ANTI – THEFT PROTECTION THROUGH HOME AUTOMATION USING ARDUINO

A PROJECT REPORT

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SENSE

Acknowledgment

We are grateful to the department of electronics and communication engineering for giving us an opportunity to carry out this project which is an integral fragment of the curriculum in BTech program at VIT.

We would like to express our humble gratitude to the faculties at SENSE school for familiarising us with the theories and concepts for the ultimate completion of the project.

We would also like to express our heartfelt gratitude to out Prof. Malaya Kumar Hota Sir (Department of Communication Engineering, VIT Vellore) who has remained an integral part of our project.

We would also like to thank our peers for the constant encouragement and support in helping us getting past our limited knowledge so as to complete the project.

Last but not least we would like to thank our parents and family members for their never-ending support and motivation.

This project helped us to conduct research in embedded-system technology based areas. We came to know and learn about many new concepts and wide range of applications of Bluetooth modules and Wi-Fi modules. We express our sincere gratitude to each other and every individual who helped us to understand the methodology to do the project and to present it as clearly as possible.

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Abstract

There is an increasing demand for smart homes, where appliances react automatically to changing environmental conditions and can be easily controlled through one common device.

Home automation is a relatively new phenomenon that's gaining popularity among homeowners as it becomes less and less expensive.

Home automation involves introducing a degree of computerized or automatic control to certain electrical and electronics system in a building.

Salient Features of our Project

This project presents a possible solution whereby the user control devices by using their existing mobile phones, where control is communicated to the microcontroller from a mobile phone through Bluetooth interface.

This project demonstrates a simple home automation system which contains a remote mobile host controller and several client module(Home appliances)

This client module communicates with host controller through a wireless device such as Bluetooth enabled smart phone; in this particular case, an android based smart phone.

It is also possible to increase energy efficiency if the smart appliances are used properly by scheduling the on and off times.

Objective

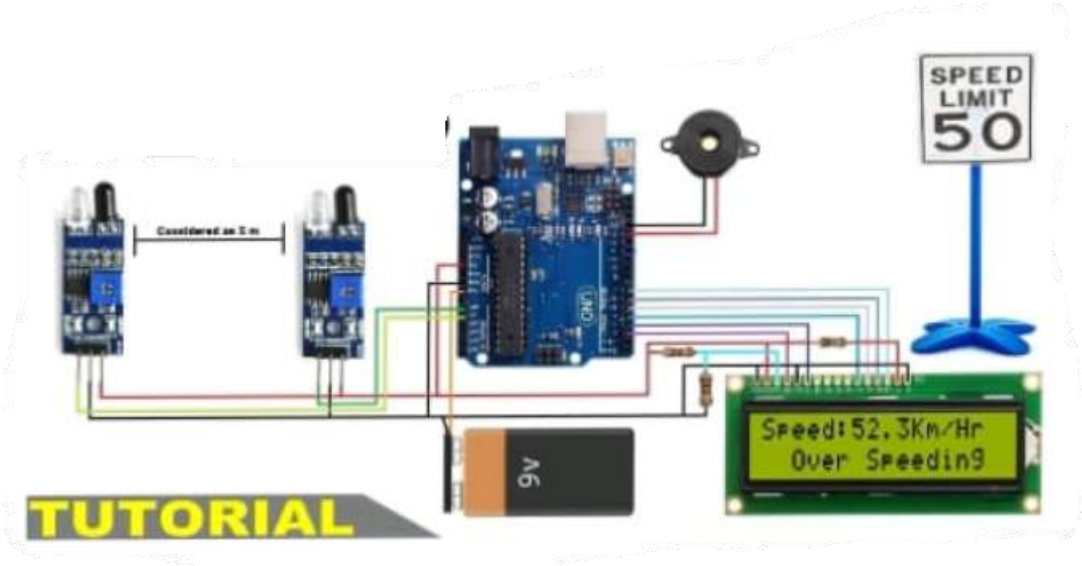
As suggested by the title, this project is an anti-theft protection system.

We are doing this project to ensure safety of home appliances in order to prevent them form being stolen. Sometimes, we are doing an important work and we wont see who is entering and leaving the house. Using this system we can easily identify whether an individual has entered the house and attempted to steal something.

We are doing this Bluetooth home automation to ensure the saving of energy appliances and helping the visually impaired people to ensure safety of home appliances. By using switch as electrical appliances we are wasting lots of energy resources. It is very easy to operate by using our mobile and laptop. The requirement for making the electrical connections at home is just Wi-Fi.

Components Required

i. Arduino UNO
ii. Arduino Software
iii. 5 LEDs
iv. Resistors
v. Node MCU
vi. 3 Breadboards
vii. Blynk App
viii. 2 PIR Sensors
ix. 2 Ultrasonic Sensors
x. 1 Buzzer



LITERATURE REVIEW:

The approach is inclined for people with disability to perform real-life operations at home by directing appliances through speech. Voice separation strategy is selected to take appropriate decision by speech recognition . This system is developed by using the Visual Basic 6.0 as programming language and Microsoft voice engine tools for speech recognition purpose. Appliances can be either controlled by timer or by the voice command or by blynk app. The commands are generated and control it by using blynk app of corresponding buttons we made then the microcontroller on the basis of SMS takes a decision of a particular task.

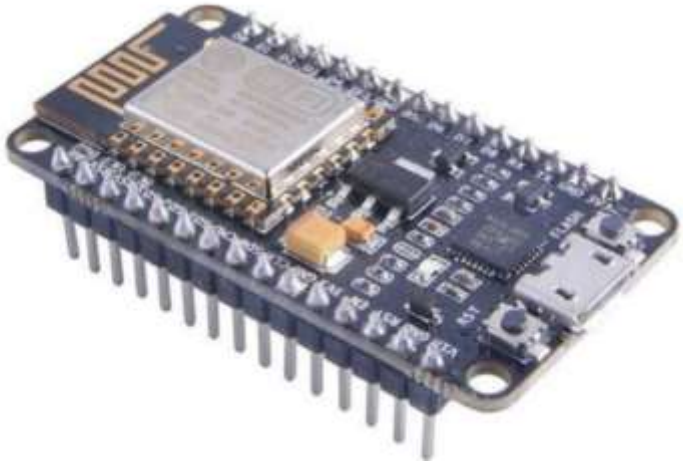
The Home camera alerts the user to many motion or noise while out of the House. It also tracks the indoor air quality, notifying the user if dangerous levels of voltaic organic compounds are detected. It has taken security, privacy and home health to the next level through a partnership with IFTTT, a service that allows rule-based actions and triggers between a range of devices and services. Users can enhance their Withings Home, a HD security camera equipped with environmental sensors, by connecting with blynk app to make household automation a reality. Home automation refers to the monitoring and controlling of home appliances remotely. with the never-ending growth of the Internet and its applications, and we are also doing this project along with antitheft to avoid steeling of things by other persons

ARDUINO IDE:

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution.

NODE MCU (ESP8266) :



NodeMCU is an open source IoT platform, includes firmware which runs on the ESP8266 Wi-Fi Module from Espressif Systems, and hardware which is based on the ESP-12 module. The term “NodeMCU” by default refers to the firmware rather than the development kits. NodeMCU firmware was developed so that AT commands can be replaced with Lua scripting making the life of developers easier. The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and microcontroller capability

FEATURES OF NODE MCU (ESP8266):

1. Open-source
2. Interactive
3. Programmable
4. Low cost
5. Simple 6. Smart
7. WI-FI enabled
8. USB-TTL included
9. Plug & Play

Features of the new Blynk IoT Platform:

Blynk. App: a unique, no-code mobile app builder for IoT.

Blynk. 360: a web console to manage devices, users and data.

Templates: new device creation process designed for scale. Blynk server has 5 ports open for different security levels. Hardware may select to connect to 443 (9443) or 80 (8080), depending on it's capabilities. Connection between the app and the server is always is done through SSL/TLS, so it is always secured. Here blynk is used to control my led on and off with the help of nodemcu.With the help of wifi connection it makes the nodemcu to change blynk platform from offline to online based on the connections we made in breadboard and in blynk app control switches

Design and Working

First we are detecting the object using ultrasonic sensor and by using that we are calculating the distance between the 2 objects. If the distance is less than 5 cm, the LED glows buzzer makes a sound else LED does not glow and buzzer does not make a sound.

Secondly, we are calculating he speed of the object moving from PIR(piezoelectric infrared) sensor to and another PIR sensor and if the speed is within a certain limit, the LED will not glow and buzzer will not make a sound. If the speed is above a certain limit, the LED glows and buzzer makes the sound.

Arduino Code 1 (for ultrasonic sensor):

```
int timer1;
int timer2;

float Time;

int flag1 = 0;
int flag2 = 0;

float distance = 5;
float speed;

int ir_s1 = A0;
```

```
int ir_s2 = A1;

int buzzer = 13;

void setup(){
  pinMode(ir_s1, INPUT);
  pinMode(ir_s2, INPUT);
  pinMode(buzzer, OUTPUT);
  Serial.begin(9600);



  Serial.print(" Speed Detection ");
  delay(2000);
}

void loop() {
if(digitalRead (ir_s1) == LOW && flag1==0){timer1 = millis(); flag1=1;}

if(digitalRead (ir_s2) == LOW && flag2==0){timer2 = millis(); flag2=1;}

if (flag1==1 && flag2==1){
    if(timer1 > timer2){Time = timer1 - timer2;}
else if(timer2 > timer1){Time = timer2 - timer1;}
 Time=Time/1000;//convert millisecond to second
 speed=(distance/Time);//v=d/t
 speed=speed*3600;//multiply by seconds per hr
 speed=speed/1000;//division by meters per Km
}
```

```
if(speed==0){

if(flag1==0 && flag2==0){Serial.print("No man  detected");}
                else{Serial.print("Searching...    ");}
}
else{

   Serial.print("Speed:");
   Serial.print(speed,1);
   Serial.print("Km/Hr  ");

  if(speed > 50){Serial.print("  Over Speeding  "); digitalWrite(buzzer, HIGH);}
          else{Serial.print("  Normal Speed   "); }
   delay(1800);
   digitalWrite(buzzer, LOW);
   speed = 0;
   flag1 = 0;
   flag2 = 0;
 }
}
```

Arduino Code 2 (for PIR sensor):

```
int timer1;
int timer2;

float Time;

int flag1 = 0;
```

```
int flag2 = 0;

float distance = 5;
float speed;

int ir_s1 = A0;
int ir_s2 = A1;

int buzzer = 13;

void setup(){
  pinMode(ir_s1, INPUT);
  pinMode(ir_s2, INPUT);



  pinMode(buzzer, OUTPUT);
  Serial.begin(9600);



  Serial.print(" Speed Detection ");
  delay(2000);
}

void loop() {
if(digitalRead (ir_s1) == LOW && flag1==0){timer1 = millis(); flag1=1;}

if(digitalRead (ir_s2) == LOW && flag2==0){timer2 = millis(); flag2=1;}

if (flag1==1 && flag2==1){
```

```
    if(timer1 > timer2){Time = timer1 - timer2;}
else if(timer2 > timer1){Time = timer2 - timer1;}
 Time=Time/1000;//convert millisecond to second
 speed=(distance/Time);//v=d/t
 speed=speed*3600;//multiply by seconds per hr
 speed=speed/1000;//division by meters per Km
}

if(speed==0){

if(flag1==0 && flag2==0){Serial.print("No man  detected");}
                else{Serial.print("Searching...    ");}
}
else{

   Serial.print("Speed:");
   Serial.print(speed,1);
   Serial.print("Km/Hr  ");

  if(speed > 50){Serial.print("  over speed man ran away by steeling "); digitalWrite(buzzer,
HIGH);}
          else{Serial.print("  Normal Speed man not ran away   "); }
   delay(1800);
   digitalWrite(buzzer, LOW);
   speed = 0;
   flag1 = 0;
   flag2 = 0;
 }
}
```

Design and Working(Using NodeMCU, Blynk application)

In this model , data to switch ON or OFF appliances like fan, lights, night lamp are sent from the Android application Blynk to the NodeMCU.

The NodeMCU, upon receiving commands from the user (commands given through the Blynk app), sends signal to the Arduino.

The appliances which are connected to the Arduino UNO with a relay circuit as an intermediary receives command and work according to the controls.

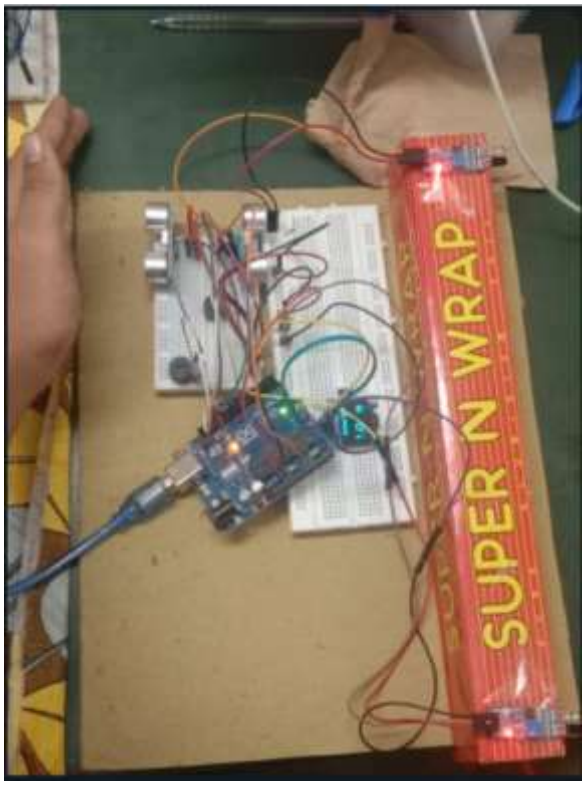
Arduino Code (for controlling LED by NodeMCU) :

```
#define BLYNK_TEMPLATE_ID "TMPL_5fSDjN-"
#define BLYNK_DEVICE_NAME "home automation pro"
#define BLYNK_AUTH_TOKEN "zvdEa3Z1IHOdnU__jNlpAXQx9vzUWDfL"

#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

char auth[] = BLYNK_AUTH_TOKEN;
```

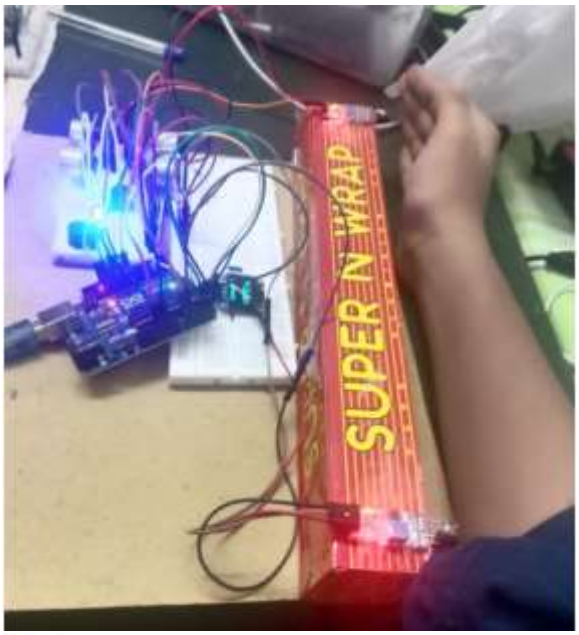
```
char ssid[] = "Airtel-MyWiFi-AMF-311WW-5629";  // Enter your Wifi Username
char pass[] = "27d8a968";  // Enter your Wifi password
int ledpin1 = D4;
int ledpin2 = D6;
int ledpin3 = D7;

void setup()
{
  Serial.begin(115200);
  Blynk.begin(auth, ssid, pass);
  pinMode(ledpin1,OUTPUT);
  pinMode(ledpin2,OUTPUT);
  pinMode(ledpin3,OUTPUT);
}

void loop()
{
  Blynk.run();
}
```

CONNECTIONS:

Ultrasonic sensor:



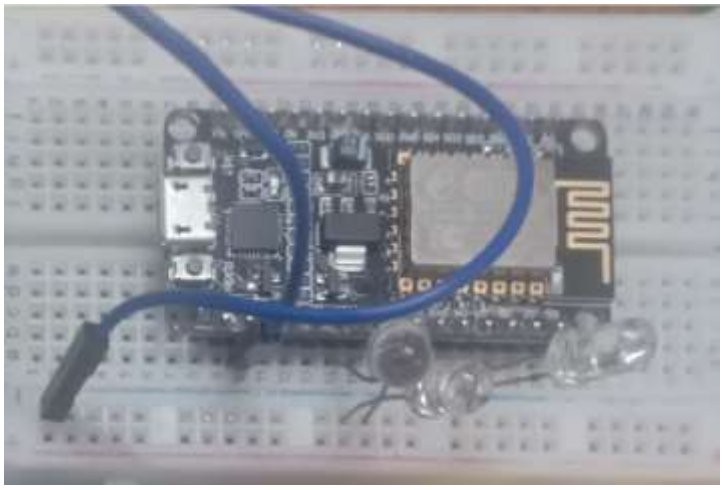
PIR Sensor:

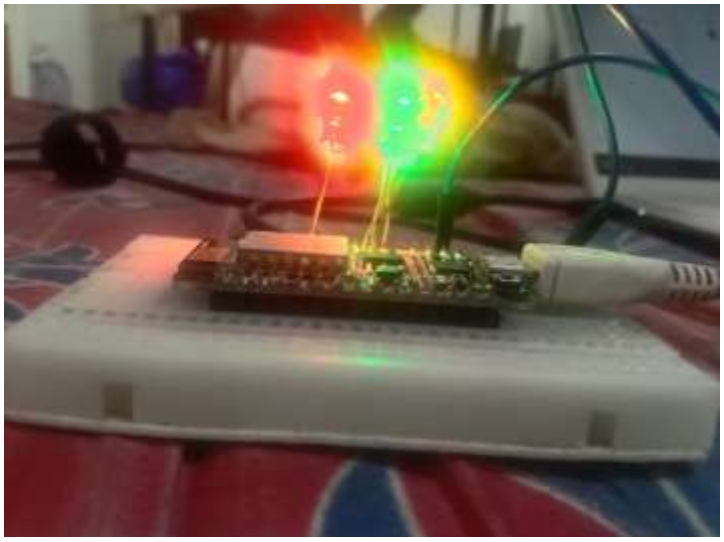

SUPER N WRAP

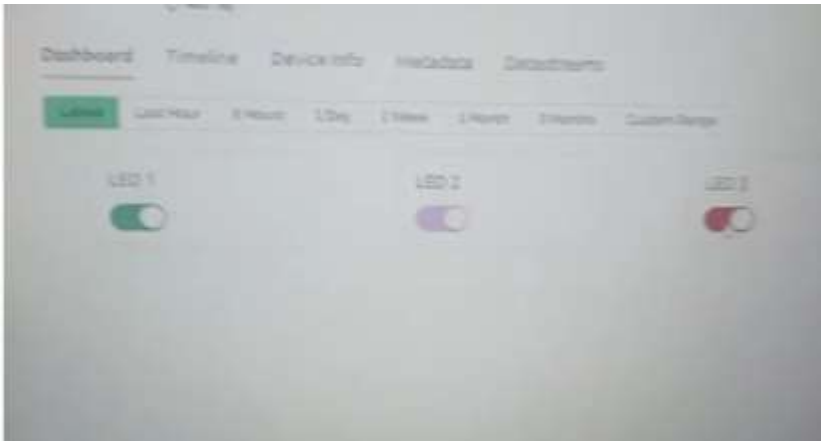

SUPER N WRAP

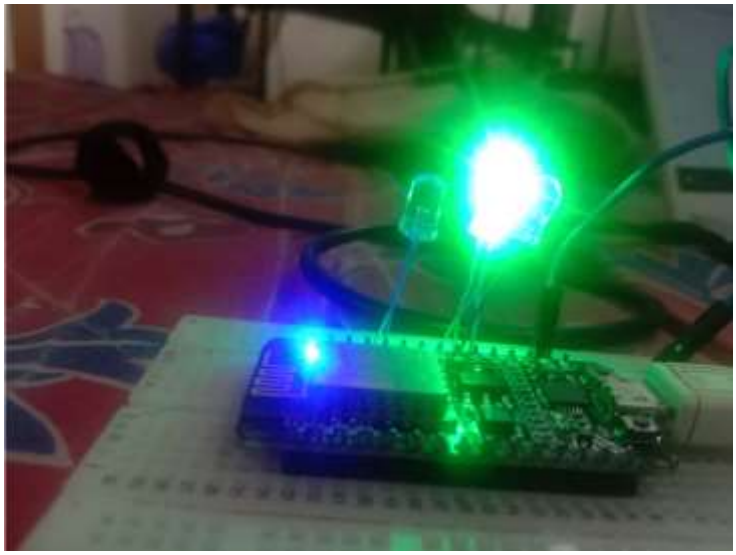

COM4
Send
Speed:ovfKm/Hr over speed man ran away by steeling Speed:ovfKm/Hr over speed man ran away by steeling

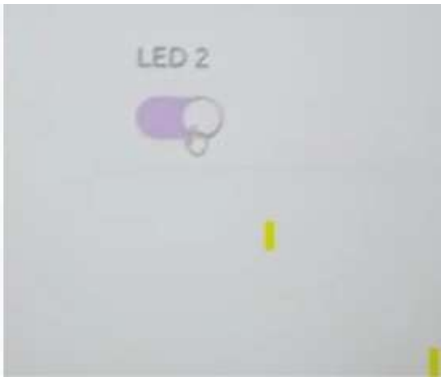
Node MCU:

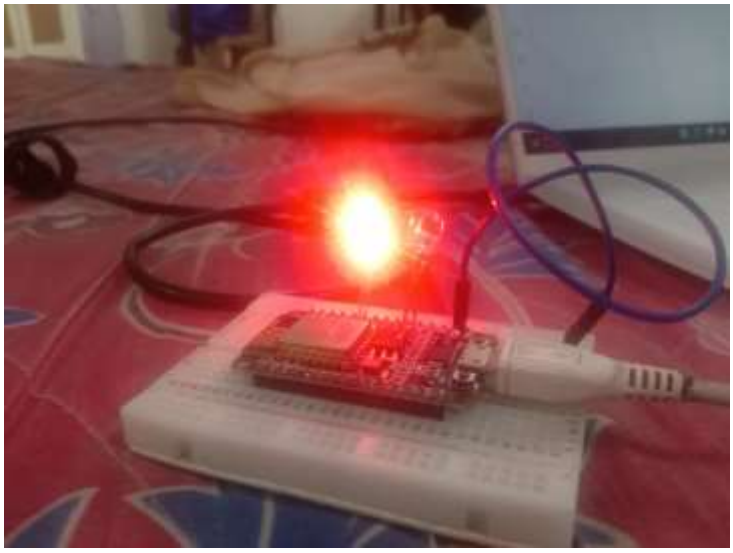






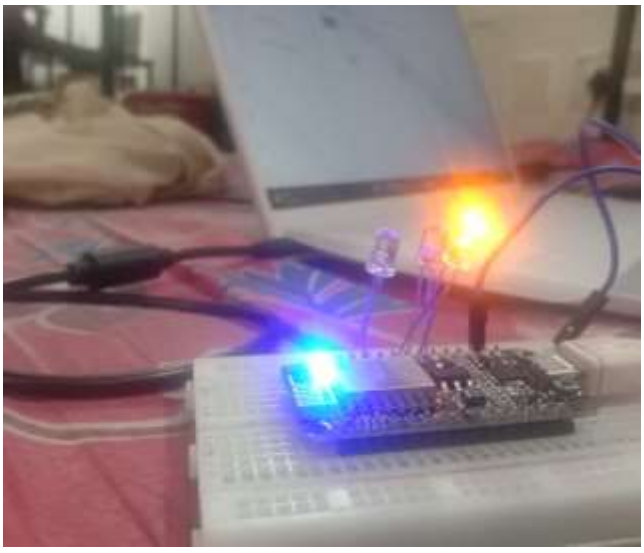



LED 2




LED 1


LED 3



Result video of our project :

For ultrasonic sensors:

https://youtu.be/pfMcrVvIkiw

for PIR sensors:

https://youtu.be/ooii5WMooKI

for NodeMCU:

https://youtu.be/0bKet11GhcM

EXISTING METHODOLOGY:

A home automation system allow users to control electric appliances of varying kind. Many existing, well established home automation systems are based on wired communication. This does not pose a problem until the system is planned well in advance and installed during the physical construction of the building. IoT is a system that uses computers or mobile devices to control basic home functions and features automatically through Internet from anywhere around the world. Internet or IP protocol-based communication in home automation systems is always a popular choice. The capacity of a product or system to communicate in a standard way with other products or system is Interoperability. The existing system has a drawback that the graphical user interface (GUI) is not provided to the user and the user has to remember all the AT commands to control the connected devices. Also, the system uses the java-based functions. Now a days, the usage of those mobile has less. But in the proposed system we are controlling all devices through android mobile and web server and the user no need to remember the commands also. Some devices are automated like cooler, Fan, Light, Electric motor etc.

RESULTS AND DISCUSSION:

The model has achieved its aim of calculating the speed of the man and also its distance. In this model the two IR sensors detect the man passing nearby, measures time and with its help measures speed, if the speed of the object is more than 50km/hr, it will give a horn else it will display the speed on the laptop's screen and thus we can find that the man steels our things and ran away.If not man didn't steel the things the ran away. This we are ding to ensure that our things was stolen by someone or not

In the second part of the experiment with the help of Ultrasonic sensor, which measures distance of the nearby person from ultrasonic sensor. In this the sensor measures the distance and if the distance is less than 5cm it will give an horn. This model can be used in real life to give an alarm for the person who enters in our house.

CONCLUSION:

Using this model we can easily detect the speed of vehicles/human by utilizing Arduino and IR sensors so that it alerts the over speed of vehicles/human. This paper is mainly used as sport check, to control over speed near prohibited areas. The system accumulates information of vehicle/human speed (moving objects) by displaying on LCD display and if over speed occurs it alerts by giving buzzer. The designed detection system continuously monitors the speed of the approaching vehicle/man. It minimizes the difficulties of traffic department and make ease to control the rash driving / over speed vehicles on highways. So that, the police can provide their service with more ease and accuracy while sitting in control room. We can also use this system in our home to ensure that our things was stolen by someone and ran away or not when we are not alert

This model is calculating accurate distance from any obstacle that we want to measure. The device can be used in many different fields and categories like distance calculation in construction field, robots, car sensor to avoid obstacles ,Person entering into the home so the person who was there in the house can easily identify that other person had come to the room when he was not alert and many other applications.

References:

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