

Smart Home Security System using Internet of Things

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Abstract— This paper deals with the design of the smart home using wireless technology. Now a days, security system is more preferred over manual system. IOT is the latest internet technology. Home appliances control of smart security system uses mobile and computer for their controlling purpose to operate the system anywhere around the world via internet. This system uses Arduino Mega Microcontroller as a processor. The motion sensor, smoke sensor, water level sensor and light sensor are connected with the Arduino Mega.

Key words: Internet of Things (IoT), Arduino Mega, Ethernet

I. INTRODUCTION

Safety and security are the most important things. The advancement of the technology increases the security of the system. There is a rise in security because of robbery and burglary and busy human lifestyle. And this reasons leads to necessity of controlling the devices. The lifestyle is changing it is not a constant factor. Internet of Things can be explained as connecting of the objects like internet televisions, smart phones, sensors and actuators to the internet. The IoTs technology is useful one for creating new concepts and wide development space for smart home security in order to provide intelligence, comfort and improved quality of life [2]. This devices are connected in a link for the communication and controlling purpose. The IOT technology is useful for the innovation of new concepts. Home security is most useful for the apartment or the individual home and for the comfort and peace of mind home should be installed with the perfect security system. The basic component of home automation security system are motion detectors, humidity detector, door lock detector and smoke detector and light detectors [6].

II. SYSTEM CONTROL DESIGN

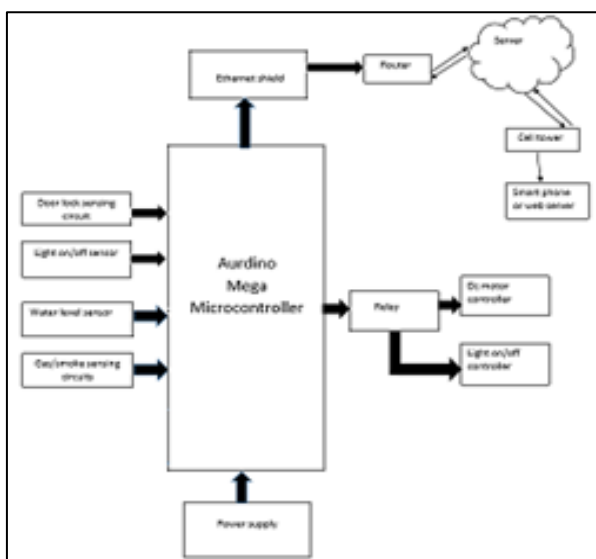


Fig. 1: Overall Block Diagram of the Smart Security System Using IoT

The system control design consists of two parts named as Microcontroller and web page design.

The block diagram is shown in fig.1. It consists of smoke sensor, door lock sensor, water level sensor, motion sensor, light on/off sensor, router, cell tower, Ethernet shield and smart phone. The smoke sensor used for the leakage of the gas or the fire detection. Door lock sensing circuit is placed at doors and windows to detect the intrusions. Relay circuitry used for the light on/off circuit. Motion level sensor used for the detection of the unwanted motion of the people. Water level sensor used to monitor the level of water tank. When there is a correct manual intervention the microcontroller reads the smoke signal, motion sensor and other magnetic signals. It will send these data to the web page through the internet. When the data and command received the relay state will be changed and the output is displayed on the web page. Real time status is also displayed on the webpage via internet access.

A. Microcontroller Unit

The microcontroller unit is divided into two parts. First part is sensor section and another is driver section. The smart security system for home appliances based upon IoT has abilities to monitor all these sensors. This system also monitors smoke sensor, light sensor, water level sensor. ENC28J60 Ethernet module is used along with the RJ45 connector. And by using this connector we can connect the microcontroller and web server data. The Ethernet and Arduino are interfaced with each other via the Arduino SIP pins. Arduino mega microcontroller uses 'C' language. Arduino software will collect the data from the sensors then the actions will be apply to the actuators and it is pre-programmed in the server and keep record in the server database.

1) Sensors Section

Sensor sections are used for detecting following parameters:-

- Smoke sensor
- Door lock detector
- Water level sensor
- Motion sensor

a) Smoke or Gas Detection

To detect the leakage of the gas and smoke, the smoke sensor is used. This sensor used for the detection of the gases like LPG/Butane/methane/hydrogen/alcohol/butane/propane. We are using MQ-2 smoke and gas sensor. MQ-2 is a semiconductor type sensor, which sense the presence of the smoke or gas and gives appropriate output. The circuit starts working with 5V when the gas is detected by sensor.

b) Motion Detection

Motion detection is used to switch on and off the lights of passage. Hence, passive infrared sensors (PIR) sensor is used as motion sensor. If there is some movement of peoples around the sensor the lights will on and after some period the lights will automatically off. If there is high signal on signal I/O pin of PIR sensor then motion will be detected. PIR

sensors are electronic device and it is most of the used for security purpose to detect the movement of peoples around some area. Radiations from the human beings are infrared radiations it is not visible for human eyes but it is detected by some electronic devices.

c) Door Lock Detection

The intrusion sensor are placed at doors and windows to detect the intrusion. Intrusion gives more security. The Hall Effect sensor is used or this. This sensor is proximity sensor. It is a magnetic sensor. When a current carrying conductor is placed into a magnetic field then the voltage perpendicular to both current and the field is generated and this effect is known as Hall Effect. In this a magnet is attached to the door or window, whereas the sensor is attached to door or window itself. And the magnet and sensor should be closed to each other whenever the door is closed.

d) Water Level Sensor

Water level sensors are used for detecting the tank will be off. If the tank is full that is at some highest level then motor connecting with the tank will be off. And if water level is go below some level then it is detected by the water level sensor and the motor will on automatically.

2) Driver Section

Driver section contains buzzers and relays. Relays are used for light on/off system and motor on/off. And buzzers are used in the alarm system.

B. Web Control Design

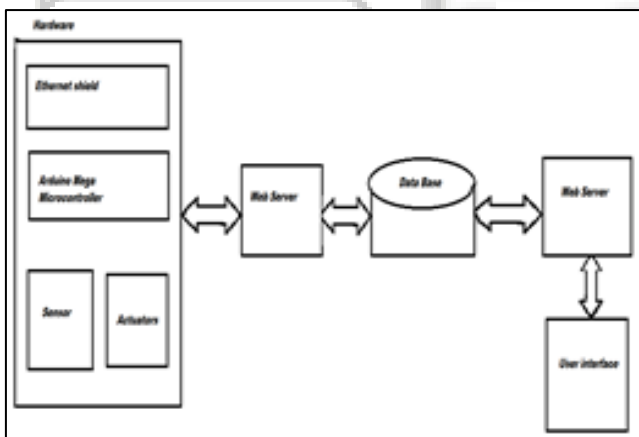


Fig. 2: Block Diagram of the Data Flow for Home Security System

Web control design contains two sections one is database logging system and the second is the user interface.

The block diagram is shown in the figure. It contains Arduino microcontroller, sensors, actuators, Ethernet shield, and Ethernet server. When microcontroller has 5V supply, then it collects the data from sensors and this data is send to the web server this is called POST method. The web server will read the data from Arduino by using post.php web server page and it will change the read data to the related variables. This related variables are send to the database by using this page. Then server used to monitor the user interfaced.

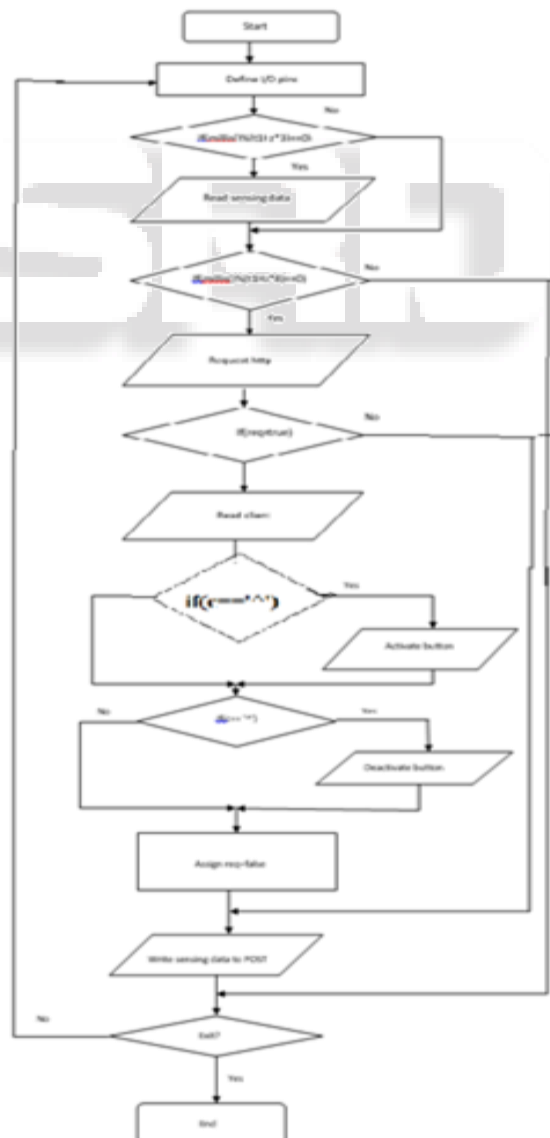
1) User Interface



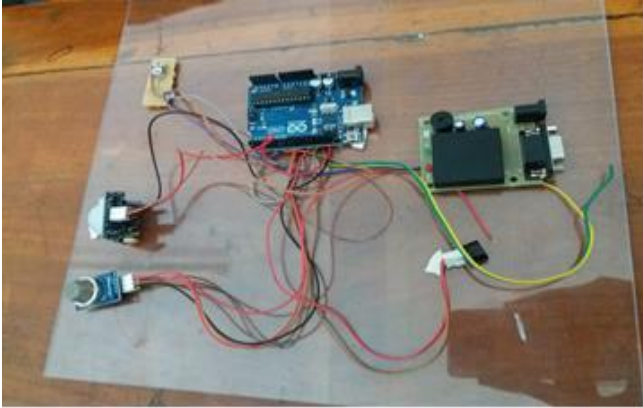
Fig. 3: Overall Real Time Monitor and Control User Interface

The user interface was used not only for monitoring system but it also control light ON/OFF. The user can easily watch the real time status of any sensor on the webpage through web server via internet.

III. IMPLEMENTATION



IV. TEST AND RESULT



V. CONCLUSION

This home appliances control of smart security using IoT is effectively by using web server. This system consists of web server and sensors. Server controls and monitors the various sensors and can be easily configured to handle more hardware. This system not only monitors the sensor data but also actuates a process according to the requirement.

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