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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING SCHOOL OF ENGINEERING

Report on

ULTRASONIC SECURITY SYSTEM

**Bachelor of technology
Computer Science and Engineering**

By

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CONETENTS

| Content | Pg.no |
|------------------------|--------------|
| Abstract | 3 |
| Components Used | 4-5 |
| Working Principle | 6 |
| Circuit Explanation | 7 |
| Setup | 8 |
| Snapshots of the model | 9 |
| IDE Code | 10-11 |

ABSTRACT:

This project includes an ultrasonic security system which is very helpful for maintaining security around our surroundings. This device gathers the data from the surroundings and keep a track of every motion happening around, with this its easy to alert the owner. When there is any motion in the neighborhood the sim module calls the number mentioned in the code which can be a nearby police station or the owner himself. Security is an important part of home, especially if we are going to share a house with prior strangers without a lock on our room door. Ultrasonic sensors work by emitting sound waves at a frequency too high for humans to hear. They then wait for the sound to be reflected back, calculating distance based on the time required. This is similar to how radar measures the time it takes a radio wave to return after hitting an object. So, this would helpful for us to know if someone is entering our house without intimation. The one of the main peculiarities of this innovation is, it is affordable for everyone, the total cost is around Rs 2000. There are many such devices available in the market but not this portable and of low cost.

COMPONENTS USED

Arduino nano board:



Ultrasonic Sensor



Sim 800L



Jumper wires



3.7v Li-Po Battery



WORKING PRINCIPLE

Ultrasonic sensors work by emitting sound waves at a frequency too high for humans to hear. They then wait for the sound to be reflected back, calculating distance based on the time required. This is similar to how radar measures the time it takes a radio wave to return after hitting an object.

While some sensors use a separate sound emitter and receiver, it's also possible to combine these into one package device, having an ultrasonic element alternate between emitting and receiving signals. This type of sensor can be manufactured in a smaller package than with separate elements, which is convenient for applications where size is at a premium.

While radar and ultrasonic sensors can be used for some of the same purposes, sound-based sensors are readily available—they can be had for just a couple dollars in some cases—and in certain situations, they may detect objects more effectively than radar.

For instance, while radar, or even light-based sensors, have a difficult time correctly processing clear plastic, ultrasonic sensors have no problem with this. In fact, they're unaffected by the color of the material they are sensing.

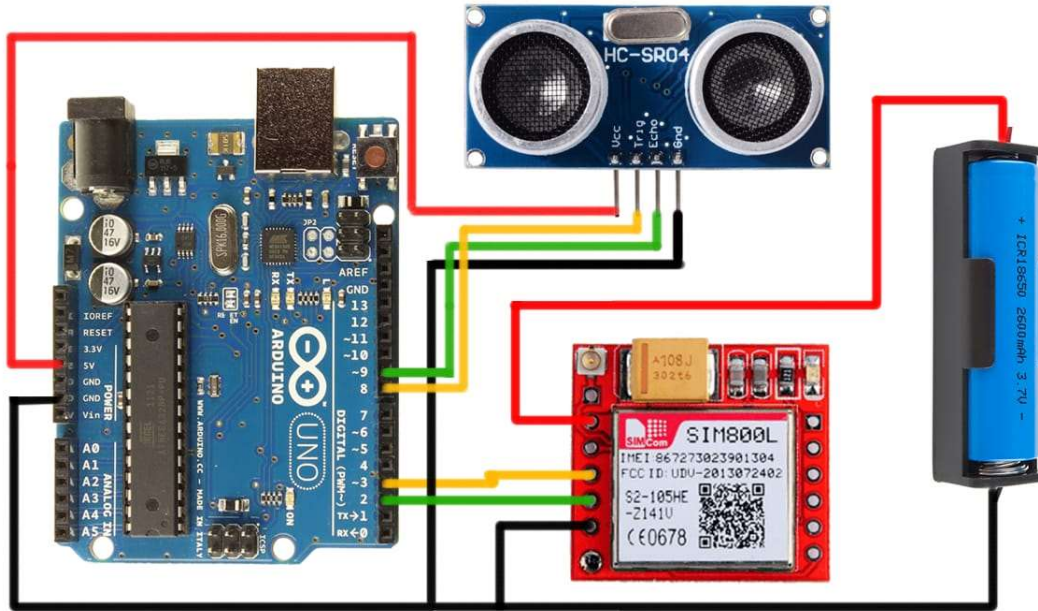
On the other hand, if an object is made out of a material that absorbs sound or is shaped in such a way that it reflects the sound waves away from the receiver, readings will be unreliable.

CIRCUIT EXPLANATION

PINCONNECTIONS

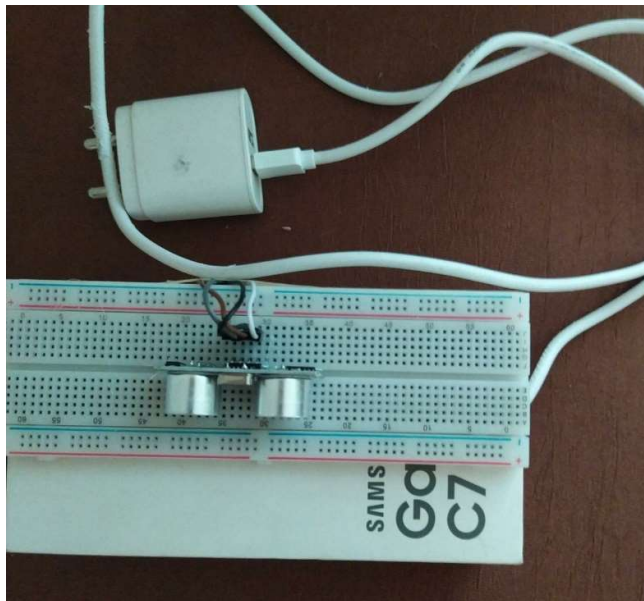
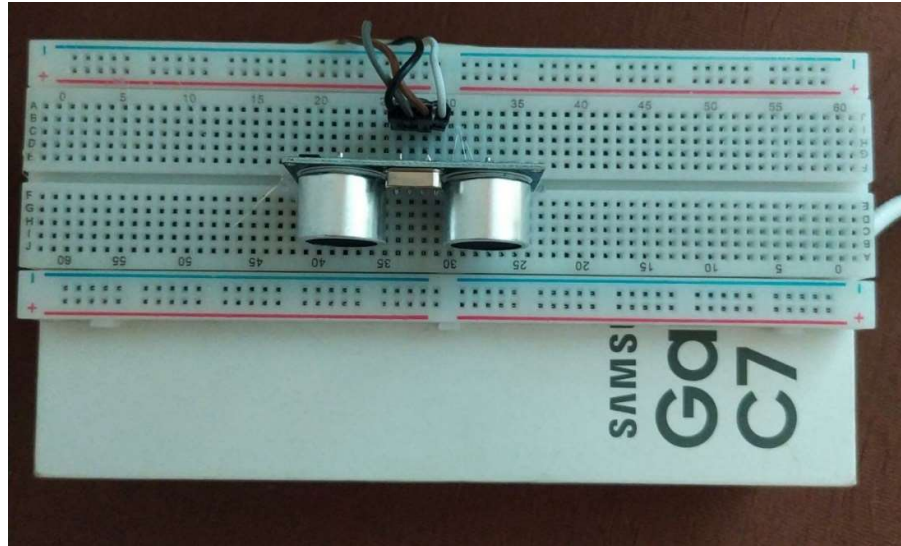
| Sensor/component Pins | Arduino nano board |
|----------------------------------|-------------------------------|
| Ultrasonic sensor trig pin | 8 |
| Ultrasonic sensor echo pin | 9 |
| Ultrasonic sensor Vcc and Gnd | +5v and Gnd |
| Sim 800L | 2,3 |
| Sim 800L Gnd | Gnd |
| Battery positive and negative | Sim 800L Vin and Gnd |

SETUP



Note: We used Arduino nano with similar connections. This image is taken from tinkercad

SNAPSHOTS OF THE MODEL



IDE CODE

```
#include <SoftwareSerial.h>

//Alarm reciever's phone number with country code
const String PHONE = "7411902929";

//GSM Module RX pin to Arduino 3
//GSM Module TX pin to Arduino 2
#define rxPin 2
#define txPin 3
SoftwareSerial sim800(rxPin,txPin);

//the pin that the pir sensor is attched to
#define trigPin 8
#define echoPin 9

void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);

  Serial.begin(115200);      // initialize serial

  sim800.begin(9600);
  Serial.println("SIM800L software serial initialize");

  sim800.println("AT");
  delay(1000);
}

void loop()
{

  while(sim800.available())
  {
    Serial.println(sim800.readString());
  }

  while(Serial.available())
  {
    sim800.println(Serial.readString());
  }

  long time_duration, distance_in_cm;
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
```

```
delayMicroseconds(10);
digitalWrite(trigPin, LOW);
time_duration = pulseIn(echoPin, HIGH);
distance_in_cm = time_duration / 29 / 2;

Serial.print(distance_in_cm);
Serial.println(" cm");

//Ranging Distance – 2cm – 400 cm
//if the distance is equal or less then 10 cm
if (distance_in_cm <= 5) {
  Serial.println("Motion detected!");
  Serial.println("calling...");
  sim800.println("ATD"+PHONE+";");
  delay(20000); //20 sec delay
}

delay(500)
```