

A REVIEW ON “IOT-HAS VIA WI-FI MODULE”

Paras Sharma¹, Kshitij Singhal², Neha¹, Megha Dixit¹,
Rishabh Singh¹, Shivani Gill¹

¹U.G. Scholars, Dept. of E&C Engg., MIT Moradabad
Ram Ganga Vihar, Phase II, Moradabad (244001), India

²Associate Professor, Head of Dept. of E&C Engg., MIT Moradabad
Ram Ganga Vihar, Phase II, Moradabad (244001), India

ABSTRACT

The aim of this review paper is to summarize one of the IoT Application “Home Automation System (HASs) using Wi-Fi module”, its prototype and design implementation that uses Wi-Fi technology as a network infrastructure connecting its parts. The proposed system consists of Arduino board with ESP8266; i.e. the first part is the server, which presents system core that manages, controls and monitors users’ home and the second part is hardware module paired to Arduino microcontroller and switches to calibrate the working through server. Moreover, IP address and authentication provided to users give a backup/support to the concept of controlling devices through Wi-Fi module (cloud computing) as it increases the security of the system and makes the use easier and reliable.

KEYWORDS: IoT, HASs, Arduino, ESP266, network, Wi-Fi module, IP Address

I. INTRODUCTION

Internet of Things (IoT) deals with billions of home intelligent objects which could be connected to sense and collect the data. Among many IoT applications, The “Home Automation” concept has existed for many years. The terms “Smart Home”, “Intelligent Home” followed and has been used to introduce the concept of networking appliances and devices in the house. Home automation Systems (HASs) represents a great research opportunity in creating new fields in engineering, architecture and computing (Huidobro and Millan, 2004). HASs becoming popular nowadays and enter quickly in this emerging market. Due to the advancement of wireless technology, there are several different of connections are introduced such as GSM, WIFI, ZIGBEE, and Bluetooth in which Wi-Fi connection is easily accessible.

II. LITERATURE SURVEY AND RELATED WORK

Home Automation began with labor-saving machines. Self-contained electric or gas powered home appliances became viable in the 1990s with the introduction of electric power distribution and LED to the introduction of washing machines. In 1975, the first general purpose home automation network technology, X10 included a 16 channel command console, a lamp module and an appliance module.

By 2012, in the United States, according to ABI Research, 1.5 million home automations were installed. After then, According to Li et. al., there are three generations of home automation, examples of which are ZIGBEE automation, amazon echo, Robot Rovio., etc.

[1.] December 2015, Kaushik Ghosh, Rushikesh Kalbhor:

Their paper represents an affordable and flexible home control system using an Arduino, web server with IP connectivity for interacting with devices and appliances remotely using Android based application. It demonstrates the usefulness of the system using devices such as light switches, temperature sensors, and water-level sensors. In addition to remote control it also provides reminders.

[2.] June 2015, P Pavan Kumar, G Tirumala Vasu quoted:

The system consists of a micro Web-server based on Arduino Mega ADK with wifi shield, hardware interface modules and the Android compatible Smart phone app. The architecture presented in this work can be customized in different ways in order to accommodate different application scenarios with minimum recoding and design i.e. each time a new device is added to the micro Web-server.

[3.] 2016, Vinod Choudhary, Aniket Parab, Satyajit Bhapkar, Neetesh Jha, Ms. Medha: Paper proposes a low cost, secure auto-configurable, remotely controlled solution. The approach discussed in the paper is novel and has achieved the target to control home appliances remotely using the Wi-Fi technology to connect and satisfying user needs and requirements. Wi-Fi technology is capable solution has proved to be controlled through remote, provide home security and is cost-effective as compared to the previously existing systems. The home automation using Internet of Things has be experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet.

[4.] 2009, Ilango Sriram, Ali Khajeh-Hosseini:

This paper has presented the work published by the academic community advancing the technology of cloud computing. Much of the work has focussed on creating standards and allowing interoperability, and describes ways of designing and building clouds. We were surprised so far not to see significant contributions to the usage and scaling properties of Hadoop/MapReduce, which is a new programming paradigm in the cloud.

III. EXISTING SYSTEMS

Currently there exists no system at cheaper rates. Various systems are hard to install, difficult to use and maintain. Current systems are generally proprietary and closed, not very customizable by the end user.

1. Java-based automation system through World Wide Web integrated into a PC-based server at home.
2. Home automation system by using Bluetooth.
3. Home automation system by using ZIGBEE.
4. Home automation system using GSM.

IV. SYSTEM ANALYSIS AND DESIGN

Home Automation is the residential extension of building automation and involves the control and automation of lightning, heating, ventilation, air conditioning and security as well as home appliances that0 use Wi-Fi for remote monitoring. Modern system generally consists of switches and relays connected to a 'gateway' from which the system is controlled with a user interface that is interacted either with a wall-mounted terminal, mobile phone software, a web interface and most often via internet cloud services.

This design is constructed with Atmega328p microcontroller which is connected with the ESP8266 WiFi module, over which cloud computing is done. The regulated and stabilized supply of 5v is given to the circuit with 7805 ic and 2 capacitor of 100uf and 10uf respectively to give output with no spikes as the Atmega328p microcontroller is operated at 5v. An LCD display of 16*2 is used. WiFi module first check the condition whether the prior network is available or not if condition followed to be true then the LCD display shows that it is connected to the network. Atmega328p microcontroller checks the conditions whether the serial data which is given over ESP8266 is true or not and if its true then what condition it fulfils. According to the conditions the 12v relay switches works with ON \OFF operations. There are 4 relays used connected in parallel.

The designed app for the home automation system provides the following functionalities to the user:

- Remote connection through internet to the Web server.
- Provides IP and user authentication.
- Controlling and monitoring of Home Appliances.
- Scheduled reminders

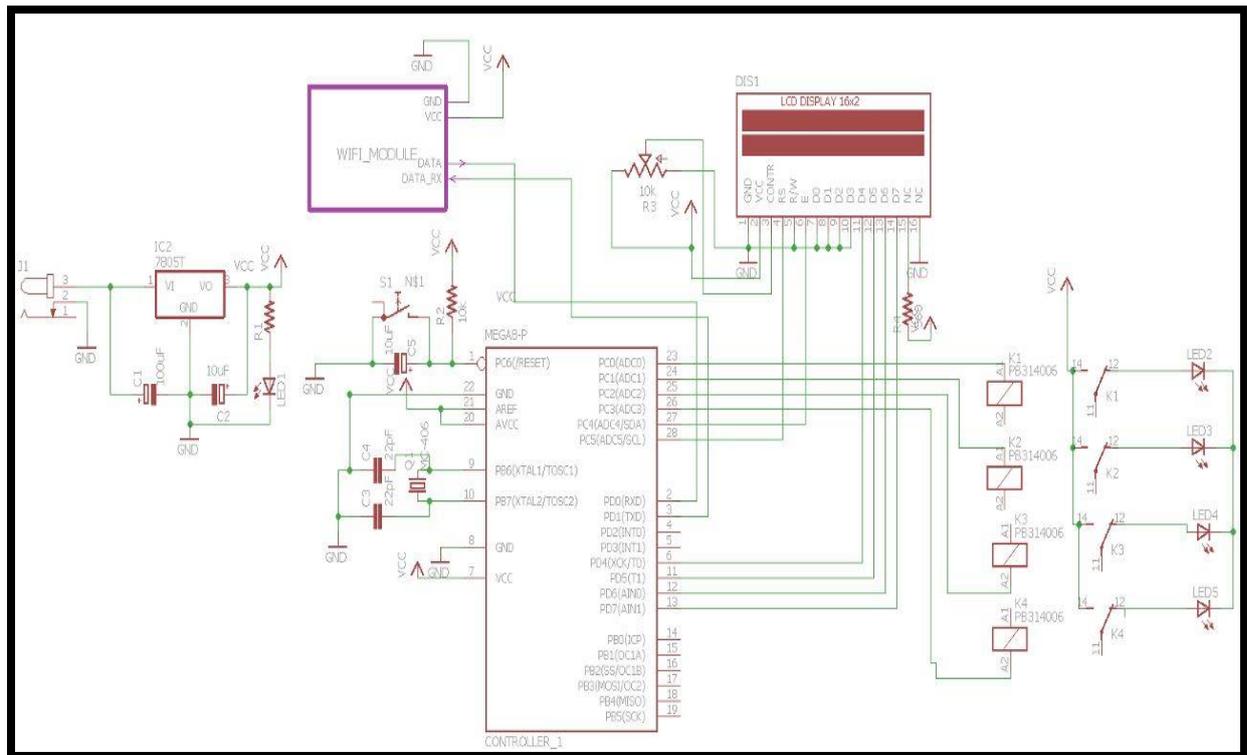


Fig: 1 Block Diagram

V. DEVELOPMENT PLATFORM ARDUINO BOARD WITH WI-FI MODULE

Yes, a WiFi network connected to the internet can be vulnerable to hacking yet the technology is still in its infancy. There are a wide variety of technology platforms, or protocols. The automation protocol transport has involved direct wire connectivity, powerline and wireless hybrid. Among those the successful match is with Domestic patch panel, Laptop controller for automated sprinkler system, An ad for the Kitchen Computer in 1969. The practical implementation at the end also set a statement that the controlling device for the automation in the project is a microcontroller. The data or message sent over Wi-Fi will be received by Wi-Fi module (ESP8266) connected to a microcontroller, where microcontroller reads the data and decides the switching action of the electronic devices connected to it through switches. Up until now you've been manually controlling the WiFi module via the serial console. It's obviously possible to control the module programmatically via an Arduino sketch. But by avoiding that we will make it drive by charging and discharging of capacitors. In other words, Our Relays can be controlled by microcontroller when rely to charging and discharging of capacitor followed by 7805 positive voltage regulator. Our Relay units are responsible for actual control of load and a protection diode to protect against counter electromotive force (CEMF) and spikes.

The ESP8266 module comes with firmware preinstalled. It is useful to update the firmware to the latest version. This requires running the esp8266_flasher.exe and installing the latest firmware.bin file. We are now going to see the steps for appliance-controller module. This first step is to place the ESP8266 breakout board on the breadboard. Then, the only thing you need to do is to connect the Power Switch. Connect the two pins on the right (-in and Ground) on the GND pin of the ESP8266 board and the +in pin to the pin number 5 of the ESP8266. Then, also connect any electrical device to the Power Switch, and the other end of the Power Switch to the main electricity. This is the completely assembled device controller.

VI. SOFTWARE DESIGN VIA FLOWCHART

This section describes the proposed architecture and design of flexible and low cost home controlling and monitoring system. The three basic building blocks of this project are Arduino microcontroller, Web server and Android application. The basic idea is to control different appliances and devices using the mentioned components. Web server will help the user to access the devices remotely. Such an application is very useful but less secure, anyone can share that application or access it if no security is provided. So to make the app more secure we can provide a password protection. The system is proposed to provide a cost efficient home automation technology.

The proposed Smart home system has the capabilities to control the following components in users home and monitor the following:

1. Temperature and humidity
2. Motion detection
3. Door status
4. Video monitoring
5. Lights, fans, HVAC on/off
6. Other Appliances switching On/Off

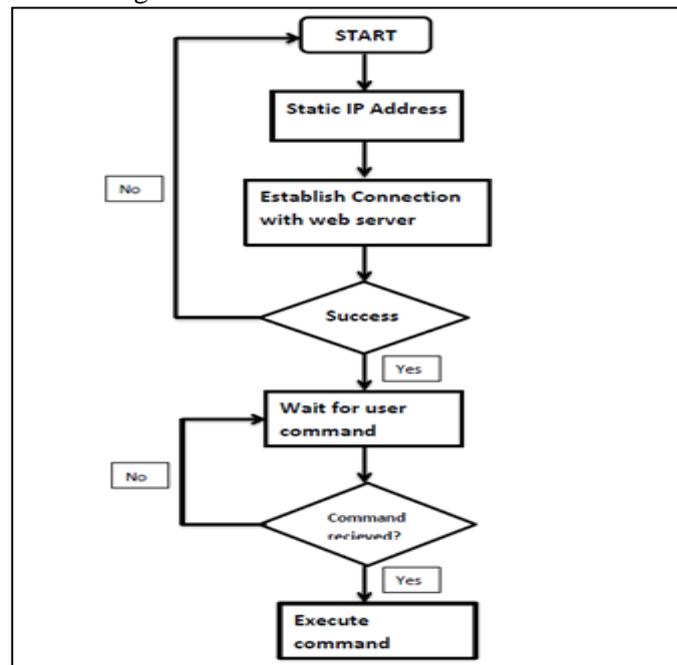


Fig 2: Flowchart for connection establishment and command execution

VII. FUTURE SCOPE

Future internet design for various IoT use cases, such as smart cities, smart environments, smart homes, etc. The fields of interest include: IoT architecture such as things-centric, data-centric, service-oriented IoT architecture; IoT enabling technologies and systematic integration such as sensor technologies, big sensor data management, and future Internet design for IoT; IoT services, applications, and test-beds such as IoT service middleware, IoT application programming interface (API), IoT application design, and IoT trials/experiments; IoT standardization activities and technology development in different standard development organizations (SDO) such as IEEE, IETF, ITU, 3GPP, ETSI, etc.

VIII. CONCLUSION

The system offers users an easy & effective means of controlling their various home appliances from a remote location i.e. without physically being present at home. The system makes use of the internet to enable remote access to the various home appliances. Home

automation refers to the use of computer and information technology to control home appliances and features (such as windows or lighting). Systems can range from simple remote control of lighting through to complex computer/micro-controller based networks with varying degrees of intelligence and automation. Home automation is adopted for reasons of ease, security and energy efficiency. Home automation can also provide a remote interface to home appliances or the automation system itself, via telephone line, wireless transmission or the internet, to provide control and monitoring via a Smartphone or web browser. Powerful microcontrollers are used as parts of most home and office appliances of today.

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AUTHOR'S PROFILE

Kshitj Singhal lisened qualification degree of B.Tech, M.Tech, P.HD with experience of 5-10 years. He is currently with M.I.T. Moradabad (U.P.), India, where He is working as a Head of Department of Electronics & Communication Engineering. He has authored 15 National journals and 30 International Journals and carry specialization in VLSI Design.



Megha Dixit is pursuing B.Tech in Electronics & Communication Engineering from Moradabad Institute of Technology, Moradabad. She is a student of 4th Year and has keen interest in communication Also Area of Interest includes Robotics, Digital Logic Design, Embedded System etc. and aspire to go in research.



Neha is pursuing B.Tech in Electronics & Communication Engineering from Moradabad Institute of Technology, Moradabad. She is a student of 4th Year and has keen interest in electronics field. Area of Interest includes Robotics, Embedded System etc. and aspire to go in research.



Paras Sharma is pursuing B.Tech in Electronics & Communication Engineering from Moradabad Institute of Technology, Moradabad. He is a student of 4th Year and has keen interest in electronics field. Also Area of Interest includes Robotics, Embedded System, Java etc. and aspire to go in research.



Rishabh Singh is pursuing B.Tech in Electronics & Communication Engineering from Moradabad Institute of Technology, Moradabad. He is a student of 4th Year and has keen interest in electronics field. Also Area of Interest includes Robotics, Embedded System etc. and aspire to go in research.



Shivani Gill is pursuing B.Tech in Electronics & Communication Engineering from Moradabad Institute of Technology, Moradabad. She is a student of 4th Year and has keen interest in electronics field. Also Area of Interest includes Robotics etc. and aspire to go in research.

