

Home based intelligent security system

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Abstract - Proposed system deals with the idea of multipurpose, cost-effective design to control the on-off mechanism of various devices. This is more helpful in case of crisis, the situation in being the absence of the authority at the work place so that he/she is unable to monitor in person for the purpose of safety. This project evaluates the development of a Low-cost security system using Arduino. The PIR sensors are used to detect a human body that is a constant source of IR energy. The system receives signal generated by PIR sensor detecting the presence of individuals. Detecting the presence of any human in a specific time period, it triggers an alarm & sets up a message to a predefined number through a GSM modem. Fingerprint based door unlocking system makes proposed system advantageous and secure over conventional system like password based system. This highly reliable approach has low hardware requirement, therefore it is well-suited to surveillance, industrial applications and smart environments.

GSM based Control System shows the emerging applications of the GSM technology. Using GSM technology, a system has been proposed that will act as an particular system which can reports about alarming situation to the user. This project can be further extended to employ in household and even in various industries where the entire monitor and control of various other parameters could also performed at no cost. Among these, this project focuses on the monitor & control of the parameters like LPG gas and fire.

Key Words: Home security system, Motion detection, Fingerprint identification, fire detection, LPG detection, GSM communication

1. INTRODUCTION

Many security systems are based on only a single system. In an event of system failure or intrusion of the user authentication, there is no backup system to monitor the home continually. This shortcoming can be dealt with using multiple security systems or multi-layered security systems. However, multi-system implementations will definitely be more demanding in terms of computational cost.

Burglar alarm module and fire and gas leakage alarm module. Both subsystems work independently but are incorporated into a single automated system for practical implementation.

This invention relates to an intelligent home security system and method for residential houses or small business offices. More particularly, this invention relates to an intelligent

home security system and method with the associated hardware by applying psychological knowledge and human intelligence for real-life simulating, reactive real-life simulating, active responding with human detection for possible trace analysis, alarming and automatically reporting event to respective person or organization.

1.1 Comparison of conventional and proposed system

A popular and conventional system or similar principle protect the home from intruder by monitoring the home, alarming and/or reporting the intruder to the security monitoring center or the respective person once an intrusion is detected. On the other hand, it also protects resident life safety and house safety from CO, gas, fire or smoke. This all home security systems in markets today are passive systems which are not accurate.

Proposed system differs from existing schemes by achieving High accuracy without the high cost. The need for microcontroller is also eliminated. By using ARDUINO based control system operation time has been reduced. By using PIR motion detector accurate and reliable human detection is possible as well as by using the same, intruder can be detected more accurately, this key feature of the system also ensured by using fingerprint identification for authorized entry. Other safety systems like Gas leakage detection, smoke detection, Fire detection is also interfaced with the control system. By using GSM technology, communication with authorized person of the alarming event is provided.

1.2 System Description

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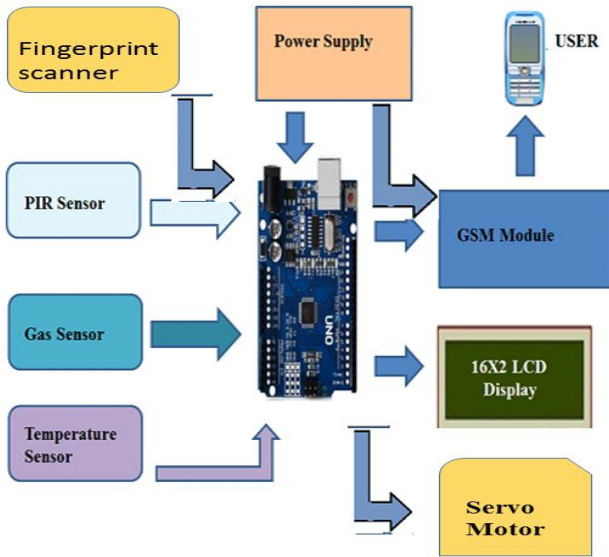


Fig -1: Block diagram of proposed system

2. Hardware used

A. Arduino UNO

The Arduino board is the central unit of the system. The Arduino Uno is a microcontroller board based on the ATmega328. It is a programmable micro controller for prototyping electromechanical devices. You can connect Digital and Analogue electronic signals/Sensors.

B. PIR sensor

The PIR Sensor module allows you to sense motion. It is almost always used to detect the motion of a human body within the sensor's range. It is often referred to used "PIR", "Pyro electric", "Passive Infrared" and "IR Motion" sensor. The module has an on-board pyro electric sensor, conditioning circuitry and a dome shaped Fresnel lens. The PIR sensor module provides an output "HIGH" when a human body is detected within its range and an automatic Delay "LOW" when the body leaves its range.

C. Gas Sensor

The sensitive material used in MQ-2 gas sensor is tin oxide (SnO₂), which has lower conductivity in a clean air medium. When the target LPG leak is detected, the sensor's conductivity rises and increases proportionately as the extent of gas leakage increases. The detection range of MQ-2 gas sensor is 300-5000 ppm and has fast response time and is a low powered device (5V). This sensor has different resistance value in different concentration.

D. Temperature Sensor

The LM35 series is a low cost and precision Integrated Circuit Temperature Sensor whose output voltage is proportional to Centigrade temperature scale. Thus LM35 has an advantage over other temperature sensors calibrated in Kelvin as the users don't require subtraction of large

constant voltage to obtain the required Centigrade temperature. It doesn't require any external calibration. It is produced by National Semiconductor and can operate over a -55 °C to 150 °C temperature range. Its output is linearly proportional to Centigrade Temperature Scale and its output changes by 10 mV per °C.

E Fingerprint sensor

The GT-511C3 FPS (fingerprint scanner) is a small embedded module that consists of an optical sensor mounted on a small circuit board. The optical sensor scans a fingerprint and the microcontroller and software provides the modules functionality which automatically processes the scanned fingerprint. The module can be used in projects for identifying users, for example allowing access through a door by scanning a finger print instead of using a key

The module is small and easy to mount using two mounting tabs on the side of the sensor. The on-board JST-SH connector has four signals: Vcc, GND, Tx, Rx.

E. 9g servo motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servo motors. We are using tiny and lightweight with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller.

F. GSM module

A GSM modem is a device which can be either a mobile phone or a modem device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection. A GSM/GPRS MODEM can perform the following operations:

1. Receive, send or delete SMS messages in a SIM.
2. Read, add, search phonebook entries of the SIM.
3. Make, Receive, or reject a voice call.

3. Experimental results.

Figure 2 shows the alerting messages of alarming events such as; if LPG gas leakage is detected by the sensor than "GAS DETECTED" is sent on the user's mobile. Same system works for other two alarming situations such as "HIGH TEMPERATURE" when temperature is beyond the permissible limit caused by fire. "MOTION DETECTED" if any intruder is detected. These all alerting messages sent on the user's phone number which is programmed in the code..

Fig.3 shows the complete implementation of individual sensors explained above. Shown image shows that motion detection system, PIR sensor is mounted near the main door so that it can detect any trespassing activity by any unauthorized person such as thief. Other two safety ensuring sensory system is placed in kitchen area which are gas detection and fire detection sensors, these provides safety from any fire event occurred due to gas leakage or any other reason. Main control system is shown where it is interfaced with LCD screen and GSM module. This whole system is interfaced with above mentioned three sensory systems and shows the appropriate alerting message on LCD screen. These same messages are forwarded to the authorized user through GSM communication. Near the door for authorized entry in house fingerprint sensor is mounted which is interfaced with another controller and servo motor. This assembly ensures the authorized entry in the house. Fingerprint of authority is already enrolled in system which are used to run servo motor by identify the fingerprint images. Through this servo motor opens the door as fingerprint of authorized person is detected.

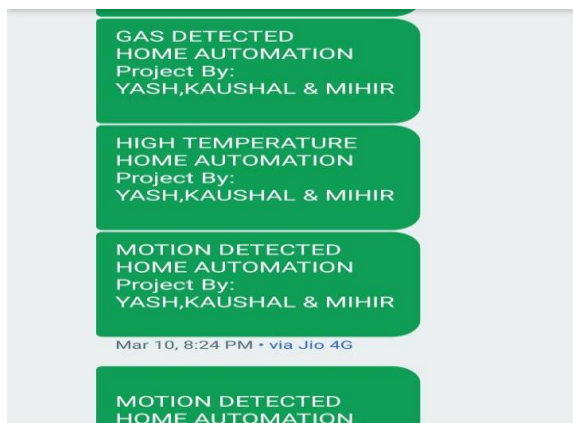


Fig. 2 Alerting messages through GSM

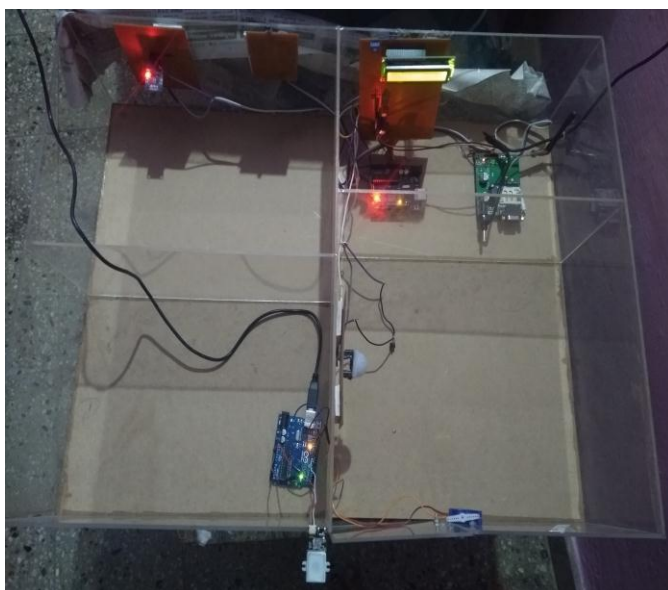


Fig. 3 Hardware implementation

4. Future work

- 1] In proposed system use of camera by image capturing can make system more accurate as well as reliable.
- 2] Detection of short circuit in electrical wiring can make system safer and different than the available conventional systems.
- 3] By using thermal sensor, accurate motion detection of stationary human can be detected more accurately.
- 4] An upgraded version of the fingerprint module could be used.

5. Conclusion

On this project we concluded that this is the user friendly approach to the available home security system. This system achieves high accuracy and reliability by the use of one or more safety and security detection systems. Since it is the cost effective anti-theft system it helps to reduce crime rate also. by wireless communication User is informed about the situation by using GSM technology makes system more reliable .Hence these features makes our proposed system more unique .Also the fingerprint based door lock system provides more secure unlocking over conventional method like lock and key or even password based system.

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