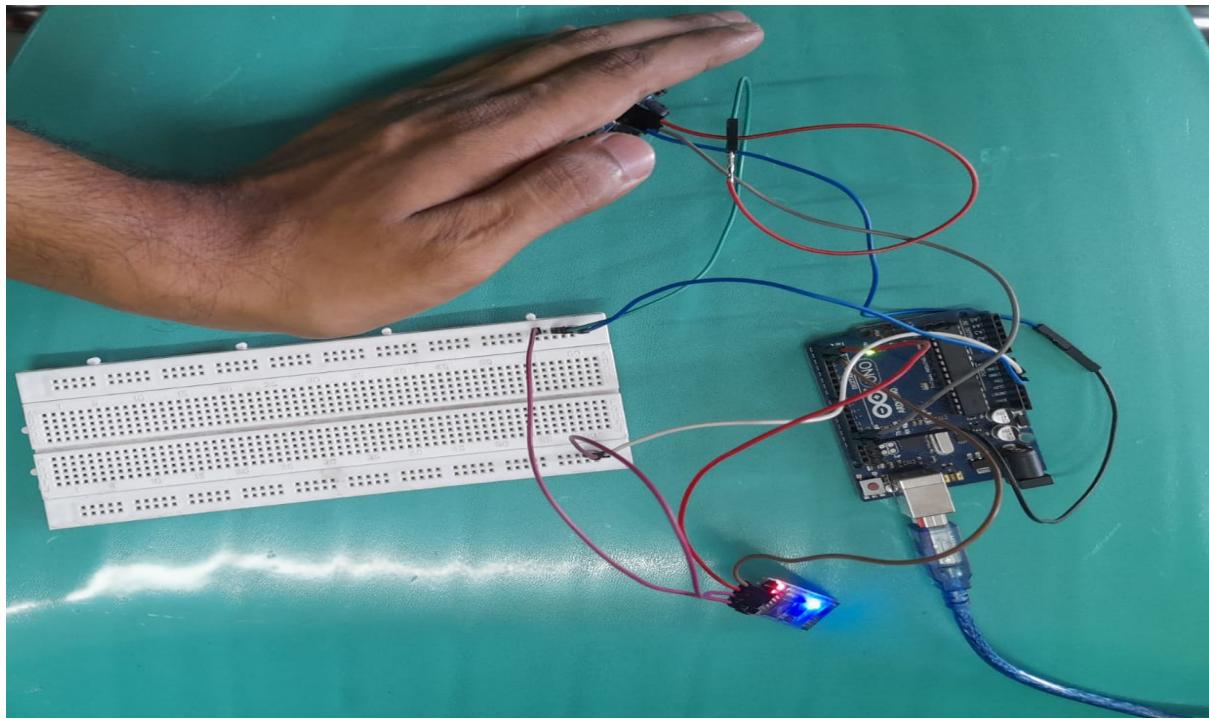


Figure 4.2.3 Human Presence is detected by Master

In the above image the PIR sensor is sensing the human presence and HC-05 module which (acting as a transmitter) sends the signal to another HC-05 receiver module.

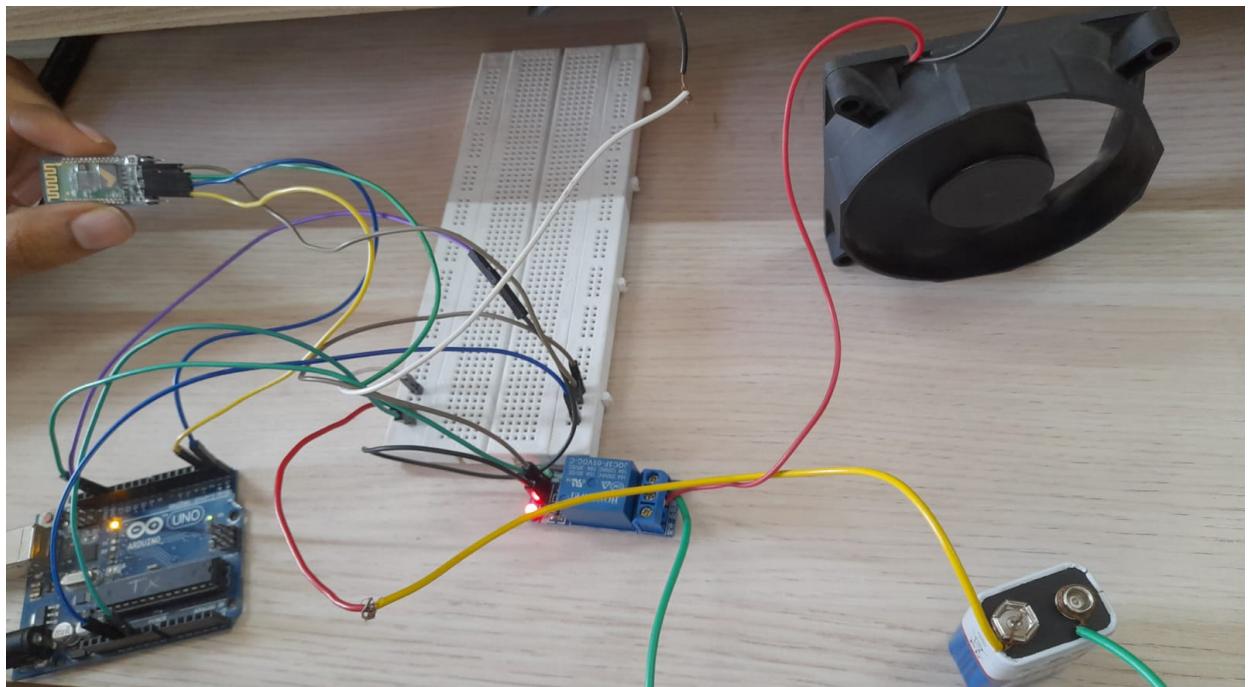


Figure 4.2.4 Slave starts the Fan

In the above image the HC-05 received signals from the HC-05 transmitter module and there is relay module which act as the main switching system between the battery and FAN. After receiving the signal FAN will start.

4.3 Phase Of Code

Master Code/ Transmitter code:

```
const int out=13;  
int value=0;  
void setup(){  
    Serial.begin(9600);  
    pinMode(out,INPUT);  
}  
void loop(){  
    int val=digitalRead(out);  
  
    delay(100);  
    if(val == 1 && value == 0)  
    {  
        Serial.println("A");  
        value = 1;  
        delay(10000);  
    }  
    else if(val == 0 && value == 1)  
    {  
        Serial.println("a");  
        value = 0;  
        delay(0);  
    }  
    //delay(200);  
}
```

Slave Code/ Receiver code:

```
//char Incoming_value = 0;           //Variable for storing Incoming_value
#define led 13
void setup()
{
Serial.begin(9600);      //Sets the data rate in bits per second (baud) for serial
data transmission
pinMode(led, OUTPUT);    //Sets digital pin 13 as output pin
}
void loop()
{
// put your main code here, to run repeatedly:
if(Serial.available())
{
char val = Serial.read();
if(val == 'A')
{
digitalWrite(led, HIGH);
}
else if(val == 'a')
{
digitalWrite(led, LOW);
}
}
}
```

Conclusion

Main purpose of home automation systems is to provide ease to people to control different home appliances and to save electricity, time and money. We have developed an automated fan system. The purpose of this project was to build an automated fan with human detector capabilities by using the PIR sensor which can be implemented in our homes. The work is focused mainly on human detection, and no other parameter is involved. This system can also be used to work with heavy home appliances like AC's with few more modifications. The system built can be extremely useful for persons of physical disability.

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