Smart Security Alarm System using PIR Sensor

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Abstract: In day to day life, we hear a lot many cases or incidence of crime, burglary and many more things happing around us, so the need of smart security system increased. There is various security system are available in the market like CCTV, ultrasonic detectors, photoelectric detectors etc. but these systems are may costlier, consume more electrical power usage, complex security etc. In this system we tried to overcome these drawbacks likely this system consists of cheap sensor and Arduino UNO, Bluetooth module, Buzzer. The sensor we have used is PIR sensor also Passive Infrared sensor which has ability of intruder, radiation emitted by human body sense by this sensor when the intruder is range of it and then creates output and sends signal to Arduino for further signal processing or setting motion other devices like alarm system, lighting system etc. This system would save at least some power and some devices get activated when the intruder is come in range of sensor. PIR is reliable, low-cost sensor. It also consists of appropriate software and Bluetooth module for the notification purpose it sends the notification on your android phone. The buzzer/piezo gives siren when the intruder is detected. This type of system receiving lot much importance in IOT sector. This type of system can be employed in banks for locker, homes, offices, shops/malls etc.

Keywords: PIR sensor; Arduino UNO; Bluetooth module; Buzzer; Tinkercad

I. INTRODUCTION

As the population is increasing day by day, number of crime and burglary also increased that's why the need of smart security is also increased. The need of smart security system in different shops, offices, malls as well as in homes becoming very essential and also employed in it [1,2]. These employed system are consists of transmitter and receiver which is used for accuracy but this type of system may very expensive. In this system we tried to apply simple and low-cost solution which can be very easy to operate and there is no need of skilled person so anyone can use it very easily. In this system we have used Arduino UNO, Bluetooth module, PIR sensor, Buzzer. PIR sensor is Passive Infrared sensor as the name indicates it is an electronic sensor that measures infrared light radiated from human body [3]. PIR detects radiation and produces a output which is in digital form, that output is send into Arduino UNO [4]. Here, when intruder is come in the range of PIR sensor the buzzer gives siren and sends notification on mobile phone by using specific software application and Bluetooth module which will be plus point of this system, everyone can use this from anywhere[5,6]. This is how the system works which will be more beneficial due to its properties that are cost efficient, portable and reliable too in every field and homes, banks etc.

II. IMPLEMENTATION

The system consists of PIR Sensor, Arduino Uno, Bluetooth module, buzzer.

- The PIR sensor, buzzer, Bluetooth Module is connected to Arduino.
- The signals sensed from PIR sensor are sent to the Arduino microcontroller.
- Then the Microcontroller sends signal to buzzer and Bluetooth module.
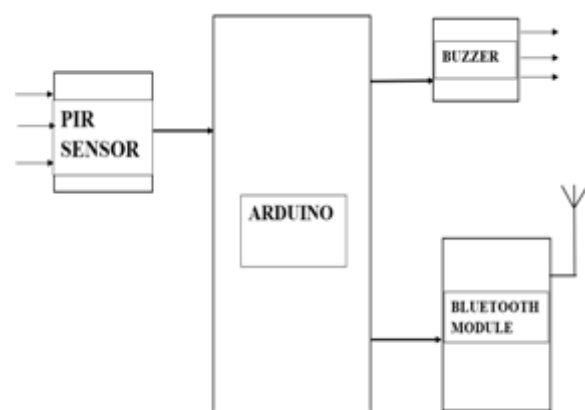

Fig 1.   Basic block diagram

III. CIRCUIT DIAGRAM AND METHODS

The connections are made as per the circuit diagram above figure 1 and figure 2 switch on the circuit. The PIR

sensor is powered. Whenever any human is detected the sensor detects the IR rays emitted from the human. VCC of PIR is connected to 5v supply pin of Arduino. GND pin is connected to pin 5 of Arduino. Output pin of PIR is connected to pin 7 of Arduino.

This PIR sensor has a span of 5 meters. we can adjust the pot provided for the sensor to vary this distance. When any intruder is detected, the PIR sensor outputs a logic HIGH value i.e. voltage of 3.5V to 5V to Arduino UNO's Pin 7.As soon as the Arduino detects logic HIGH on Pin 7, it makes the Pin 8 HIGH Buzzer is connected to pin 8 Buzzer sound indicates that an intruder is detected

Simultaneously the Bluetooth module is sent with a signal The Rx pin of Bluetooth module is connected to Tx pin of Arduino. Bluetooth pin Tx is connected to Rx of Arduino. VCC of Bluetooth module is connected to 5v supply and GND pin is grounded.

Bluetooth module is connected to the software application Bluetooth module sends signal to the software application the buzzer can be turned off using the software application

A. Human detection

Human detection part of the system completely depended on the program responsible for the elimination of any background noises. The PIR sensor responsible for the detection of movement adjusts itself to the infrared signature of its surroundings and keeps watching for any interchanges [5,6]. In the absence of motion, the LED indicator will remain fainted, and the program will continue updating the surroundings. If the sensor detects motion, the frame for motion detected will be the input frame to the process of human detection, and accordingly, the motion detection indicator will light up.
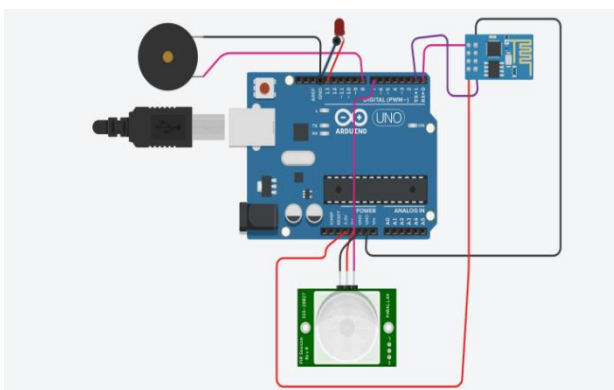

Fig 2.   PIR sensor implementation in Tinkercad.

B. Notification on Device

The system works in a way that every time movement is detected, the piezo and Bluetooth module indicates the detection. The notification algorithm gained from the Arduino design file enables an instruction on the system to transmit a signal to the software connected. For this system, the holder, whose device has been stated during

the program outline and execution, receives a notification on movement detected in the region.

Test Result Simulation which is very easy on Tinkercad [7,8].
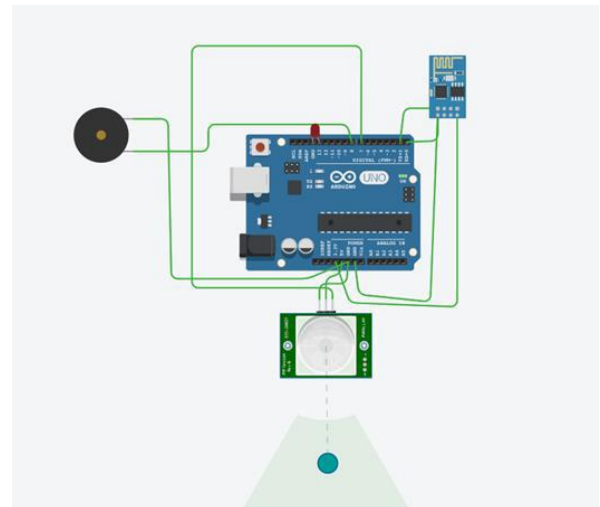

Fig 3.   Intruder is detected by PIR in Tinkercad.

This is the result when there is no intruder detected by the PIR sensor.

- The Buzzer is off.

- The Led light is off.

- And there is no notification from the Bluetooth module.

These are the results when an intruder is detected by PIR.

The system can be used to provide security in houses. It can also be applied a monitoring system in the work offices along with security purpose. The system can be used in banks for security of lockers and other important things. The system can be used in dark. GSM module can be implemented in this system.

By using PIR sensor streetlight control [8], human detection [9] and in motion detection system used [10]. So PIR sensor is very use full for monitoring and detecting presence which is essential in different sectors now a days.

IV. DIGITAL TOOL

The most effective method to utilize a portion of the math, factors and documentations, control parts, contribution just as result is vital at the underlying stage on the Tinkercad climate. Likewise various scientists have done various applications. Arrangement joined with all inactive and dynamic part in a solitary framework Tinkercad stage is ideal to use in various applications.

For the web-based method of reasonable applications, the instructive establishment can serve in extremely brilliant and smooth manner. It is extremely free streaming

programming and parcel of study instructional exercise can make the plan work process to be exceptionally simple, intriguing and in reasonable structure to the clients. It additionally expands the interest likewise save the expense, time and endeavors. It is a best learning stage where the client can foster their abilities adequately by utilizing it effectively and easily. Tinkercad device has beneficial outcome on understudies, learning on various reasoning approach and light them for various contests. So this gives great effect on learning and investigation on things of research center exercises , so it is more advantageous to the entire schooling framework.

Essential reason behind all such various applications, is that anybody can quickly play out the pragmatic and it is a shrewd cycle and furthermore it wipes out utilization of time for the educator. Later fruitful execution, understudy or work representatives need less an ideal opportunity to finish the project execution plan. Security can be improved by utilizing all such computerized apparatus and furthermore lessen the sit around. Diverse arrangement of execution on all unique circuit might expand the efficiency.

V. CONCLUSION

The PIR sensor alarm system was designed using Arduino controller. The Arduino was connected to a Bluetooth module and buzzer to indicate the output. The Arduino was programmed using Arduino IDE. When the intruder was detected by

the Pir sensor the buzzer was set on. Also, the app connected to the Bluetooth module was notified. The buzzer was set off using the app.

The system design in this project overcomes this challenge through the use of Arduino which is cost-friendly, low power consumption and high-resolution power. For security, the system is efficient as it is applicable for surveillance of small personal areas.

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