

IOT to Oversight Smart Home Environment

Prajakta Sanjay Gaikwad, Amit Sanjay Shete, Prof. S. D. Shirke

Computer Department, NBN Sinhgad School of Engineering

Abstract

In day to day life, everyone wants to urge some comfort also as secure life. Home Automation is the concept where we will control home appliances remotely to scale back efforts. Home security system is useful to protect home from fire and theft. Wireless smart home system plays a crucial character in human day to day life and growing in popularity thanks to its flexibility, adjustability and less cost installation charges. Smart home system is extremely helpful in lifestyle because it decreases human burden, saves power and reduces stress about home security for working people. Smart home automation is concerned about to regulate light ON/OFF status, fan speed and other home appliances remotely. Home security comprises services like gas leakage and theft detection. In this system, we suggest a secure as well as an effective smart home automation that allows guarding our homes from thieves or unfamiliar activities. It will also concentrates on saving power. Given smart home automated system is designed by enabling the key aspects of IoT that promotes users to watch an IoT developed home from any place and at any moment from a web when data is saved within cloud. The smart home automated system consists of motion sensor to sense a object in motion from surrounding where smart home automated system is planted.

I. INTRODUCTION

Improvement of technology makes the human day to day life gets simple with the assistance of latest technologies. thanks to the flying progress of web technology(IT) and smart embedded systems, people are taking more interest in using the web to regulate and observe differing types of devices. In recent years, the concept of a sensible house is a growing interest among consumers. IoT is defined because the connection between different devices like smartphones, pc , and tablets to the web , which brings within the new quite communication between things and other people . IoT uses aren't limited to just one particular field. it's shown contribution from small scale applications to the massive scale applications[7 8].

In suggested system, we develop a protected smart home automated system which is based on concept of IOT and which gives security from theft and also saving electrical power. This proposed automation system has an advantage by removing the utilization of previous computer system and its related devices at the time of execution.

II.PROPOSED SYSTEM

Proposed automated smart home system includes 3 modules: (a) Cloud Server, (b) Hardware Interface module (c)Software or application.

For developing a system, firstly the sensors are configured which are connected to ESP8266-12E module. This module accepts instruction from an interfacing port. This module is programmed with Arduino which is formed to receive and then to process commands communicated over the Internet from end user. Depending on a cloud service provider which is referred as Blynk, the cloud server is configured. To develop IOT based application, blynk gives end to end solution. Finally, a smartphone application is developed and connected to this module using a cloud service provider blynk over the web.

Figure 1 gives the blueprint of the home automation system to be developed. A User can control home automation system by login into cloud server blynk through the internet. To demonstrate switching functionality, low volting switching relays are used by integrating a device with ESP8266-12E module. Using web-based application, remote users can access server over the internet only when server is connected to internet.

Features of proposed system are as follows:

- It has automated switches for home appliances.
- It is able to sense object which are in motion.
- The password is generated by integrating fingerprint and password.

The working of the home automated system depends on the saved data on cloud server. Information of home appliances of each room is stored in a server. At initial phase it sends a request to the cloud server. Then it will halt till it gets acknowledgement from server. Alarm is triggered and detailed report about incident is sent when it senses any motion object. Whenever a new object is sensed, an alarm is triggered. Fig. 2&3 shows the dataflow of proposed automated system.

III.EXPERIMENTAL SETUP

In this segment, we give practical results by parameter evaluation. Parameter evaluation is important for fitting the proposed system surrounding environment.

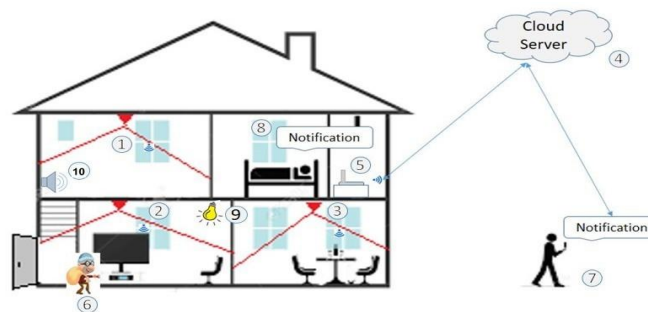


Figure 1

- 1) PIR sensor to detect motion
- 2) For detecting motion PIR sensor is used
- 3) PIR sensor to sense motion
- 4) Cloud server known as blynk
- 5) Internet gateway
- 6) Robber
- 7) Notification sends to enduser1
- 8) Notification sends to enduser1
- 9) On detection of the robber ,light will automatically turn on.

On detection of the thieves, an alarm is also triggered

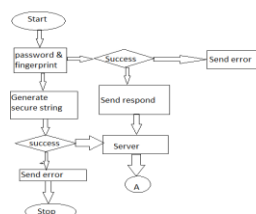


Figure 2

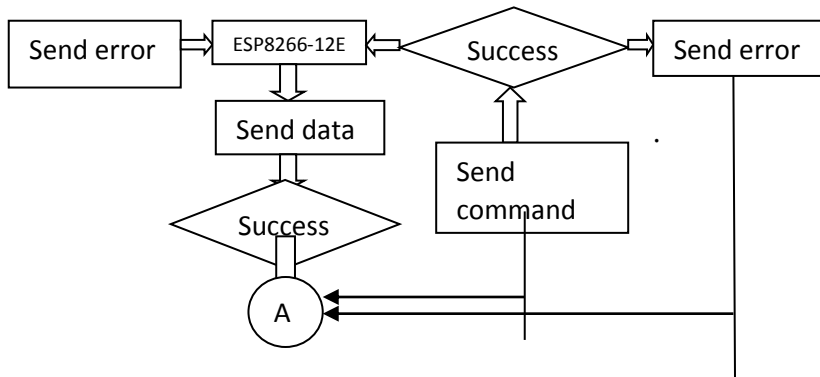


Figure 3

To verify the proposed system in real time environment we place the system in real environment. i.e for 60 days we placed this modules in 30 rooms to evaluate system. This system is also depends on power utilization approximation model for every room. Within this time, we calculate efficiency to detect theft and power cost per each room after every 5 days. For measuring total cost, we calculate: 1)total hours to consumes power, $th = (\text{consumed time in sec}/60 \text{ sec}) * (24\text{hours}/\text{day})$

2)total hours in a month $tm = (th * \text{no of days})$, 3)total watts consumed, $tw = tm * \% \text{ of total watts bulbs or devices located}$, 4)Total cost, $Tc = tw * \text{rate per unit}$.

This automated system has 2 significant steps to complete the work.

Algorithm : Proposed system(S, userID, pwd)

Input: 1)'S' is power supply required to enable IOT devices 2)'userID' is user ID of the house owner , 3)'pwd' is the password for the specific user and fingerprint (F).

Output: To control devices based on IOT and automatic object detection.

- i. Start the application and ESP8266-12E module.
- ii. Application and ESP8266-12E is configured with a blynk server.
- iii. Transfer the data to the server and server forwards it to ESP8266- 12E module.
- iv. ESP8266-12E module processes the data and sends back the data through blynk server.
- v. Blynk server sends data to the application on request and displays data on application.
- vi. Compare received string with predefined string by correspondingly activating the sensors and switch the Electrical loads.
- vii. Show status of electrical loads on application.
- viii. Stop

Step i): Initiating ESP8266-12E relay board

First initiate ESP8266-12E board. After initiating board, instructions are written which goes through Arduino. Then the board was joint to GPIO pins by giving supply of 220v-240v AC connection. Solid State Relay (SSR) switches are used to connect various home appliances. A rectifier is used for passing the current to relay board.

Step ii): Operating ESP8266-12E module through mobile phone.

To access through cloud server, ESP8266-12E module is connected with net through WiFi. It is programmed through Arduino ESP8266-12E in such a way that it can work in stand-alone mode. The application is installed in operator's phone. Application is used to connect to the same cloud server by using either server's IP address or domain name. For login into the server securely, user must give password and fingerprint. With the help of above process, the operator can supervise home/office remotely from any place at any moment with minimum cost and efficient energy.

IV. RESULTS:

Arduino script is used to supervise the variation in infrared signal (IR) of motion detector. When it senses a barrier it sets motion flag which triggers the buzzer and switch on the light. A notification is pop up on user's phone when a motion is detected by the sensor. Whenever there is any interruption inside the surveillance area it will report to the user aware about the situation in every 5 seconds.

When the appliances are turn on, the user interface is upgraded for showing the current status. It has security aspects like user confirmation to activate proposed home automation system through fingerprint as well as user's password and interruption identification with aware message. Home automated system doesn't need separate personal computer which makes system cheaper in price. Finally, we calculate the cost for power consumption at every alternative 5 days before and after deposition of proposed home automation system.

Security and vulnerability analysis

Proposed system is designed by providing security to smart home automated system. Our system is in dangered to 2 major attacks: (i) man-in-the-middle attack (ii) online dictionary attack.

1) Man-in-the-middle attack: It is made to imitate the communication between the the application and server. Thus developer give extra layer of security by integrating user's password and fingerprint to create the actual password.

2) Online dictionary attack: It is made to guess the password during communication between components like the system or human. Before sending for actual verification, we can create a 256-bits long password using one-way hash. So, it prevents the attack.

V. CONCLUSION:

In this paper, proposed system is provided to assure security of smart home automated system with many components like users, motion sensors, cloud server, moving object detection module, and alarm module User can control module remotely. The system has been developed to fulfil the requirements of the enduser which decreases human efforts, saves power by making safer. It has many features like minimum time, prevent attacks against man-in-the-middle and online dictionary attacks, low cost, highly scalable with minimum infrastructures. Proposed system are often extended in real time environment like offices and corporations. For future reference and analysis we will also add more features like live video streaming, integrating camera and call alerts.

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