International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.06, April 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

ANALYZING AND IMPLEMENTING THE PROTOTYPE MODEL FOR SMART OFFICE USING INTERNET OF THINGS(IOT) VIA BLUETOOTH IN INTERFERRING SURROUNDINGS

Harpreet Singh[1] Meenakshi Mittal[2] ,Toshaljeet Kaur[3]

[1,3]*Research Scholar, Departmentof Computer Science and Technology,*
Central University of Punjab Bathinda (India)
[2]*Assistant Professor, Departmentof Computer Science and Technology,*
Central University of Punjab Bathinda (India)

ABSTRACT

As the technology is progressing, we are evidencing automation in almost every single field. A fully automated office is the future for upcoming generations. Everyone wants their appliances to be working on the touch of their fingers. This paper presents an answer which helps in achieving the task successfully. Though Automation requires good performance, so a network analysis of how the communication between the devices via Bluetooth technology is taking place is the mainconsideration of this paper. An open source microcontroller Arduino Uno Atmel is used with Android application and Bluetooth HC-05 Module along with temperature and Gas Sensors, the whole of which constitutes Office Automation System.

The main objective is to analyzethe performance of Bluetooth Communication and implement Smart Office System using IoT (Internet of Things)that is capable of controlling and automating most of the work place devices with the help ofeffortlessly sensible android application.

***Key Words*:Arduino Uno ATMEL Microcontroller, BTSnoop file, Packet Delivery Ratio, Packet Loss, Throughput.**

1. INTRODUCTION

With the rapid development in IOT, its applications are moving at a very fast rate. Smart Office being one of its kinds. Designing a smart office is becoming trendy and a diverse topic, how an intelligent office should be. Interconnecting various things in office making it a smart one is the new area of topic in Industries. Providing smarter environment to work in will enhance the quality of employees. In this environment, the things interact to provide qualitative and quantitative results to the employee without making him to do much effort. The sensors interact with the things to provide a smarter environment. As shown in Figure 1, every appliance is on the ease of hand of user from AC switch to the bulb in the room. This work is own to the specialized progression. This system can be connected adequately and productively in an extended dimension to fit for the necessity of modern, research and business applications. Microcontroller is the core of the device which handles all the sub

devices associated crosswise over it. Automation enables holding routine responsibilities to a smart framework and decreases the cost of human blunder.The proposed system is intended to overcome the flaws of previous system. The proposed office automation using Arduino makes the system quite interactive to provide ease in day to day life thereby improving the efficiency, flexibility reliability and saves electricity and human efforts. No Network analysis has been done regarding the communication between the devices, so an analysis of Intelligent Office is carried out to find what may be the flaws that can be seen in the system.

Fig. 1 How Smart Office should be.

2. LITERATURE REVIEW

This section gives a brief survey about the current smart office system proposed in the literature by the researchers in the past. For instance, Renuka Bhuyar and Saniya Ansari proposed the Smart Office Automation System[1]. This paper provides the algorithm for Office Automation, The ARM-II Micro controller is being used for designing the environment. It also includes Finger Module and Security Alarm which is connected to the ARM chip which in turn is programmed at certain Threshold and connectivity is done via GSM Module. At the end, results are determined. The focus of area is to reduce the consumption of power and develop an energy efficient system.

P RRodge, Jaykant Prajapati,Anup Salve and Pallavi Sangle presented the IOT Based Smart Interactive Office Automation Office [2]. This paper proposes the Office automation using Raspberry Pi 2. Implementation is done by connection of devices with Raspberry pi setup, relay, mobile app development, connection of Raspberry pi and microchip. There is an introduction of new application developed by Researchers to control the automation in office. There is a discussion of scheme to lower the system and make the system more flexible. The system reduces human effort for controlling and monitoring of the appliances as well as handling of the visitor counter.

C´ıntia B Margi A,Renan C. A Alves A, Johanna SepulvedaB presented the Sensing as a Service: Secure Wireless Sensor Network Infrastructure Sharing for the Internet of Things[3]. This paper explains the concept Internet of Things (IOT) and Wireless Sensor Networks (WSN), composed of devices capable of sensing/actuation, communication and processing. SDN based frame work is also discussed in this paper. Also, the parameters like delivery rate, delay, and control overhead are considered while examining the working of

SDN. There is a whole new concept of Post-Quantum Algorithm came into discussion. IT-SDN Performance evaluation using COOJA is done through simulation. Delivery Rate and Delay is also being calculated using COOJA.

Vijay Jadhav,Lakshman Kexplains the Office Automation & Attendance System Using IOT[4].This paper explains the different segments and innovations utilized as a part of a model framework to office automation utilizing IOT. This research paper is expected to present to us a bit nearer toward a brilliant office where all appliances and gadgets are effectively controlled and observed remotely.

Arpana S Kapare,S.A Shaikh has presented an Internet of Things: Based Office Automated Implementation System Using Android[5]. This paper explains that the internet of things intends to provide ease and safety at work. It also proposes a system which is designed to overcome the drawbacks of wired system and to improve security, flexibility, efficiency. Paper gives an idea about system which is interactive to provide ease in day to day life, also saves electricity, human efforts. A proposed system is developed to control and monitor the various electrical appliances in an office infrastructure via internet. IOT improves the quality of work and life. The system provides security and surveillances for unwanted entries, also precise and a very safe control of electronic devices by enhancing the office automation through use of IOT. The results are quite impressive and can help in developing a more friendly and interactive environment.

3. PROPOSED METHODOLOGY

The proposed system consists of Arduino Uno Atmel Microcontroller that goes about as the fundamental controller. Android application, that aids in remote communication. Commands from mobile device is passed through android application via Bluetooth Channel which is been received at the system end by the Arduinowhich in turn operates the appliances connected to it. Fig. 2 depicts the Block Diagram of Smart Office.

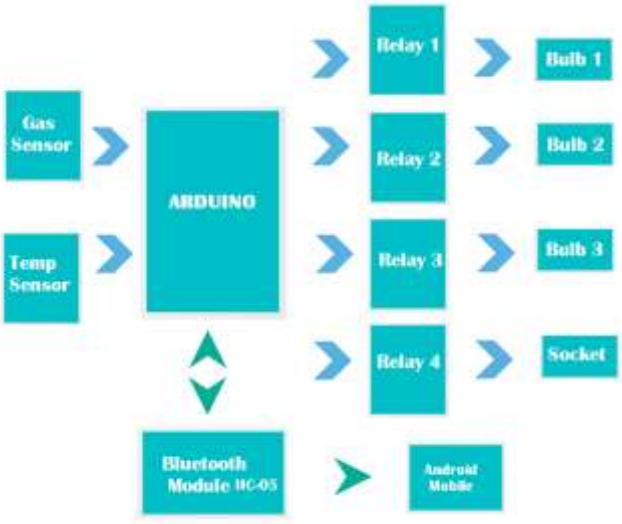

Fig. 2 Block Diagram of Smart Office

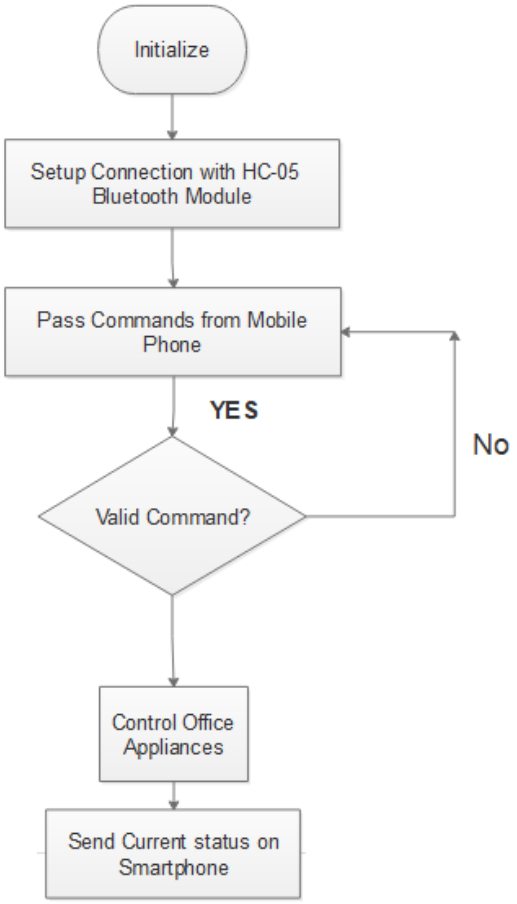

Fig. 3Flow chart of proposed office automation

HARDWARE:-

The functional parts of Office Automation are as follows-

(i) Arduino Uno Microcontroller: -The Arduino board is based on the Atmel ATmega328 datasheet. It has 6 Analog Pins (A0, A1, A2, A3, A4, and A5), 14 digital I/O Pins out of which 6 can be used as PWM Pins. EEPROM of 1Kb, a flash memory OF 32 Kb, with input voltage of 7-12V and output voltage of 5V.[6]

Fig. 4Arduino Uno Microcontroller

(ii) HC-05 Bluetooth Module: - The Bluetooth module is a master slave module.It works on a frequency of 2.4 GHz ISM Band. Power supply of +3.3VDC 50mA.

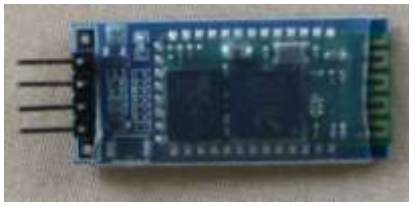

Fig. 5Bluetooth HC-05

(iii) Relay: - A relay is an operational switch which functions when electricity is passed through it.[7]

(iv) Gas Sensor REES52 MQ2: - An analog gas sensor which is used to detect the gas leakage like smoke, methane and liquefied flammable gases.

(v) Temperature DHT11: - A digital sensor which is highly calibrated and works with 8bit microcontroller. This sensor also has a high humidity resistivity component.[8]

(vi) PCB (Printed Circuit Board): - It is a board which serves as a base for the electronics sockets and components.

(vii) LED (Light-Emitting Diode):- A lead semiconductor device which emit light, a pn–junction devices which has ability to emit light, when turned on.

(viii) Demonstration Board: - A functional board to Show the smart office implementation using different color Bulbs and Socket.

SOFTWARE:-

The different Software used for analyzing and implementing the Smart Office: -

(i) Android Bluetooth Remote: - An android application which remotely connects with the HC-05 Module via Bluetooth and when commands are being passed from mobile, Arduino responds by switching appliances ON/OFF.

ASCII	OPERATIONAL COMMANDS
0	Red Lamp ON
1	Red Lamp OFF
2	Blue Lamp ON
3	Blue Lamp OFF
4	Yellow Lamp ON
5	Yellow Lamp OFF
6	15 Ampere Socket ON
7	15 Ampere Socket OFF

(ii) Wireshark: - An open source packet analyzer tool used to study the packets which are passed while communication takes place between the devices.

PACKET FILES: -

The packet file which is analyzed for Bluetooth Communication: -

BTSNOOP File: -The BTSnoop File format which stores the HCI Packets. It is stored in the form of log when communication takes places between the Bluetooth files. The snoop file is an array of octet, the packet capture file is being depicted in the fig. 6.

Fig. 6 Packet capture file (Structure)

4.RESULTS AND DISCUSSION: -

The working implementation of office implementation is depicted in fig. 7, commands are passed from mobile devices and Arduino board responds to them. Various performance metrics are considered while communication. These are: Packet Loss, Packet Delivery Ratio and Throughput.

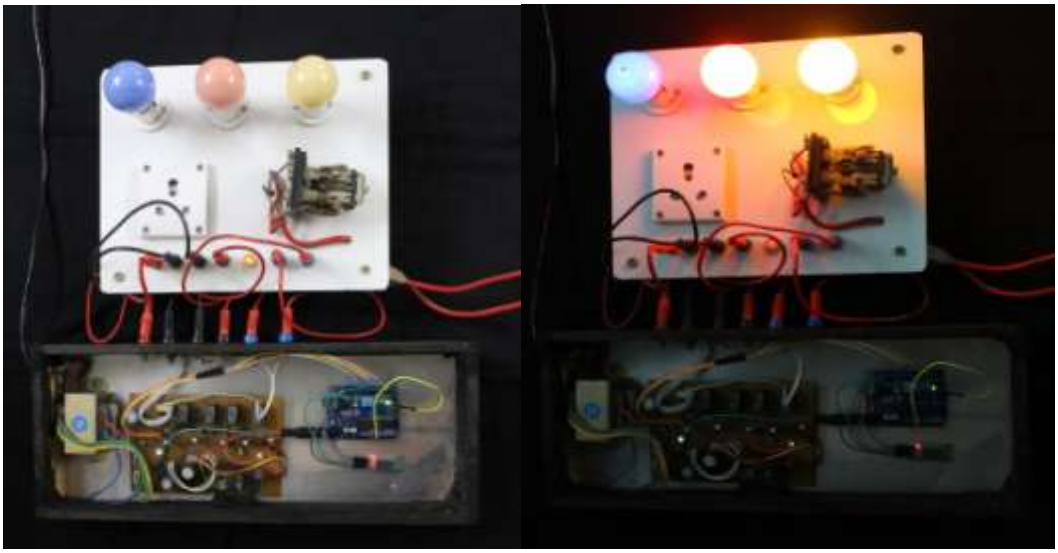

Fig 7. Working Demonstration of Office Automation

Packet Loss: Packet loss is number of packets that were failed to deliver.[9]

Packet Delivery Ratio (PDR): Packet delivery ratio it is the ratio of number of packet delivered to the designation to the total number of packet[10]

*Throughput:*Throughput: It is the number of packets received by Total Time.

Experiment was carried out in two different locations to find out the performance of office automation. One in high interfering surroundings and other in low interfering surroundings. Below are the Graphical results of two locations at three varying distances.[10]

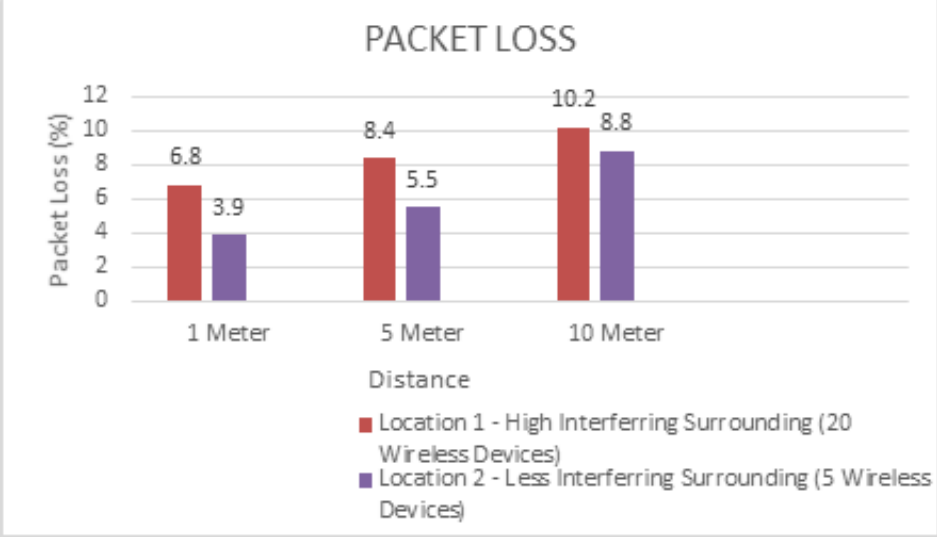

Fig .8Packet Loss

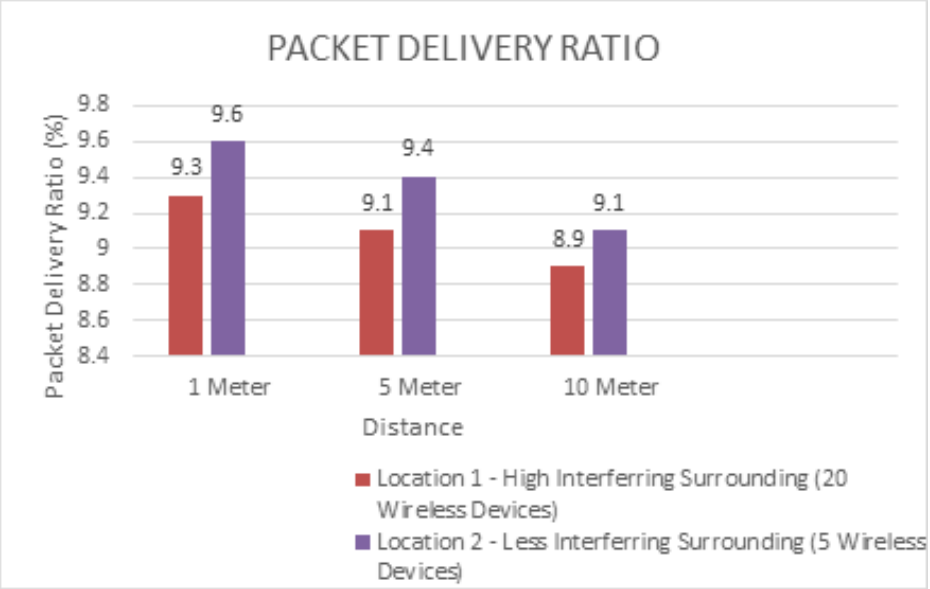

Fig .9Packet Delivery Ratio

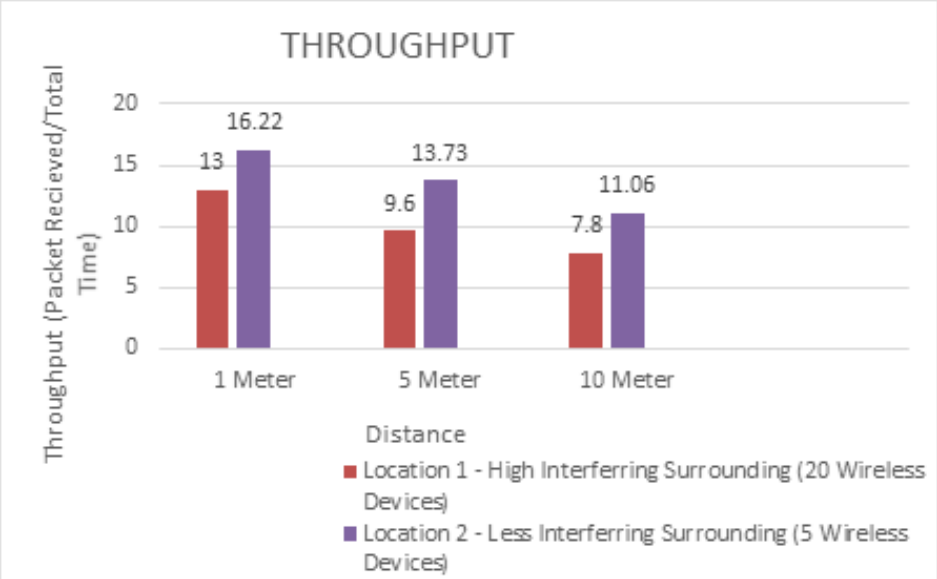

Fig .10Throughput

These kinds of results are seen due to interferences from devices using same frequency which our office automation is working on. There is a high packet loss in Location 1 where same frequency devices are quite many while in Location 2, Packet loss is less.The reason is that packet collision takes place when two or more devices transmit over a same frequency slot. Since Packet Loss is less in Location1, it experiences a high PDR value than Location 2. Similarly, throughput has an interdependent relationship with PDR, location 1 has high throughput value than the location 2.

5. CONCLUSION AND FUTURE SCOPE

The purpose of the system is to control office appliances via Bluetooth and analyze the performance while communicating with the Arduino.The system is tested successfully. Parameters like packet loss, packet delivery ratio and throughput are analyzed while communicating. There is also a discussion on different Hardware and software sections. The designed system is very helpful to reduce human efforts and thereby providing extra safety in office environment. The proposed system is user friendly and provides automation at the tip of fingers. The system is tested within 1 -10 Meters and 100% accuracy is achieved. The system is designed even to handle high wattage devices.

The current system is limited to only certain distance. The same approach can be extended to GSM and Wi-fi, where both can be analyzed separately. There can also be a comparison between different wireless technologies.

REFERENCES

[1] R. Bhuyar and S. Ansari, "Smart Office Automation System," *International Journal of Emerging Trends & Technology in Computer Science (IJETTCS)*, vol. 151, no. 3, pp. 100-105, 2016.

[2] P. R. Rodge, J. Prajapati, A. Salve and P. Sangle, "IoT Based Smart Interactive Office Automation," *International Research Journal of Engineering and Technology (IRJET)*, vol. 04, no. 04, pp. 982-986, 2017.

[3] C. B. Margi A, . R. . C. A. Alves A and J. S. B, "Sensing as a Service: Secure Wireless Sensor Network Infrastructure Sharing for the Internet of Things," *Open Journal of Internet of Things (OJIOT)*, vol. 3, no. 1, pp. 91-102, 2017.

[4] V. Jadhav and L. K, "Office Automation & Attendance System Using IoT," *International Research Journal of Engineering and Technology (IRJET)*, vol. 4, no. 7, pp. 3112-3115, 2017.

[5] A. S. Kapare and S. A. Shaikh, "Internet of Things Based Office Automated Implementation System Using Android," *International Journal Of Advanced Technology in Engineering And Science*, vol. 5, no. 4, pp. 174-178, 2017.

[6] S. H. S, S. V. S, S. R, S. J and K. K. S, "Office Automation System Using Internet of Things," *International Research Journal of Engineering and Technology (IRJET)*, vol. 04, no. 07, pp. 1619-1622, 2017.

[7] K. Selvaraj and A. Chakrapani, "Smart office Automation System for Energy Saving," *International Journal of Advances in Computer and Electronics Engineering*, vol. 2, no. 9, pp. 8-12, 2017.

[8] M. M and S. A, "Iot-Based Measuring Temperature And Humidity In The Cattle Diary," *International Journal of Recent Scientific Research*, vol. 6, no. 11, pp. 7358-7360, 2015.

[9] A. H. M. Aman, A.-H. A. Hashim, H. A. M. Ramli and S. Islam, "Packet Loss and Packet Delivery Evaluation Using Network Simulator for Multicast Enabled Network Mobility Management," *International Journal of Future Generation Communication and Networking*, vol. 10, no. 04, pp. 41-50, 2017.

[10] P. Rohal, R. Dahiya and P. Dahiya, "Study and Analysis of Throughput, Delay and Packet Delivery Ratio in MANET for Topology Based Routing Protocols (AODV, DSR and DSDV)," *International Journal For Advance Research In Engineering And Technology*, vol. 1, no. II, pp. 54-58, 2013.