IOT BASED HOME SECURITY SYSTEM USING ARDUINO

Kodali Pragathi *1, U. Vamsi Krishna*2, P. Deekshitha Reddy*3, M. Mysaiah*4

*1Student, Department of Electronics and Communication Engineering, ACE Engineering College, Hyderabad, Telangana, India

*2Student, Department of Electronics and Communication Engineering, ACE Engineering College, Hyderabad, Telangana, India

*3Student, Department of Electronics and Communication Engineering, ACE Engineering College, Hyderabad, Telangana, India.

ABSTRACT

This project work is used to provide high-level security system for the common people at domestic side. Robbing locked houses is quite common these days, to avoid these types of muggings, this project work is designed with IR technology. The main concept of the system is to detect the passing person near by the sensors and acknowledge by activating the buzzer automatically. Fire detection is also done through the sensor and activates the buzzer. Initially the process begins with intruder sensors; here infrared sensors are used for detecting the presence of a person who entered in to the house by breaking the lock. Whenever the house is attacked, the IR beam is interrupted, by which a logic high signal is generated from the trigger circuit output. The microcontroller unit will activate the buzzer. Apparent motion is detected when an infrared source with one temperature, passes in front of an infrared source with another temperature. For detection of fire, an IR receiver is used. The controller is interfaced to the Real Time Clock for reading the time and will be displayed in the LCD which is interfaced to the controller. A small 3X4 matrix keyboard is interfaced to the controller.

Keywords: Home security, Arduino, IoT, Sensors, Wi-fi module.

I.   INTRODUCTION

The main aim of this project work is to develop a high-level security and safety system for many organizations in addition to the domestic applications. Design aspects are considered for real time applications. The method of intruder sensing is used to detect the presence of a person who is roaming within suspected area; in this regard proximity detection scheme is designed with infrared sensors. When the system is used for domestic purpose and whenever the house is supposed to be locked, and there is no one in the house, then the intruder sensing circuits must be activated. This circuit is designed with infrared signal generator & infrared signal detector, these two sensors can be arranged parallel to each other and this set of sensors can be placed at the entrance of main door or any other place convenient to the house owner. Whenever any person enters the house and passes near the sensors, immediately the system acquires the interrupted information and activates the alarm. The microcontroller used in this project work is interfaced with a keyboard to enter the timings duration during which the system is to be activated. As an RTC is connected to the controller, the time is displayed in the LCD continuously. Based on the interruption signal obtained from the IR sensor or the PIR sensor, the controller activates the alarm. Presently the controller is programmed to activated the alarm, if required the information can be passed to user mobile through the GSM technology. All the sensors connected to the controller falls under the embedded technology.

II.   METHODOLOGY

The block diagram shows the complete pictorial representation of the setup. The entire project is implemented using Arduino which also consists of the LCD panel to display which of the sensors is currently activated. It contains four types of sensors: IR sensor, Fire sensor, LM35 temperature sensor and a gas sensor. It contains four push keys for the entry of password, a buzzer that gets activated when any sensor goes off. A wi-fi module to send a message to warn about the activation of the sensor.
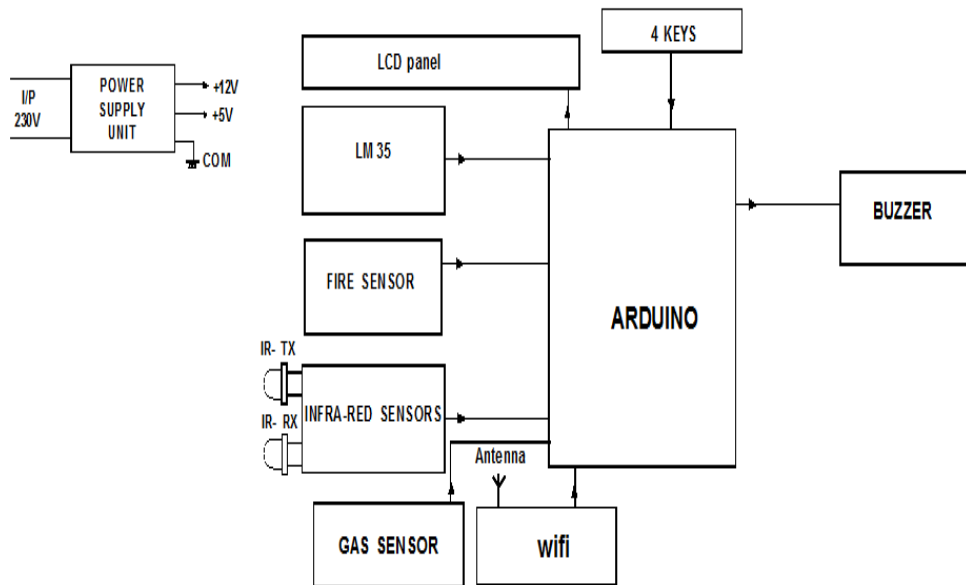
Fig 1: Block representation.

Hardware Components used:

1. Power supply unit.
2. LCD panel.
3. Temperature sensor LM35.
4. Fire sensor.
5. Infrared sensor.
6. Gas sensor.
7. Wi-fi module.
8. Arduino NANO.
9. Keys.
10. Buzzer.

III.   DISCRIPTION OF HARDWARE COMPONENTS

Power supply unit:

The power supply unit produces 230V AC current which is converted as required. A step-down transformer is used in this case to convert the 230V AC current into 5V and 12V supply that is passed to the sensors.

LCD panel:

LCD displays are very useful for displaying user information and communication. Due to its compactness and ease of programming for characters and graphics, more information in the form of text message or graphics can be displayed.

Temperature sensor LM35:

The LM35 IC is a general-purpose tone decoder designed to provide a saturated transistor switch to ground when an input signal is present within the pass band. External components are used to independently set center frequency, bandwidth and output delay.

Fire sensor:

The fire sensor detects the presence of combustible gases like methane, propane, butane etc. In the presence of a detectable gas, the sensor's conductivity increases depending on the gas concentration in the air. A simple electrical circuit can convert the change in conductivity to an output signal which corresponds to the gas concentration.

Infrared sensor:

IR 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.

Gas sensor:

It converts the concentrations of various gases into electrical signals.

Wi-fi module:

The function is to convert serial port or TTL level into embedded module which can conforming to Wi-Fi wireless network communication standard, with built-in wireless network protocol IEEE802.

Arduino NANO:

This is used to read inputs and display the output on a LED display.

Keyboard:

A small keyboard with 3X4 matrix is interfaced to the controller to enter the time duration during which the system is to be activated. The time data generated by the keyboard is stored in microcontroller internally, it is not displayed anywhere but the normal time will be displayed in the LCD.

Buzzer:

It is an audio signaling device that is activated when a sensor goes off.
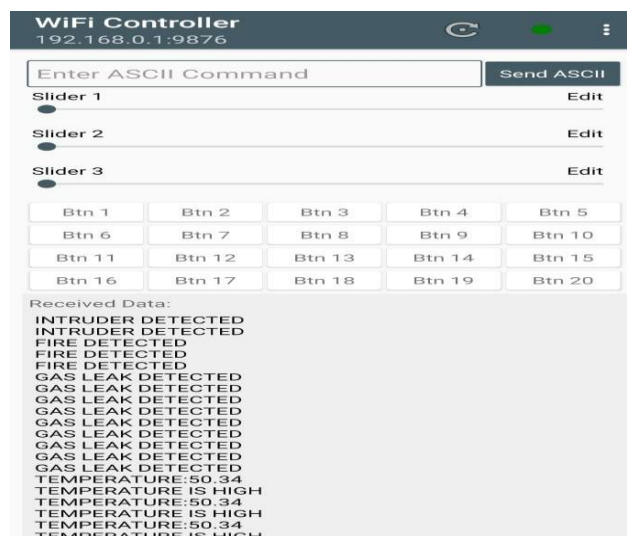
IV.   RESULTS AND DISCUSSION

The Result of this project is showed in below photos:
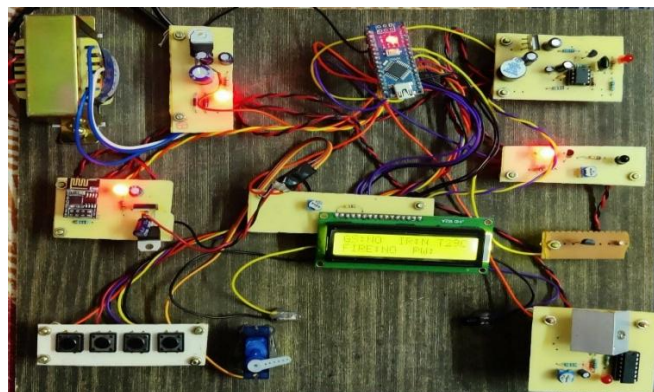
Fig 2: Complete Project

The above picture shows the working of the complete project. In this picture, we can observe all the sensors are activated. The results are displayed on the LCD. The wi-fi module and the RPS are also activated to show their working.

Fig 3: Test case results

Figure 3 shows the test case results that were taken for the purpose of completion of the project. In this picture we can see that the IR sensors, fire detectors, gas leakage and temperature sensor were activated. The Arduino NANO converted the raw signals into electrical signals which were sent via the WI-FI module.

V.   CONCLUSION

In this paper we have introduced design and implementation of a low cost, flexible and wireless solution for home. The system is secured for access from any user or intruder. The users are expected to acquire pairing password for the Wifi module and the cell phone to access the home appliances. This adds a protection from unauthorized users. This system can be used as a test bed for any appliances that requires on-off switching applications without any internet connection. The full functionality of the home appliances control system was tested and the wireless communication between the cell phone and Wifi module was found to be limited to <50m in a concreted building and maximum of 100m range was reported to be applicable in an open range.

VI.   ACKNOWLEDGEMENTS

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