



# **FACEBOOK BASED HOME APPLIANCES SECURITY CONTROL AND MONITORING USING MICROCONTROLLER**

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## **ABSTRACT**

*Home automation is becoming more important day by day due to its numerous advantages. Home automation technology gives essential security to homes and associated control operations. The proposed innovation is to design a basic home security application through reading and posting of messages in social networking sites. This data can be shared to authorized user via social networking sites to accomplish home automation. Flexible embedded processor and with the support of open source packages the required camera system and systems for Facebook management and one time password management are implemented. The system developed provides user friendly automation for security of home using Facebook and can be enhanced in future using bio metric authentication. In this paper we propose a system that takes an advantage of secure authentication systems of social networking web sites for example, Facebook, tracks physical home environment of end user, taking into account which user can control the home environment and give home security remotely.*

**Keywords:** *Facebook Interface, Microcontroller, Raspberry Pi, Sensor.*

## **I. INTRODUCTION**

With the development of the Internet, many homes normally have network connections as one of the mandatory things in day by day life. Home equipment for example, TVs, fridges, entryways, light controllers, fans and air conditioners come with embedded network capabilities for creating a home automation and connecting to other ubiquitous devices (e.g., digital camera, mobile phones). Once several appliances are connected, the solution of management these devices are required to be successfully controlled. The smart device allows users to monitor and control home appliance functions from the Facebook. The smart device receives the virtualized data of the home appliances from the Facebook. All of the proposed components communicate with each other using HTTP and transmit data using XML. The proposed system provides home appliance monitoring service to users via a home appliance virtualization function supported by a social network.

Internet of things (IoT) is now becoming a new revolution after Internet in IT domain. Owing to the rapid development of IoT, many companies and developers devote to seek out methods that make the IoT more



universal. Be that as it may, for quite a long time, IoT implementation is at conceptual level. On the contrary, recently, the development of social network is amazing. The total number of registered users of Facebook increased to 1 million in only one year since it was founded. By the end December 2015, the total number has expanded to 1.18 billion. With social community, people can share their status and moods to their friends everywhere and any times through just a little click. Social network users use messages, pictures, videos and websites to share contents like travel, food and fun things. However, there are only computers, mobile phones and tablets can use social networks now. So if brilliant devices can involve in social network, and they also can send their status to social network as human beings do, then Internet of things can be all around associated with interpersonal organization.

IOT incorporated the interconnecting the objects through a unique IP address. Later on, the Web of Things (WoT) paradigm has been introduced to overcome and address more complicated issues. WoT performs object integration and connectivity on the application layer by utilizing Web protocols and technologies integration easier, adaptable and reusable in various applications. In existing home automation techniques household apparatuses can be controlled utilizing the graphical user interface gave on the specific home automation applications. The possibility of remotely controlling electronic appliances at home appears to be extremely great, however in the event that the remote get to control falls in the wrong hands, it can spell disaster. In this paper another new approach of monitoring the physical home environment through social networking sites has been presented. Social networking websites are giving tremendous efforts to maintain privacy of the uploaded content and secure personal information of all users. Thus monitoring and controlling of home environment can be achieved with the help of inbuilt security options provided from social networking sites. Additionally the home owner can have the right of giving the controls of this system to the other family members in his or her absence by including them in a social networking site groups. The paper is organised as follows: Section I is the introduction of the paper. Section II and section III contains literature survey and proposed methodology. Finally Section IV give conclusion of the paper.

## II. LITERATURE SURVEY

The system proposed in [1] gives 3 intends to control the home: the GSM network, the Internet and through speech. The real time monitoring has been an important feature that can be utilized in the home automation systems. As a change in the status of the devices occurs, the user can be informed in real time. The user commands are transferred to a server which is usually done by a PC. The server processes the user commands and sends them to the relevant units. This can help control the appliances. GSM is utilized as a communication medium to help build up connection in places where there may not be appropriate internet availability. The server utilizes AT commands to communicate with the GSM modem. The mobile interface is developed using J2ME. The server has 4 engines running – the web server, database, main control program and speech recognition program. The system can be controlled using SMS. It can send confirmation messages. . Each application node has four parts – the transmitter, receiver, I/O device and a microcontroller. The main control program in the server takes status information from the devices' transceiver in real time. The system makes utilization of a PIC16F887 microcontroller for home appliances control [2]. It makes use of GSM for control of the appliances. This is an SMS based system. GSM has been used due to its high availability, coverage and



security. The control of home appliances is done primarily through SMS codes. AT commands can be sent through the GSM network and this controls the home devices. Messages are sent by the device to the user through SMS as well. This system can however incur additional costs for the SMS. There is no UI that the user can use to control the device. This system has the disadvantage of not being able to program the devices. Also SMS relies on upon the networks and there is a possibility of delayed delivery. The system doesn't have any state information related to the devices and expects the user to keep track of it.

The system [3] is depicted as an M2M system. It utilizes GSM for communication. GSM offers options for M2M which include Dual Tone Multi Frequency (DTMF), SMS and General Packet Radio Service (GPRS). This system chooses to use the SMS along with AT (attention) commands. It has a PC as a centre of commands. A GSM dial-up and communication system is embedded in the PC. Visual C++ is used for implementation. The PC decodes the received messages via SMS and performs the commands required. It is a system that can be programmed for the required application as per requirements. The system also has the ability to control mechanical appliances, through sensors that convert electrical to mechanical signals. Nonetheless, this system is not intended to give feedback to the user. The system is PC centric and requires the PC to be on all the time. It can't be used as a real time control system.

The home server is based upon a SMS/GPRS portable cell module and a microcontroller [4]. This permits the user to monitor and control any apparatuses at home using any Java enabled cell phone. The paper presents the design and implementation of AT modem driver, text based command processing software and power failure resilient output from the microcontroller. The mobile phones are used to give a easy to use interface. They likewise serve to send commands and receive feedback from the system as SMS strings. The hardware components include an Atmel microcontroller, which is connected with a RS232 serial port. It additionally has EEPROM memory to ensure that the relevant details are stored. A password based authentication system has to be used. The text messages sent will contain the password which is used to ensure the message is sent from a valid source. The main disadvantage of this system is that it relies heavily on the SMS, which is not very fast and dependable. There can be delays in delivery. Also security of the system is compromised since passwords are sent freely over the network.

### III. PROPOSED SYSTEM

Web-based social networking advances are utilized to execute a home automation concept to solve home automation issues by various short range communication technologies. The proposed system to remote control home automation through Social network which is generally utilized for communication. Remote and local controls are valuable. Home automation system is integrated through a common home gateway which gives network interoperability. Social networking based home automation systems have the low installation and running costs. Social networking based home automation system also has been used to implement home automation with various capabilities to monitor alarms (power, temperature, motion, fire and door alarms, etc.). A few sensors are directly connected to a microcontroller through proper interface as a sensor host.

Although present systems permit different home-automation schemes in which home appliances are used and controlled remotely or automatically, considering the expanded use of social networking sites, different home-

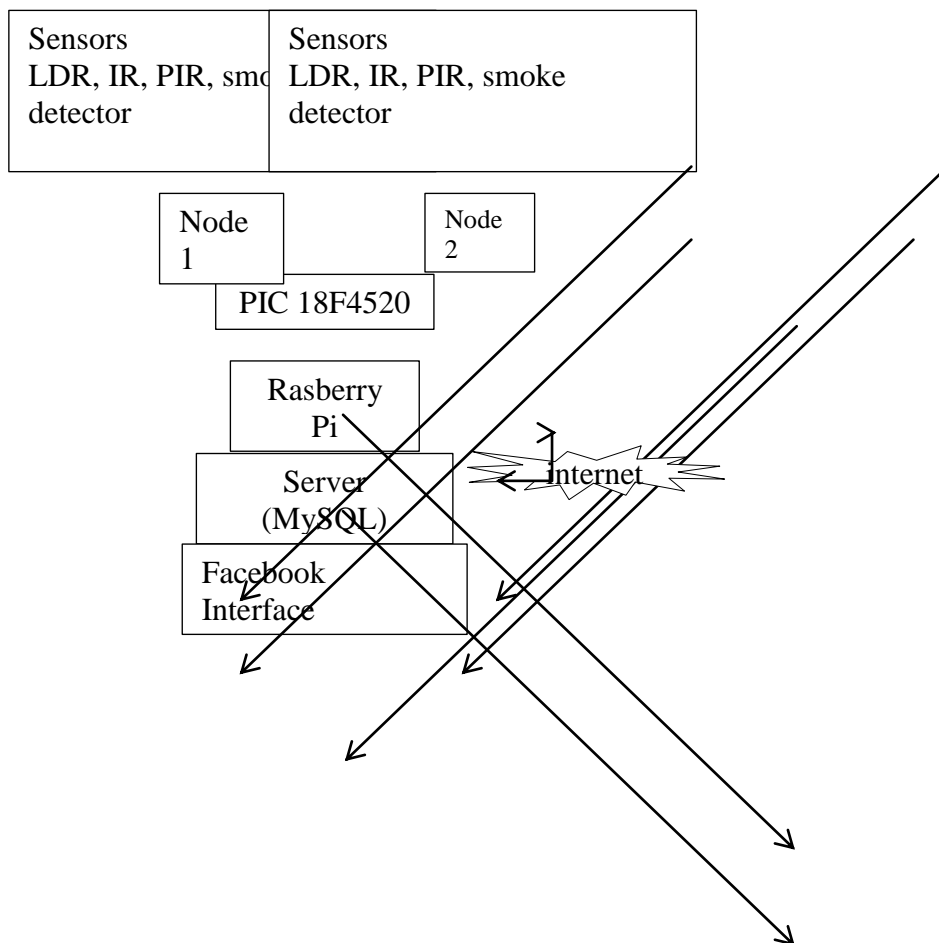


automation factors like automatic smoke detection, trespassers activity, and light intensity can be indicated on social networking groups with wireless sensor network implementation at home. Such a system presents a novel concept in which home security can be monitored by family group through the popular social media. Social media technologies are used to implement a home automation concept to solve home automation issues by different short range communication technologies. The proposed system to remote control home automation via Social network which is generally used for communication.

In the event that unintentionally fire happened in the user home, when the user is not accessible, the temperature sensor detects the room temperature continuously. If the temperature of the room is high means i.e. above the ordinary temperature, it detects and sends the status to the microcontroller. The microcontroller passes the status to the Ethernet gateway through serial communication interface and finally the status is posted on the Facebook. The output screen shot of temperature detection is given above.

If accidentally LPG is leaked in the user home, when the user is not available, the MQ5 sensor detects the smoke content i.e. gas content in the home continuously. If the LPG content of the room is high means i.e. above 750ppm, it detects and sends the status to the microcontroller. The microcontroller passes the status to the Ethernet gateway via serial communication interface and finally the status is posted on the Facebook. The output screenshot of LPG detection is given above. Once LPG leakage occurred in the user home, immediately the electrical appliance in the home can be switched OFF or the entire power supply to the home can be turned OFF by sending commands to the device Facebook account from the user account.

The operation of this block diagram is simple utilizing the microcontroller PIC18F4520 and its features and parameters are given in the introduction column of the microcontroller. The device switching circuit is comprised of relay which is used to switch the home appliances, the number of relay to be used will relies on the number of home apparatuses to be controlled and switched between. The serial interface transmits and receives information simultaneously and transmits to the Ethernet device. Proposed system is a generalized embedded system so the output is indicated with the help of LED which can be changed to various output devices like relays, door control, motor control etc. above figure describes the block diagram of the proposed system. This setup consists of input device as web camera, and output device as LED. Controlling is done with the help of social networking sites. The purpose of a wireless node is to interface with an individual home appliance and control it. The control logic embedded in such nodes is specific to the appliance it is connected to. For instance, if a node is connected to a light system (LED/tube/fluorescent) it should be capable of handling the intensity of the light;



**Fig .1 Raspberry Pi 2 B architecture with GPIO connectors.**

A sensor node, also known as a mote is a node in a sensor network that is capable to perform some processing, gather sensor information and communicate with other connected nodes in the network. This sensor node is further connected to the Raspberry Pi gateway where the inputs from all the sensors are given to next stage i.e. gateway. Out of the four sensors smoke detector and light dependent resistor are analogue type of sensors while Infra-red sensor and Passive infra-red sensor are digital sensors. A relay operation takes place for controlling a reverse way action from Facebook interface to the physical device. In this way the monitored sensor data gets showed on Facebook user interface.

### 3.1. Hardware Explanation

#### 3.1.1. Raspberry Pi

For the base station utilized a credit card sized single board computer Raspberry Pi 1. Figure 1 indicates Raspberry Pi 2 B architecture with GPIO connectors. The CPU on the board is an ARM processor, 900 MHz clock speed. CPU execution can be compared to a Pentium II 300 MHz processor. It has a variety of interfacing peripherals, including HDMI port, USB port, 1 GB RAM, SD card storage and 40 pin GPIO port for expansion. Monitor, keyboard, and mouse can be connected to the Raspberry Pi 2 through HDMI and USB connectors and it can be used like a desktop computer. It supports many of operating systems like a Debian based Linux distro,





Raspbian which is used in this design. Raspberry Pi 2 can be connected to a local area network by using an Ethernet cable or USB Wi-Fi adapter, and after that it can be accessed through remote login.

### *3.1.2. Relay Module*

The relay module has used to control the appliances by turn it ON or OFF. It's controlled by microcontroller. This relay module utilized 5V to operate and already provided by the microcontroller. The type of relay chosen is a four channel relay module because of compatible voltage to operate with microcontroller and low cost. The LED also arranged across the relay and it will light up when the relay is turned ON to indicate the status of the relay. The relay module connected with a PIC MICROCONTROLLER.

### *3.1.3. PIC microcontroller*

The proposed system consists of PIC microcontroller with in-built ADC, pH meter, LCD display, Amplifier, PC and a power supply circuit. The power supply circuit built using filters, rectifiers, and then voltage regulators. Starting with a voltage, a steady DC (direct current) voltage is obtained by rectifying the AC (alternating current) voltage, then filtering to a DC level, and finally, regulating to obtain a desired fixed DC voltage. A step down transformer connected with AC voltage typically 220v RMS, steps down to the level of the desired DC output. A full-wave rectified Voltage is provided by the diode rectifier that is initially filtered by a simple capacitor filter to produce a DC voltage since the resulting DC voltage typically has some ripple or AC voltage variation.

## **3.2. Software Explanation**

### *3.2.1. Raspbian OS*

Raspbian is an operating system which is distributed by Linux. Linux uniquely built up this operating system for Raspberry Pi devices. Last version was published in January 2014. We utilized the latest version in this project. The most popular operating system for the Pi is Linux. Several Linux distributions are available for the Pi, and we select Debian. Raspbian supersedes Debian squeeze, which has been the reference operating system for the Pi for a long time. The Raspbian distribution has many advantages over all its predecessors. It is much faster, it has more recent software, and it will soon be more stable.

### *3.2.2. MYSQL*

With more than ten million installations, MySQL is probably the most popular database management system for web servers. MySQL was created in the beginning of 1990s, now it's the most common used database engine. Main reason for its success, like PHP, it's free to use. MySQL is fast and it can run on basic hardware easily. MySQL is a relational database system. Data is held on tables. We utilized MySQL in our project because it can run stable with Apache Web Server and PHP.

### *3.2.3. The MySQL Database*

MySQL provides us with a database to store any information we require for our website, it is used widely with many websites on the internet today. To add this ability to our Raspberry Pi we again need to load a couple of packages.

### *3.2.4. Apache Web Server*

Apache HTTP Web Server is a web server in fundamental way [5]. On our cloud server we have LAMP stack. So we're utilizing Apache as web server for our project. Additionally Apache supports a variety of features



many of which implemented as compiled modules which extend the core functionality. These can range from server-side programming language support to authentication schemes.

## IV. CONCLUSION

In terms of opportunity IoT technology has significant potential in developing economies. From an economic perspective, it is expected that both demographics and marketplace trends will drive opportunity. The developing world population, especially in emerging economies, and challenges related with giving access to quality, safe, and moderate sustenance are set to grow over time. The potential utilization of IoT to combat hunger and promote sustainable agricultural has received particular attention, maybe more than any other improvement issue. This “Facebook based home appliances security control and monitoring using microcontroller” is used to provide real-time home appliance monitoring and control services. The Facebook server stores and manages a large amount of the status data generated by home appliances in smart homes. In any case, if many users connect to the Facebook server at the same time, a high amount of network traffic will happen in the server. Therefore, we will develop an effective method to decrease heavy traffic in the server. Similar to Facebook update, twitter can also be made as a platform for controlling and monitoring home appliances.

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