



NEW HORIZON COLLEGE OF ENGINEERING

New Horizon Knowledge Park, Ring Road, Marathalli
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NAAC with 'A' Grade. Accredited by NBA

MINI PROJECT REPORT ON

“HOME SECURITY USING GSM MODULE”

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(ISO-9001:2000 certified, Accredited by NAAC 'A',
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CERTIFICATE

Certified that the mini project work entitled “**Home Security System using GSM module**” carried out by **Anant Krishna (1NH17EE003)**, **Jaydeep Maity (1NH17EE022)** and **Sangam Jain (1NH17EE050)**, bonafide students of Electrical and Electronics Department, New Horizon College of Engineering, Bangalore.

The mini project report has been approved as it satisfies the academic requirements in respect of mini project work prescribed for the said degree.

Project Guide

HOD EEE

External Viva

Name of Examiner

Signature with Date

1.

2.

ABSTRACT

Home Security Systems are a crucial feature of contemporary residential and workplace setups. Home security systems should be cheap, reliable and effective. Modern complicated home security systems embrace many security measures like fireplaces, intruders, electronic door lock, heat, smoke, temperature, etc. Some security systems may be a combination of all the security measures. Such complicated systems are also costly and will not be cheap by everybody. There are individual security systems supported the need. In this project, we have a tendency to designed an easy however terribly economical home security that incorporates a operate of career the house owner on his/her mobile range just in case of associate degree persona non grata alert.

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LIST OF ABBREVIATIONS

GSM: Global System for Mobile Communications

PIR: Passive infrared sensor

FBI: Federal Bureau of Investigation

SIM: Subscriber identity module

SMS: Short Messaging Service

CHAPTER 1

1.INTRODUCTION

According to Maslow's Hierarchy of needs, safety needs is the second most important basic need for human. Security has always been of major importance in human life. Even in Medieval period, Fortified stone walls were built around the castle to keep out marauders and thieves. Nowadays, the importance of security has much more increased in our society as population is increased and unemployment has also increased.

When we look at our family and our home, we know we want them to be safe, always out of harm. In every 13 seconds a home burglary takes places, 4 burglaries a minute, 240 an hour and nearly 6,000 a day. According to the FBI, there were approximately 8,975,438 property crimes in 2012 and 23.4% were burglaries. According to statistics in India, 92,892 cases of burglary has been filed in the year 2011. This is a huge number. The growing crime rates across the places reflects the bitter reality. A burglary or theft can lead to devastating consequences, both financially and emotionally. While the loss is also redeemable, the trauma inflicted on our family and us may last forever.

It is our duty to keep our home safe and sound. Home security has modified tons from the last century and can be ever-changing in coming back years. Security is a vital side or feature within the good home applications. The new and emerging concept of smart homes offers a convenient, and safe environment for occupants. Home security system helps to protect our valuables. It helps to detect crime by allowing remote access to our home. Most importantly home security system makes room for peace of mind whenever we are out of our home.

Conventional security systems keep homeowners, and their property safe from intruders by giving the indication in terms of short message. However, a smart home security system offers many more benefits like notifying fire or gas problem, improving electricity management, low home owner's insurance premiums, medical assistance etc.

To achieve this with less expense, we have created a Home Security System using a GSM module. The main concept the project is aimed towards all the average domestic users who wish to control their household remotely by their cell phones.

The main aim of this project is to alert the owner of the house, by placing a call in his/her mobile through a GSM module, whenever a movement is detected by PIR sensor.

CHAPTER 2

2.1 SCOPE OF THE PROJECT

Scope is the range of view, perception, grasp or abilities; capacity for action in any activity, topic, project or work. It is actually the opportunity for activity and improve the work that anyone is doing. The main aim of this project is to alert the owner of the house, by placing a call in his/her mobile through a GSM module, whenever a movement is detected by PIR sensor. But project is limited on only detecting the intruder. The further scope of this project are as follows:

- I. We can set an alarm to notify the people living near us.
- II. We can use camera module to identify the intruder.
- III. We can use gas sensors to detect if there is any leakage in the gas.
- IV. We can use temperature sensor, to detect fire.
- V. We can use finger print sensors along with it for extra protection.

2.2 OBJECTIVE

Objective could be a specific result that an individual or system aims to realize among a time-frame and without there resources. There may be one or more objectives for any particular work. Objectives are basic tools that underline all the planning and strategic activities. They function the idea for making policy and evaluating performance. The objectives for our project are as follows:

- I. To know the use of PIR sensor and the way it works.
- II. To know the working of GSM module.
- III. To find out the uses of GSM module in many other aspects.
- IV. To know the working of Arduino board.
- V. To find out the uses of Arduino board.
- VI. To detect the intruders if they enter the house.
- VII. To keep the house safe from burglaries.
- VIII. To be affordable for all average domestic users.

CHAPTER 3

3. TOOLS REQUIRED

We designed the circuit using following components. And the description about each component is explained below.

- I. 2 LED's
- II. 200 Ohm Resistors
- III. Breadboard
- IV. Arduino UNO (ATmega328)
- V. GSM module (SIM 900A)
- VI. 12 V Power supply
- VII. Jumper Wires
- VIII. PIR sensor

3.1 LED's



Fig (1): LED

A light emitting diode (LED) may be a 2 lead semi-conductor source of illumination. It is a contact diode that emits light-weight once activated. When an acceptable current is applied to the leads, electrons are able to recombine with the electron holes inside the device, releasing energy within the variety of the photons. This effect is called electroluminescence, and the color light is determined by the energy band gap of the semi-conductors.

3.2 RESISTORS



Fig (2): Resistor

A resistor is a passive two-terminal electrical components that implements electrical resistance as a circuit element. In physics circuits, resistors area unit accustomed scale back current flow, adjusting signal levels, to divide voltage, bias active elements and terminate transmission lines. High power resistors that may dissipate several watts of wattage as heat, is also used as a part of motor controls, in power distribution systems, or as take a look at load for generators.

3.3 BREADBOARD

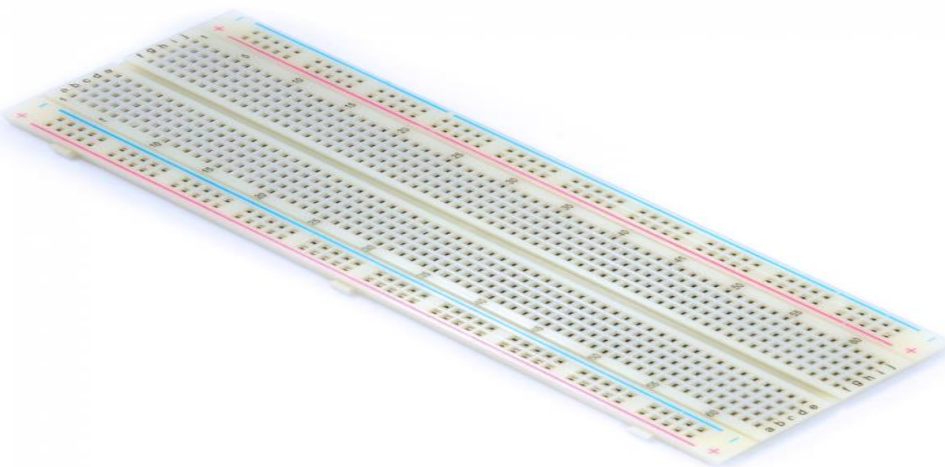


Fig (3): Breadboard

Breadboard is a solderless device for temporary connection of all electronic components and circuits. Most complex electronics components can be interconnected using breadboard including integrated circuit and board has strip of metal which connect holes in the top. It is easy to use and it is easy to create temporary circuit in it. This type breadboard is designed in 1970 AD.

3.4 ARDUINO UNO (ATmega328)



Fig (4): Arduino UNO

The Arduino UNO is a microcontroller board supporting the ATmega328. It has twenty digital input/output pins (of that half-dozen may be used as PWM outputs and half-dozen may be used as analog inputs), a sixteen-rate resonator, a USB connection, an influence jack, AN in-circuit system programming (ICSP) header, and a push. It contains all things required to support the microcontroller; merely connect it to a laptop and other devices with a USB cable or power it with a AC-to-DC adapter or battery to urge started. The ATmega328 provides UART TTL (5V) serial communication, that is obtainable on digital pins zero (RX) and one (TX). The hardware reference style is distributed below an imaginative Commons Attribution Share-Alike pair of.5 license and is obtainable on the Arduino web site. Programs may be loaded on to that from the easy-to-use Arduino bug. The Arduino has an intensive support community, that makes it a awfully simple thanks to start operating with embedded natural philosophy. The R3 is that the third, and latest, revision of the Arduino Uno.

3.5 GSM MODULE (SIM900A)



Fig (5): GSM module (SIM900A)

GSM module is built with dual band GSM engine – SIM900A, works in frequencies 900/1800MHz. The module comes with RS232 interface, which allows you to connect PC as well as microcontroller. The baud is configurable from 9600-115200 through AT command. With a small configuration of 24mm x 24mm x three millimetre, SIM900A will match the majority the house needs in our applications, particularly for slender and compact demand of style.

The GSM module is having internal TCP/IP stack to enable us to connect internet via GPRS. GSM system was developed as a digital system exploitation Time Division Multiple Access (TDMA) technique for communication purpose. A GSM digitizes and reduces the info, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has a capability to hold sixty-four kbps to a hundred and twenty Mbps of information rates. This is a complete GSM module made with a powerful single-chip, allowing us to benefit from small dimensions. It is appropriate for SMS, Voice similarly as information transfer application in M2M interface. Option for connecting mic and speaker directly to GSM module for calls. It consists of wire antenna. It has a SIM holder. It has a built in Network Status LED. Normal operating temperature ranges from -20 to 55°C. Input voltage required is 12V DC supply.

3.6 POWER ADAPTOR



Fig (6): Power Adaptor

Alternatively known as an AC/DC adapter, AC converter or charger, an AC adapter is an external power supply used with devices that run on batteries or have no other power source. An AC adapter is formed of a central unit which attracts power from an AC outlet. It then converts the power to DC.

3.7 JUMPER WIRES

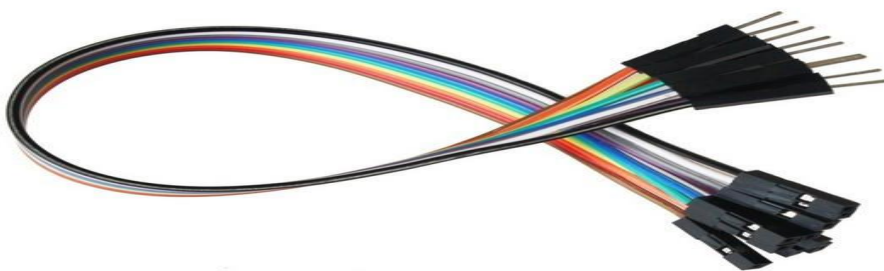


Fig (7): Jumper Wires

Jumper wires are simply wiring that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are generally used with breadboards and different prototyping tools so as to form it simple to vary a circuit as required.

3.8 PIR SENSOR



Fig (8): PIR sensor

PIR sensors permit us to sense motion, nearly always accustomed discover whether or not a person has stirred in or out of the sensors vary. They are little, cheap, low-power, straightforward to use and do not wear out. For that reason, they're ordinarily found in appliances and gadgets utilized in homes or businesses. They are usually mentioned as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.

PIRs are essentially made from a electrical phenomenon device which might discover levels of infrared light. Everything emits some low-level radiation, and also the hotter one thing is, the additional radiation is emitted. The device in a very motion detector is truly split in 2 halves. The reason for that's that we tend to are trying to discover motion (change) not average IR levels. The two halves are wired up so they cancel one another out. If one 0.5 sees additional or less IR radiation than the opposite, the output can swing high or low. For many basic comes or product that require to discover once someone has left or entered the realm, or has approached, PIR sensors are nice. They are low power and low price, pretty rugged, have a large lens vary, and are straightforward to interface with.

CHAPTER 4

4.1 CIRCUIT DIAGRAM

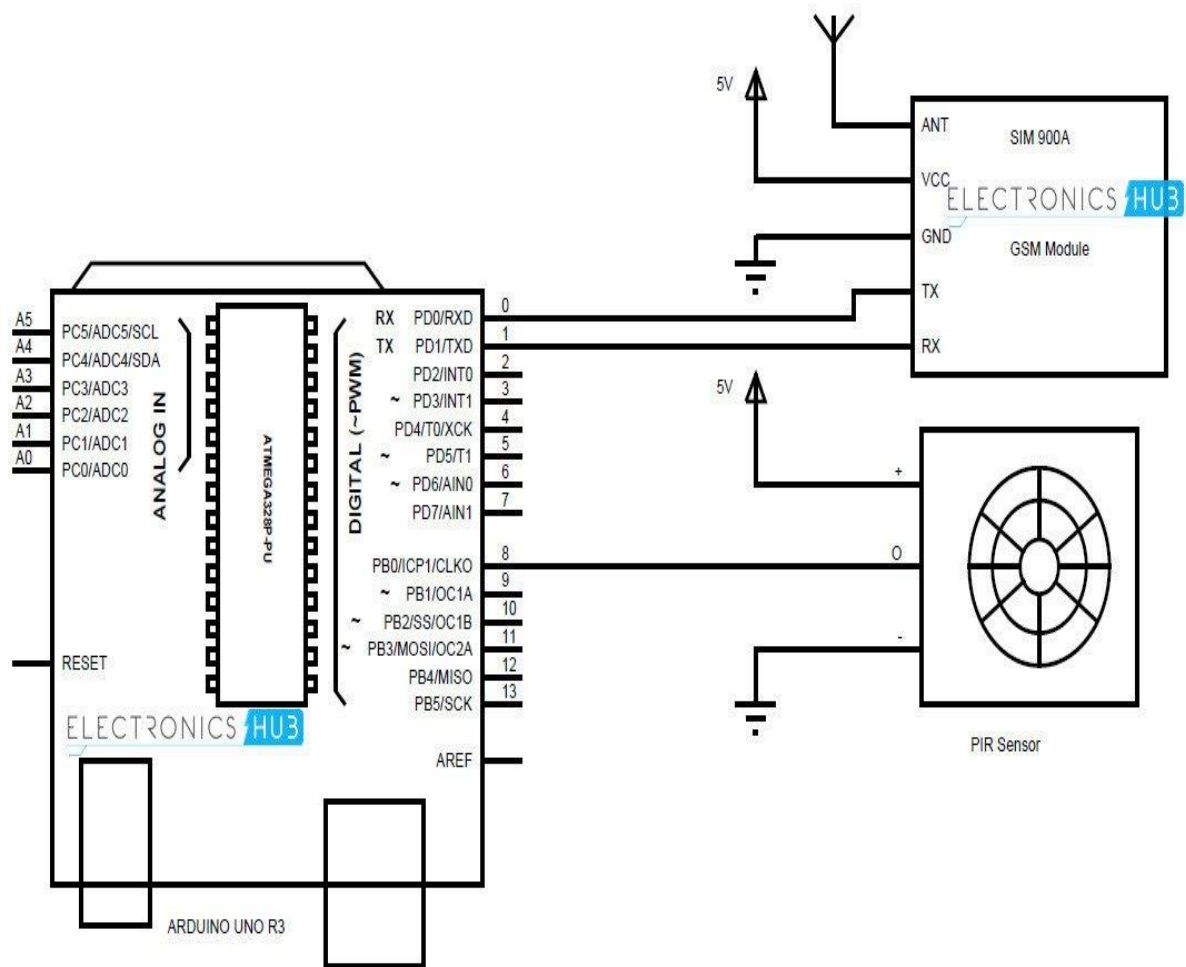


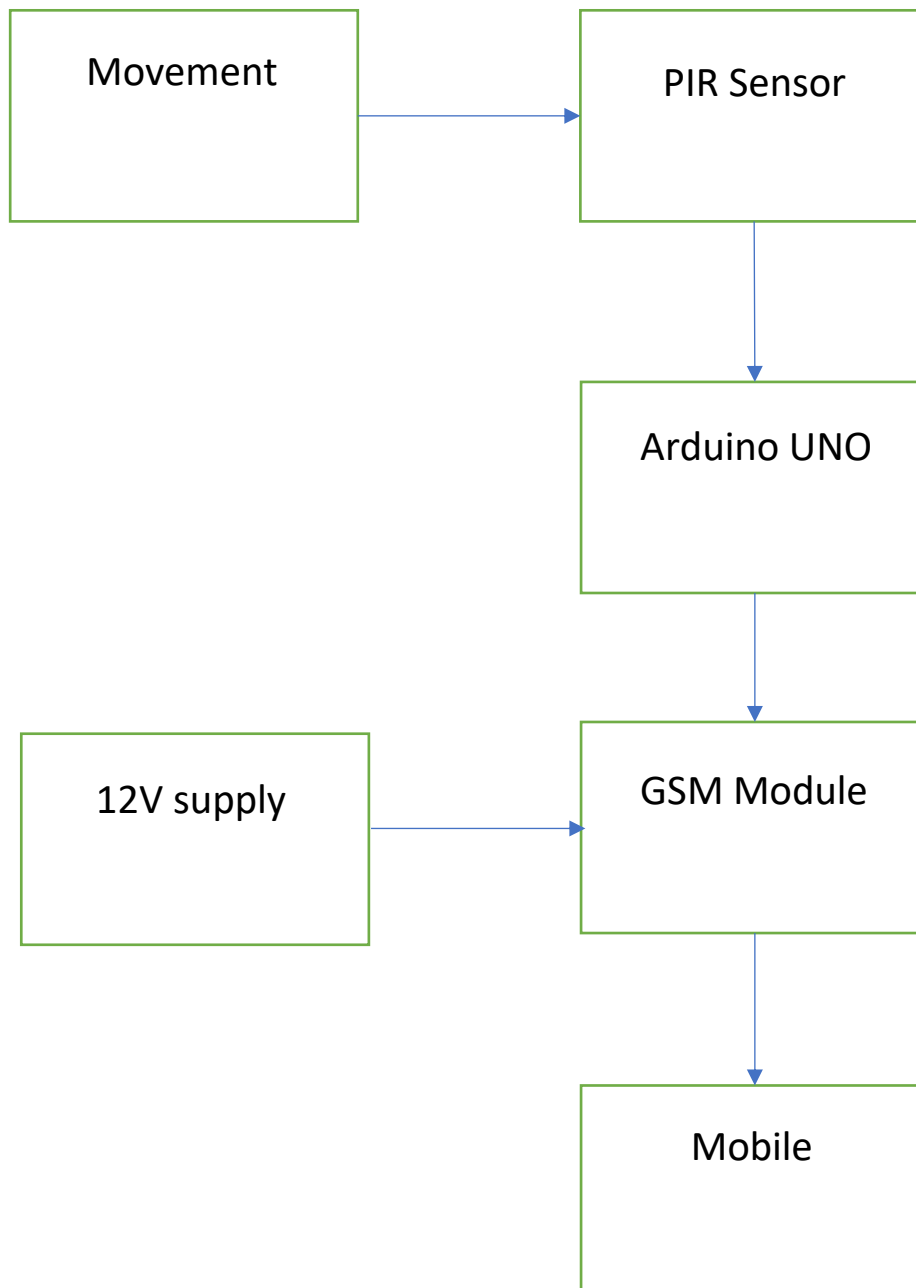
Fig (9): Circuit Diagram

4.2 CONSTRUCTION

Bring all components as per the circuit diagram. Connect the PIR sensor to the Arduino UNO board. Give 5V supply to PIR sensor through the VCC output of Arduino. Connect the 2 LED's and resistors in the breadboard. Give the supply to the LED's through Arduino. Program the Arduino. Then connect the TX pin of Arduino to RX pin of GSM and RX pin of Arduino to TX pin of GSM. Connect the ground for all the components. Give 12V supply to the GSM module.

CHAPTER 5

5.1 BLOCK DIAGRAM



5.2 WORKING

PIR detector detects motion by sensing the distinction in infrared or beaming heat levels emitted by encompassing objects. The output of the PIR detector goes high once it detects any movement. The vary of a typical PIR detector is around half dozen meters or concerning thirty feet. for correct operation of PIR detector, it needs a heat up time of twenty to sixty seconds. this can be needed as a result of, the PIR detector includes a subsidence time throughout that it calibrates its detector per the surroundings and stabilizes the infrared detector. throughout now, there ought to be little to no motion before of the detector. If the detector is not given enough calibrating time, the output of the PIR detector won't be reliable. once the PIR detector detects any motion, the output of the detector is high. this can be detected by the Arduino. Arduino then communicates with the GSM module via serial communication to create a decision to the pre-programmed mobile variety. a crucial purpose to be noted concerning PIR sensors is that the output are high once it detects motion. The output of the detector goes low from time to time, even once there's motion which can mislead the microcontroller into considering that there's no motion. This issue should be handled within the programming of Arduino by ignoring the low output signals that have a shorter period than a predefined time. this can be done by presumptuous that the motion before of PIR detector is gift unceasingly.

5.3 ALGORITHM

- I. First two LEDS are used to determine the working of PIR sensor and any movement around the sensor.
- II. The output of PIR sensor is set to low.
- III. Check the condition, When the output of PIR sensor is high, LED 2 also becomes high, which triggers the microcontroller and makes a call to the number written in the program through GSM module.

5.4 PROGRAM

```
int LED1=12;

int GND1=13;

int LED2=8;

int GND2=9;

int pirOutput=5;

void setup()

{

  Serial.begin(9600);

  pinMode(LED1,OUTPUT);

  pinMode(GND1,OUTPUT);

  pinMode(LED2,OUTPUT);

  pinMode(GND2,OUTPUT);

  pinMode(pirOutput,INPUT);

  digitalWrite(pirOutput,LOW);

  digitalWrite(GND1,LOW);

  digitalWrite(GND2,LOW);

  digitalWrite(LED1,LOW);

  digitalWrite(LED2,LOW);

  delay(15000);

  digitalWrite(LED1,HIGH); }

void loop()
```

```
{  
  if(digitalRead(pirOutput)==HIGH)  
  {  
    digitalWrite(LED2,HIGH);  
    Serial.println("OK");  
    delay(1000);  
    Serial.println("AT+CMGS=\"+916200954487\"\\r"); // Replace x with mobile number  
    delay(1000);  
    Serial.println("I am SMS from GSM Module");// The SMS text you want to send  
    delay(100);  
    Serial.println((char)26);// ASCII code of CTRL+Z  
    delay(1000);  
    Serial.println("ATD+91xxxxxxxxxx;");  
    delay(15000);  
    Serial.println("ATH");  
    digitalWrite(LED2,LOW);  
    delay(1000);  
  }  
}
```

5.5 CONNECTION FIGURE

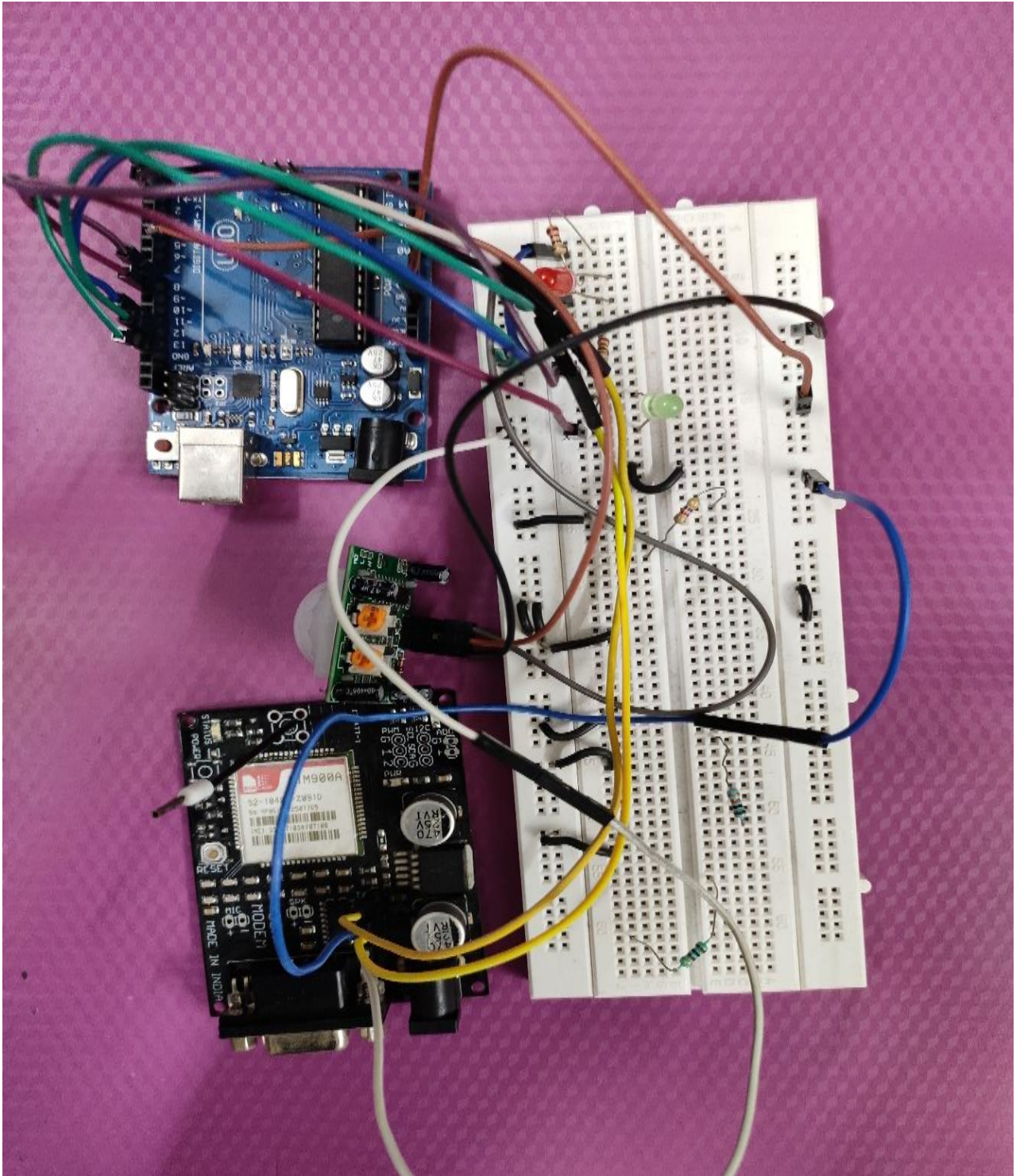


Fig (10): Connection Figure

5.6 PROGRAM OUTPUT

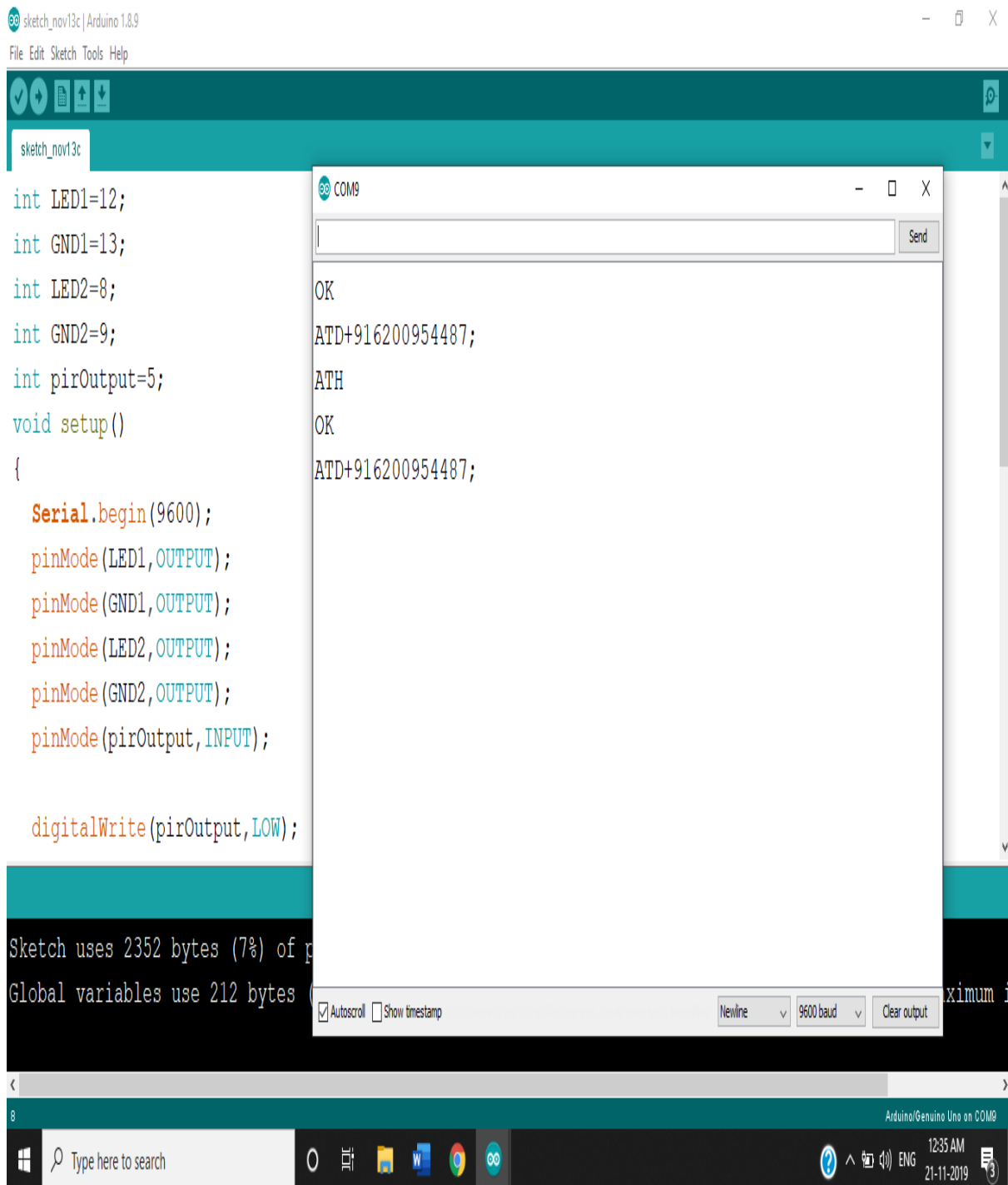


Fig (11): Program Output

5.7 PROJECT OUTPUT

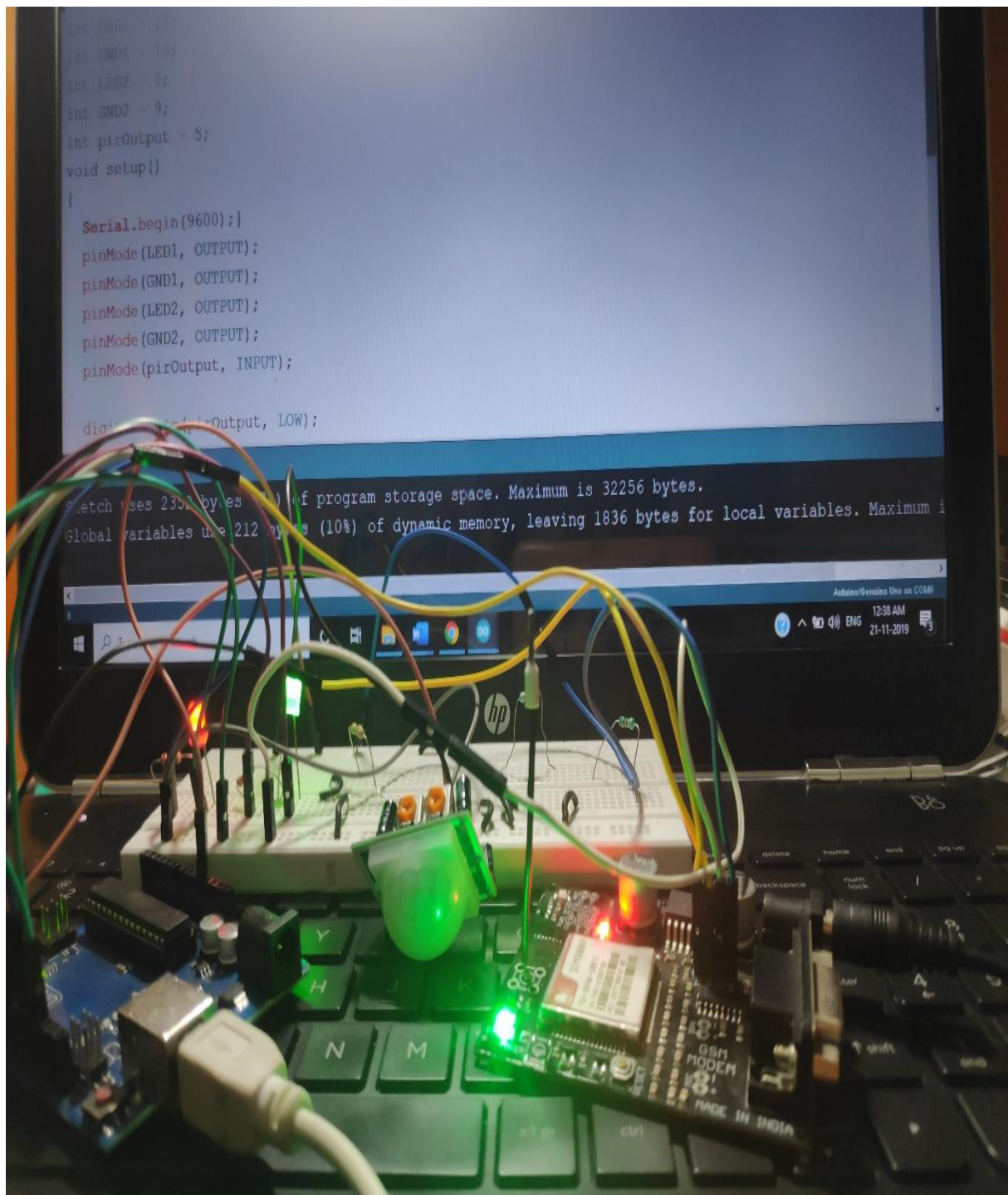


Fig (12): Project Output

5.8 BILL OF MATERIALS

For this project, we have spent nearly 1800 rupees for all the components. The prices for the components are listed below: -

• 2 LED's	-	Rs10
• 200 Ohm Resistors	-	Rs10
• Breadboard	-	Rs70
• Arduino UNO (ATmega328)	-	Rs600
• GSM module (SIM 900A)	-	Rs900
• 12 V Power supply	-	Rs50
• Jumper Wires	-	Rs50
• PIR sensor	-	Rs80

In this way and with this much amount we finished our mini project successfully.

CHAPTER 6

6.1 RESULT

The developed GSM based security system gives good response to the sensor and sends SMS when it detects the intrusion at the door. The time taken by the system to deliver the SMS is dependent on the coverage area or range of the specified mobile network. If the mobile is in the range of the system then the SMS is delivered in 25-30 seconds. Advantages of the proposed system:

1. As the system is SMS based, there is no need to have extra circuitry to transmit SMS. Mobile networks are used for transmission.
2. It is very cost effective, as day by day the cost of SMS is reducing.

Drawbacks of the proposed system:

1. All over the world, there could be a area where the mobile network is not established, so no connectivity of mobile phones in that area. Therefore, SMS cannot be delivered.
2. Older people still are not familiar with the use of mobile and find it difficult to see the SMS on mobile.

6.2 CONCLUSION

In today's modern-day world home security has been one of the most major issue related to crime, which is increasing gradually. Therefore, home automation can be the best option for security purposes wherein the use of advance technology plays a major role and is used up to the mark. This project presents a model which will give security to their home, via SMS using GSM technology the essential plan of our project is to produce GSM primarily based security even when the owner is away from the respective area. For this a wireless mode of transmission using GSM. Beside this there are many methods of wireless communication but we selected GSM in our project because is acquired. Though there are other security systems available in the market, this is one of most reliable and cost-efficient security systems. This project is designed to provide access to the system for security using extensive GSM technology for communication purposes. The detailed sensors above are used to sense the any disturbance or movement occurred and is informed to the programmed microcontroller and then information is sent between controlling unit and home owner for security purposes.

6.3 REFERENCE

- I. <https://ieeexplore.ieee.org/document/4560131/>
- II. <https://ieeexplore.ieee.org/document/7192980/>
- III. <https://www.electronicshub.org/arduino-gsm-home-security-alarm-system/>