*Grenze International Journal of Engineering and Technology, June Issue*

# Design of An Effective Class Management System

Aishwarya N Shet[1] and Asha S Patil[2]
[1-2]PES University, Department of Electrical and Electronics Engineering, Bengaluru, India
Email: aishwaryaraikar004@gmail.com, ashapatil@pes.edu

***Abstract*—Technology in the field of electronics is rapidly evolving, and it is changing our education system as well. By implementing these advanced technologies, an effective classroom management system can assist both teachers and students in receiving a better education. Our proposed system is primarily controlled by an Arduino and a Raspberry Pi microcontroller, and the system can take input from a locally hosted web server for various operations. The system takes text input from the server and converts it to speech output, then uses a speaker to announce it. The web server is also used for other system information such as fan and light on/off status, as well as how many people are in the classroom and a class timetable for each class, which assists students and teachers. The entire system was put to the test on our campus to ensure that it was functioning correctly. After running the system for several days, it is reasonable to conclude functions such as announcements, displaying time, and class schedules, as well as automatic fan light on/off control, are all working without error.**

***Index Terms*— Arduino, Raspberry Pi, Web Server, Microcontroller, Speaker, Display.**

## I. INTRODUCTION

The smart classroom is one of the most interesting smart education solutions, through using advanced technologies such as microcontrollers, internet of things, cloud integration, and wireless communication. The goal of this project is to modernize the classroom by incorporating new technologies that will aid students and teachers in improving their learning and teaching experiences. In all educational institutions and classrooms, the information board plays an important role in displaying data, so our proposed system replaced the old notice board with a digital one that can be controlled and displayed information using a microcontroller. We used a P10 Red Led for the display, which displays the current time and information about the next class, as well as other important information. The time is synchronized with an NTP server for proper value because RTCs are not always accurate and require manual adjustments if the battery dies. In this age of Wi-Fi and the Internet of Things, clocks should set themselves and be extremely precise.

We've also considered how much electricity is wasted in the classroom. In order to address the issue of electricity waste, the proposed system first determines the number of people in the classroom, and if no one is present, the light fan is automatically turned off. The automatic turn on/off of a load is achieved with a relay module, which is extremely precise and easy to control. An Arduino is used to trigger and control the relay. The number of people in the classroom is counted using an infrared sensor. It is placed near the door and detects when people enter and exit, lets the number of people inside the room to be tracked and calculated using a microcontroller. Also, the website contains information about how many people are in the room.

In comparison to the Arduino UNO, the Raspberry Pi is used because it is an arm-based processor that can do a lot more. With the Raspberry Pi, a locally hosted web server is created that displays a lot of information and

*Grenze ID: 01.GIJET.8.2.543*

accepts inputs. If there is an announcement for the students, the admin must log in to this website, which can accept text input and it will be automatically converted to speech output using a TTS converter, which it will then announce using the speaker.

*A. Objective*

1) The primary objective is to display real time fetched directly from the internet using an NTP client.
2) The second objective is to manage the electrical appliances in the classroom. Based on the number of people entering and leaving the classroom.
3) The third objective is to display the current time, next class information, and other critical information.
4) Announcement of information through the speaker inside the classroom.

## II. Related Work

Mrs. Tanuja Sali, Mr. Chetan Pardeshi, Mr. Vikas Malshette, Mr. Akshay Jadhav and Mr. Vishal Thombare [1] in this research Classroom Automation System, they have explained the adaption of new technologies into the classroom automation. The application of IOT (Internet of Things) within the advanced world is the center of intrigued of numerous analysts and standardization bodies since a few a long time. Computerization is an critical point which is progressively secured by distinctive on-screen characters inside the cleverly transportation systems, domestic automations field through various proposed courses of action. In this work systems based on remote operational developments, are proposed to address this situation.

Mohammad Moinul Haq, Aakash Rabbi, Mustafa Jamil and Araf [2] in this research they have come up with advanced clock which is smart sufficient to upgrade its time with the assistance of internet by getting the time from NTP servers at a standard interval and showing it.

Manjunath H Phalguni, Nagendra, Prathosh T and Raghvendra M Prasad [3]. In this paper classroom automation is done by using google assistant and by simple voice technology. The Smart classroom utilizing Raspberry pi is exceptionally basic and an successful user interface. It facilitates the user to control the device easily, because it is controlled utilizing voice.

Divyashree, Harinag Prasad, Sandeep G , Bhavya S , Poornima [4]. In this paper of IOT based notice board, advanced wireless notice board is designed, which can wirelessly send message from web browser to LCD associated to raspberry pi. A local web server is made, this might be a around the world server over net. At the Raspberry Pi, LCD is utilized to show message and flask for accepting the message over arrange. At anything point Raspberry pi gets any remote message from Web browser, it appears on the LCD.

## III. System Architecture And Description

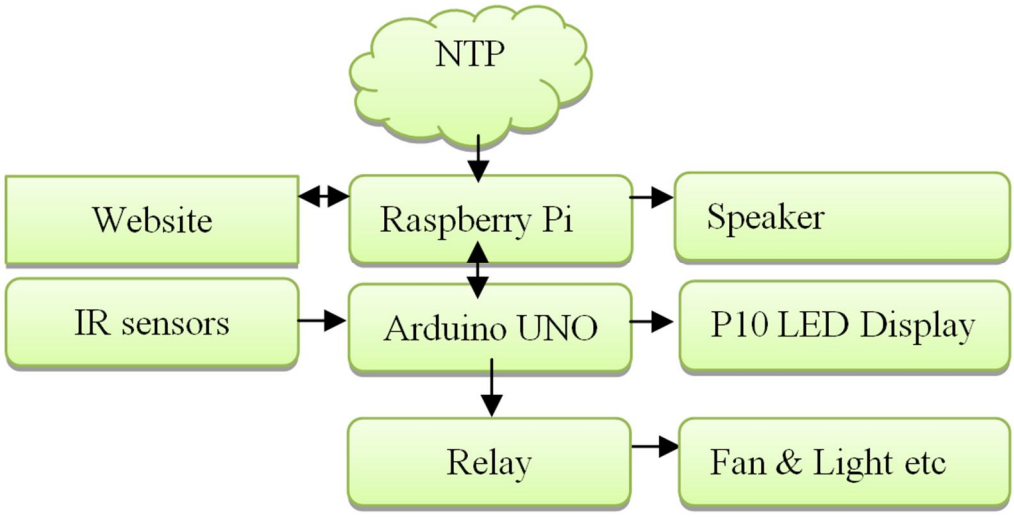


Figure 3.1. Block Diagram

The GPIO pins are used for the connection between the P10 Red LED Display, IR sensors and the Raspberry Pi 2. Speakers are connected to the Raspberry Pi using a 3.5 mm audio jack port. The proposed system consists of hardware components like speakers, a P10 Red LED display, an IR sensor, an Arduino, a Raspberry Pi, and a 5V

relay channel module. The thing within the IoT is that it can exchange and get information without any human assistance or intercession.

The Raspberry Pi has been configured to display an accurate time using NTP (Network Time Protocol) because the Raspberry Pi can update the time automatically from the global NTP servers. NTP uses the UTC as reference time. This type of clock unit does not require a manual adjustment as it keeps on updating the time using the NTP system over time and even if the Internet connection is lost or temporarily unavailable, NTP uses the measurement from the past to estimate time and corrects it autonomously. Time will be continuously displayed using a P10 LED display.

The automatic on/off of light and fans could be done, and this task will be performed by the Raspberry pi based on the number of people in the room. Whenever the person count inside the room is zero and the room is left with turned on lights and fans, it will automatically turn off the light and fan. This counting of person entry and exit is done by using two IR sensors located near the door apart from each other. Whenever the 1st IR sensor is high and the 2nd IR sensor is low, the count increases indicating a person entered the room and whenever the 1st sensor is low and the 2nd sensor is high count decreases indicating a number of the person leaving the room.

The display of the class timetable at a particular time is one of the salient features of this system. The students and respective teachers will get to know about the next class. The scheduled timetable of the class is updated in the python program with respect to time and will be displayed using P10 LED display in the classroom. Here the Arduino board is used between raspberry pi and P10 LED. Raspberry pi transfers the data to be displayed to Arduino and then the Arduino sends that data to p10 LED display. \

Its last and principal motive is to announce the data through the speaker. The information to be announced is transmitted via the internet by the customer from anywhere in the world. The Raspberry Pi 2 is permanently connected to the Display unit and receives all incoming messages from the client. The device is made up of two parts: a sender and a receiver, which is a speaker connected to the Raspberry Pi. Within the remote network, Sender is responsible for transmitting important data to the classroom. For entrance to the automated Display unit site, the client must enter the appropriate web URL, a Smartphone or personal computer can be used to access the display unit's web address. When the user gives input through the website, text input is converted to speech in raspberry pi and speaker output is received.

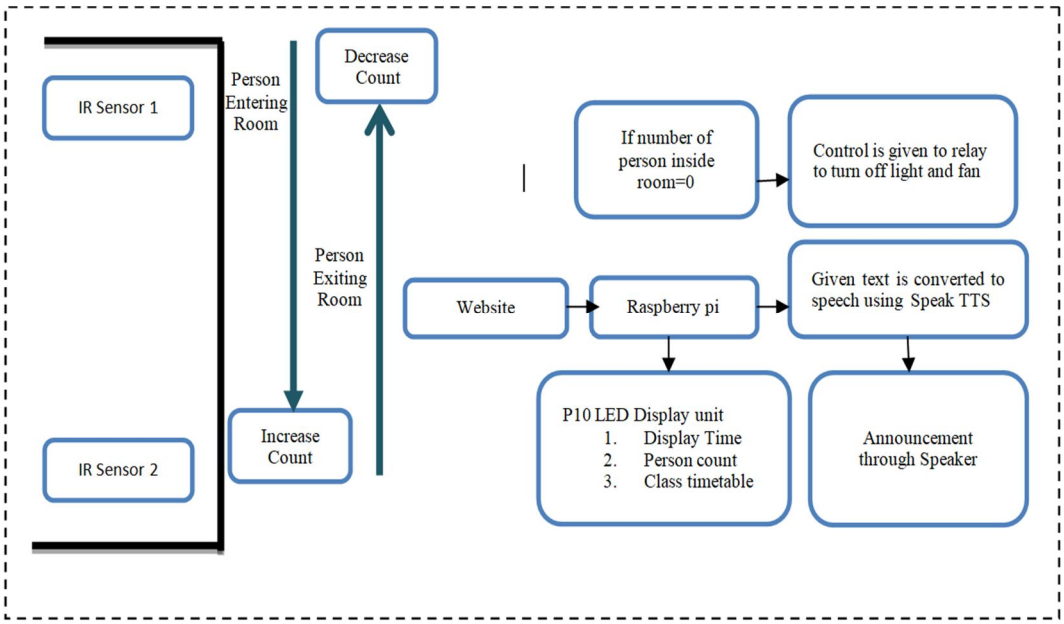


Figure 3.2. Overview of the Prototype

## IV. System Programming

Fig 4.1 represents the entire system program flow chart. The entire code is written in Arduino and python, Display unit continuously displays the time using NTP protocol, and whenever the scheduled time in the time table arrives the display unit displays the name of the next class mentioned in timetable for one minute then after that one minute display unit continuous to display the exact time. The operations on light and fans could be done and this task will be performed by Arduino, based on the number of person inside the room. Whenever the

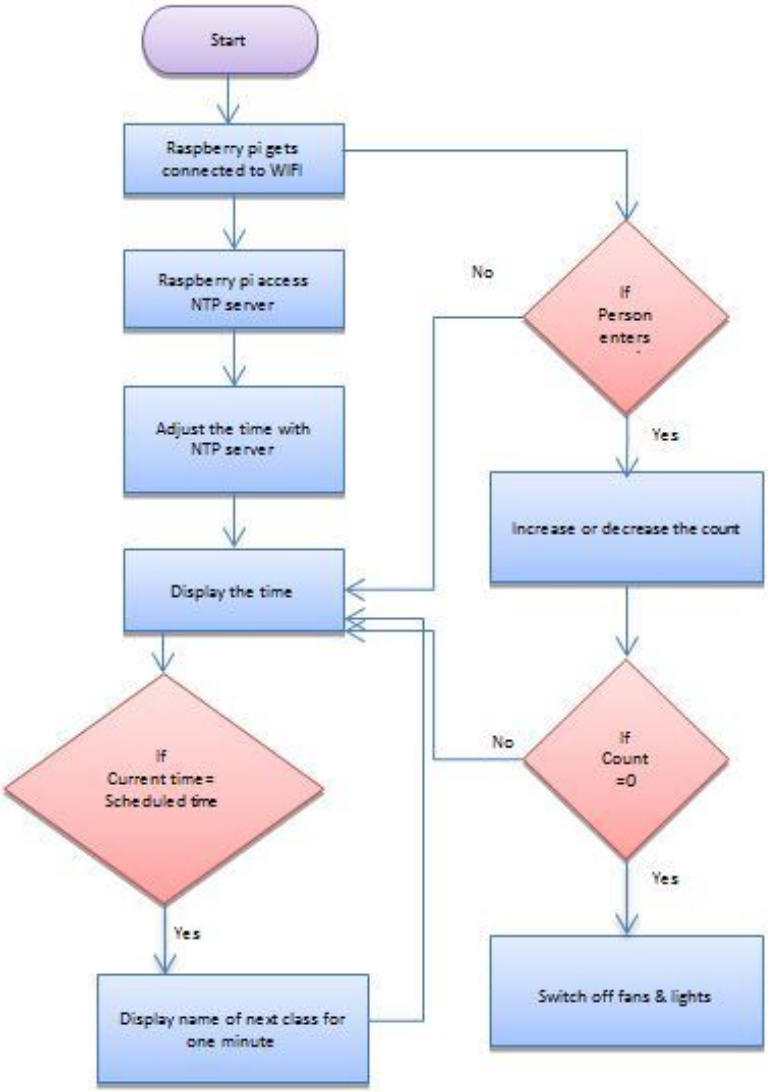


Figure 4.1. Flow Chart

person count inside the room is zero and the room is left with turned on lights and fans, it will automatically turns off the light and fan. This counting of person entry and exit is done by using two IR sensors located near the door apart from each other. Whenever the 1st IR sensor is high and 2nd IR sensor is low, count increases indicating person entered into the room and whenever the 1st sensor is low and 2nd sensor is high count decreases indicating number of person leaving the room. Fig 4.represents the program flow chart for announcement inside classroom through website. The code is written using HTML, CSS, Java Script, and python language. Whenever a user enters the website address 192.168.xx.xxx website front page is available for the user through which user can announce the information to the class through speaker. After entering into the website, user has to type the information or important issue he wants to announce in to the classroom, and click on enter button provided. User can also select the voice whether male or female voice by clicking on relevant option given and then press enter. The code of main GUI has been upgraded to control the speaker functionality, when the speak button is pressed the corresponding Java script function in the code speaker.js is invoked, this function makes ajax call and passes the written Text and Gender information to ajax_tts.php file. Now this PHP file executes the python file and the python file is responsible for converting the text to speech. In case of emergency user can also play Horn or Siren sound inside the classroom to alert the students, that option is available in the website. When the Horn or Siren button is pressed, the corresponding Java script function is called in js file, the function makes the ajax call to ajax_omx.php file and passes the path of pre-recorded files and after receiving the path information, this PHP file simply executes OMX player command to play the sound file.

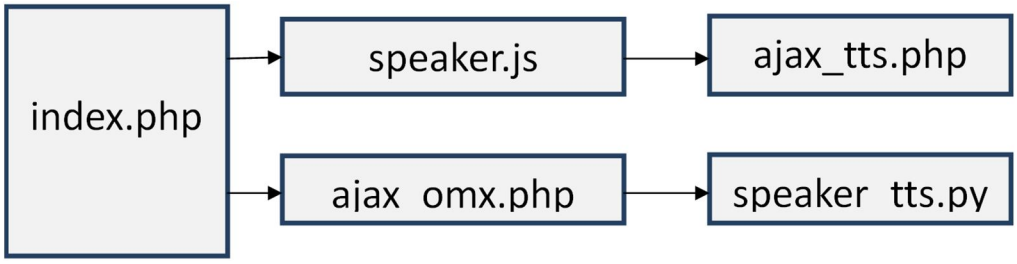


Figure 4.2 Flow Chart for Text to Speech

## V. RESULTS

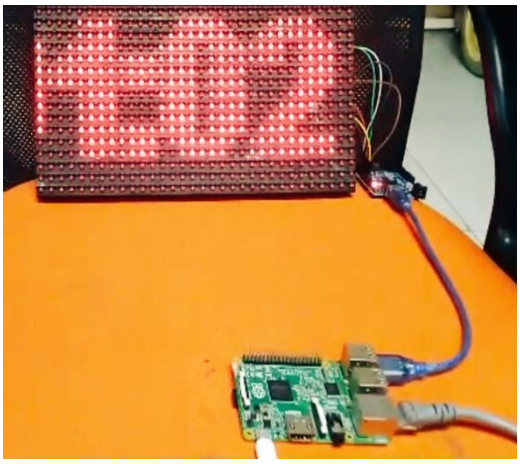

Figure 5.1.Display of Real Time

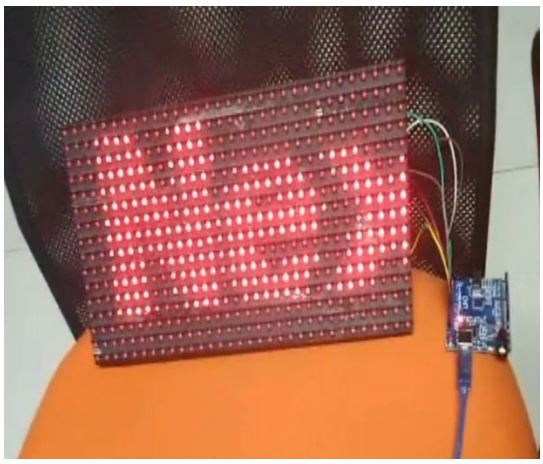

Figure 5.2.Display of Time Table

Fig 5.1 Display of real time, in this figure the very first feature that is time is continuously displayed inside the classroom by fetching the time from NTP server.
Fig 5.2 Display of time table, whenever the scheduled time arrive name of the next class being saved is displayed in the P10 LED display for some time and after that current time is displayed.

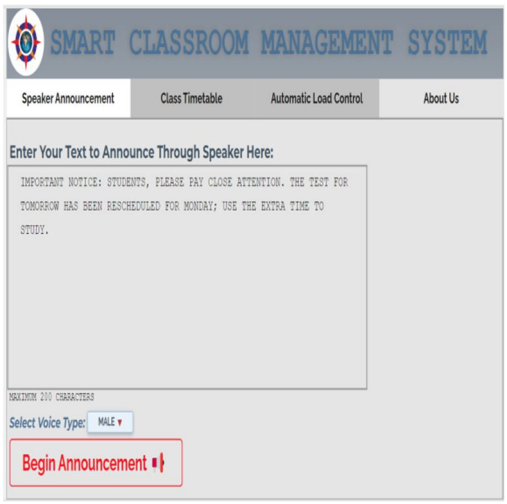


Figure 5.3.Sending Text Input Through website

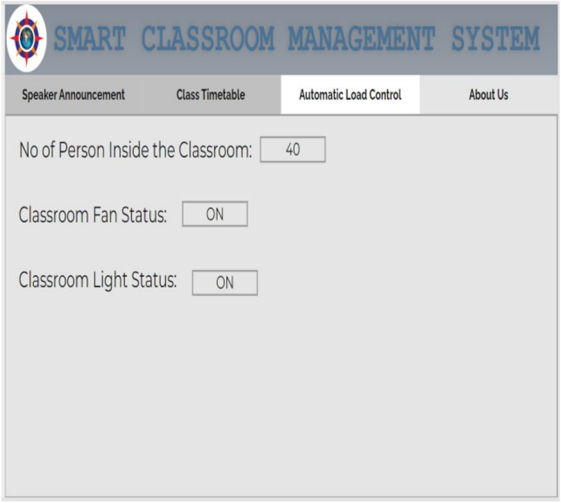


Figure 5.4.Person count and fan & light status

Fig 5.3.Sending text through website, this is the screenshot of website, by which user can make announcement to the classroom by typing the information and pressing the begin announcement button.
Fig 5.4. Represents the count of person entered inside a room and also the status of appliances such as fan and light, in this figure since count is 40, the lights and fans are kept ON, But if count is zero, Fan and lights are turned OFF and status changes to OFF.

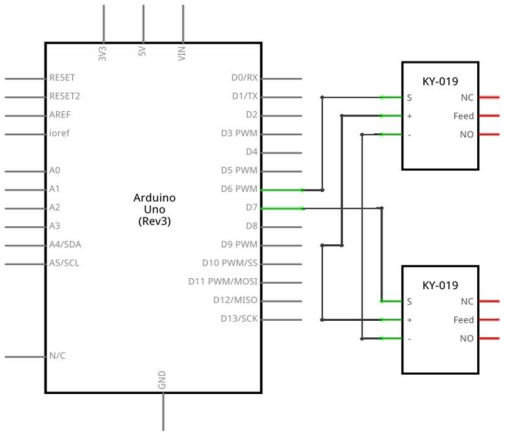


Figure 5.5.Relay & Arduino Connection

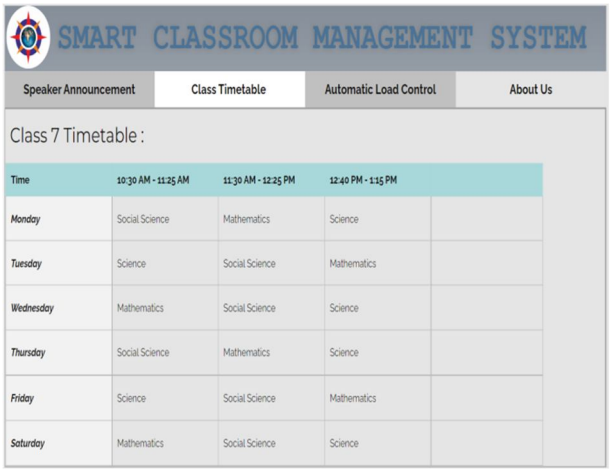


Figure 5.6.Class Timetable on Website

Fig 5.5 shows the Arduino and relay connection for a load, such as a fan light. The relay operates according to the number of people inside the classroom.
Fig 5.6 shows the class timetable that is displayed on the website.

## VI. Conclusion

In this advanced world, it is vital to implement most cutting edge digital clock and in this project traditional clock is replaced with new time display unit by using NTP method. The project focused on presenting Real Time and Date that is synchronized with an NTP server. We managed to display the number of persons entering and exiting the room, and based on that, we were able to operate the devices.
The key concept of this proposed paper is to design an efficient system that is capable of many functions, like announcing the data sent from the device used by the client. For that, the website is developed through which a user can instantaneously announce in the classroom via a speaker by using a Raspberry Pi Apache web server. By typing the message, the user gives the input and displays the scheduled timetable at the end of class. It is a dependable system that functions without error, and it can be used in a classroom.

## Future Scope

This smart classroom management system has a lot of possibility of future development. This smart system can be connected to other devices on campus to provide access to more information on a single platform. It is possible to integrate AI and machine learning for automatic attendance recording. A database for absent and present records, as well as lectures videos on the website, can be created, and many sensors for safety purposes, such as air quality and temperature, humidity, and so on, can be included.

## References

[1] Ms. Sejal V. Gawande, Dr. Prashant R. Deshmukh “Raspberry Pi Technology” International Journal of Advanced Research in Computer Science and Software Engineering ( IJARCSSE), Volume 5, Issue 4,April 2015
[2] Modi Tejal Prakash, Kureshi Noshin Ayaz, Ostwal Pratiksha Sumtilal “Digital Notice Board”, International Journal of Engineering Development and Research, Volume 5, Issue 2, 2017, ISSN: 23219939.
[3] IoT based Classroom Automation using Arduino| Volume – 2 | Issue – 2 | Jan-Feb 2018 ISSN No: 2456- 6470 www.ijtsrd.com |Volume Journal of Trend in Scientific and Development International Open Access Journal.
[4] Classroom Automation System, International Journal of Innovations in Engineering and Technology (IJIET). Volume 8 Issue 3 June 2017 27 ISSN: 2319-1058.
[5] IoT Based Real-Time Synchronized Clock.
[6] Neeraj Khera and Divya Shukla Development of simple and low cost Android based wireless notice board IEEE 2016.
[7] Aniket Pramanik, Rishikesh and Vikash Nagar GSM based Smart home and digital notice board IEEE 2016.
[8] S. Rubin Bose and J. Jasper Prem Design and Implementation of Digital Notice Board Using IoT IJRIER 2017.
[9] V.P. Patil, Onkar Hajare, Shekhar Palkhe, Burhanuddin Rangwala, “Wi-Fi Based Notification System”, The International Journal of Engineering And Science (IJES), Volume 3 ,Issue 5 ,2014.

[10] Vinod B. Jadhav, Tejas S. Nagwanshi, Yogesh P. Patil Deepak R. Patil,"Digital Notice Board Using Raspberry PI", International Research Journal of Engineering and Technology (IRJET), Volume 3, Issue5 | May2016.
[11] S. Rubin Bose and J. Jasper Prem "Design and Implementation of Digital Notice Board Using IoT" IJRIER 2017
[12] Bhumi Merai, Rohit Jain, Ruby Mishra, "Smart Notice Board", International Journal of Advanced Research in Computer and Communication Engineering Vol. 4, Issue 4, April 2015, ISSN (Online) 2278-1021.