ABSTRACT

Scrolling display board is a common sight today. Advertisement is going digital. The use of led scrolling display board at big shops, shopping centers, railway station, bus stands and educational institutes is becoming an effective mode of communication in providing information to the people. But these off-the-shelf units are somewhat inflexible in terms of updating the message instantly. If the user wants to change the message it needs to be done using a computer. It means the message cannot be changed from wherever or whenever. Also, the display board cannot be placed anywhere because of complex and delicate wiring. 'Bluetooth based LED Scrolling Display Board' is a model for displaying notices/messages at places that require real- time noticing, by sending messages through mobile. It is a system wherein the display board need not be reprogrammed to display a new message because it is wireless. The project aims to develop a moving sign board which empowers the user to change the scrolling message using Bluetooth service instantaneously unlike a desk bound device such as PC or laptop. The user can update it even from a remote distant.

Contents

LIST OF FIGURES

Chapter 1

INTRODUCTION

1.1 Introduction

Digital advertisements have become popular nowadays as shopping malls, super markets, airports use digital display boards. From every small institution to big organization, messages are displayed on digital boards. Over the last two decades the use of cell phones has been rapidly increasing. Mobile phones and the related technologies have become one of the most important things in this modern era. This drastic use of mobile phones gave the interesting idea of sending and receiving messages and the displaying them on digital board. The SMS (Short Message Service) facility in mobile handset enables us to send and receive messages all around the world by virtue of International roaming feature. The main aim of this project is to replace the conventional notice boards by wireless digital displays driven by GSM technology. The authenticated user on the sending end sends SMS (notice to be displayed on the board) using his mobile handset to the SIM card loaded in the GSM module (attached to the wireless notice board), which receives the message and passes it to the microcontroller in the Arduino Nano for storage and then displays the received SMS on the wireless digital board. The SIM card at the receiving end in the GSM module receives only those messages whose initial character is * and final is '#'. The device can be used anywhere irrespective of the place of deployment provided mobile network connectivity is available. The Internet of Things (IoT) belief system can be looked as a exceptionally unique and radically distributed networked system composed of a very large number of identifiable smart objects. These objects can convey and to interface among themselves, with end- users or different elements in the system. Entering the era of Internet of Things, the use of small, shoddy and flexible computer hardware that allow end-user programming become present. One of them, considered in this paper, is the Raspberry Pi, fully customizable and programmable small computer board. Relative investigation of its key components and exhibitions with some of current existing IoT prototype

platforms have shown that despite few disadvantages, the Raspberry Pi remains an modest PC with its effectively utilization in diverse range of research applications in IoT vision. Paper consumption is the superlative reason for forest degradation and notice is an indispensable requirement for public places, organization to get connect/ communicate with people in one way or both. Since there are many easy configurable, low power consuming wireless technologies (like Wi-Fi, Bluetooth, RF, XBEE, GSM) are available, a wireless electronic notice board system can be easily realized by using any of them replacing the need of paper notice board. Since the world is stepping towards digitization the need for wireless digital notice board is found. Wireless e-notice board is a perfect replacement of paper notice board providing easy maintenance, portability and access.

.

1.2 Existing System

There a moving message display, which can be used as the digital notice board, and also a GSM modem, which is the technology used for communication between the mobile and embedded devices. In this it can send the information by SMS and thus update the LED display accordingly. As engineer’s main aim is to make life simple with help of technology, this is one step to simplify real time noticing.

1.3 Problem Statement

Scrolling display board is a common sight today. Advertisement is going digital. The use of led scrolling display board at big shops, shopping centers, railway station, bus stands and educational institutes is becoming an effective mode of communication in providing information to the people. But these off-the-shelf units are somewhat inflexible in terms of updating the message instantly. If the user wants to change the message it needs to be done using a computer and hence the person needs to be present at the location of the display board. It means the message cannot be changed from wherever or whenever. Also, the display board cannot be placed anywhere because of complex and delicate wiring.

1.4 Objectives

This system is been developed with an objective to create wireless outdoor display board which are pretty cost effective and easy to use and portable as well as easy to setup anywhere any time.

1.5 Scope

The system can also be developed to work as real time clock by implementing some major modification, so that when the system is ideal and not displaying any message at that time the board will display TIME & DATE.

1.6 Purpose

Expensiveness of the public display systems is a major concern while developing this system and the outdoor usability as well as easy implementation. This system provides user Hassel free usage of the display board in an efficient manner.

Chapter 2

LITERATURE SURVEY

- Dharmendra Kumar Sharma and Vineet Tiwari, IEEE 2015[1] introduces a “Low cost, handheld, wireless electronic notice board” by using Atmel's ATmega32 microcontroller and different wireless technologies (Bluetooth and ZigBee) and their performance analysis based on the parameter such as range, BER (bit error rate), RSSI (Received signal strength indicator), signal attenuation and power consumption. The board receives serial information from wireless module receiver and shows it on the graphical liquid display. We have realized a common communication receiver hardware for noticeboard having compatibility with both wireless modules i.e. Bluetooth and ZigBee. We used KS0108 based 128×64 graphical LCD as display element.

- Neeraj Khera and Divya Shukla, IEEE 2016[2] has developed a simple and low cost “Android based wireless notice board”. They proposed system uses either Bluetooth or Wi-Fi based wireless serial data communication. For this purpose Android based application programs for Bluetooth and Wi-Fi communication between Android based personal digital assistant devices and remote wireless display board are used. At receiver end, a low cost microcontroller board (Arduino Uno) is programmed to receive and display messages in any of the above communication mode. Using the developed system, two different applications for displaying messages on a remote digital notice board and wireless person calling has been implemented. The developed system will therefore aims in wirelessly sharing the information with intended users and also helps in saving the time and the cost for paper and printing hardware.

- Kruthika Simha, Shreya and Chethan Kumar, IEEE 2017[4] developed a “Wireless electronic board”, which offers the flexibleness to manage data display within a given range on multiple displays. The notice board can show data being transmitted to that from a central dominant unit, employing a serial communication protocol. technology improves, efficient, financially affordable

and extremely productive output becomes an absolute necessity, and this leads us to be more inclined towards using automated control systems. Human intervention, though it offers selection, ability and interactivity, could lead on to errors, as it is a natural and inevitable results of this variability. Hence, automation of a system is an accepted means that to attenuate human error and its impact.

- M. Arun, P. Monika and G. Lavanya IJCAT 2017[6] “E-Notice board” system The Raspberry Pi2 system acts as the central server of the proposed system and also the Notice boards are accessible only by logging in with the proper credentials within the raspberry pi server. Raspberry Pi2 acts as the server for this e-Notice board system. It’s connected to internet employing a correct IP Address, so a certified user of this system can login from anyplace. Raspberry Pi is connected to the intranet network additionally. The display system in school area one will be having an Arduino board with an Ethernet Shield and a LCD Display hooked up with it. With the help of the Ethernet shield the display node is connected to the computer network. In school area two, the Arduino is connected with a Wi-Fi shield and a LCD Display and this node is also connected to the intranet through Wi-Fi. These devices will also have a valid IP address assigned towards them.

Chapter 3

REQUIREMENTS AND ANALYSIS

3.1 Requirements Specification

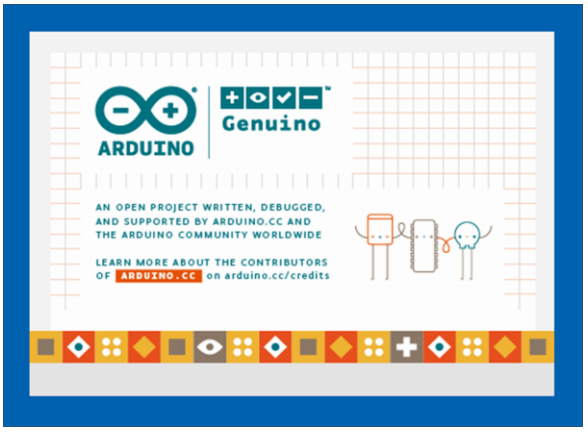
The system consists of three main parts the Arduino UNO for programming and interconnecting the system. The HC-05 Bluetooth module for receiving the messages to be displayed and the P10 Dot Matrix Display module (DMD) for displaying the received messages sent by the user via Bluetooth module.

3.2 Software and Hardware Requirements

3.3.1 Software requirements: -

Arduino IDE: -

Arduino IDE will help us to burn/upload our code into Arduino's microprocessor. Arduino code is very simple it will just print the string it receives through HC-05 module and print it on serial window of Arduino.



Android Studio: -

Bluetooth Emulator is and APK which will help user to connect to the HC-05 module and form a stable connection. After a successful connection is established user will be provided a terminal to type the required message and send it for displaying via the Bluetooth module.

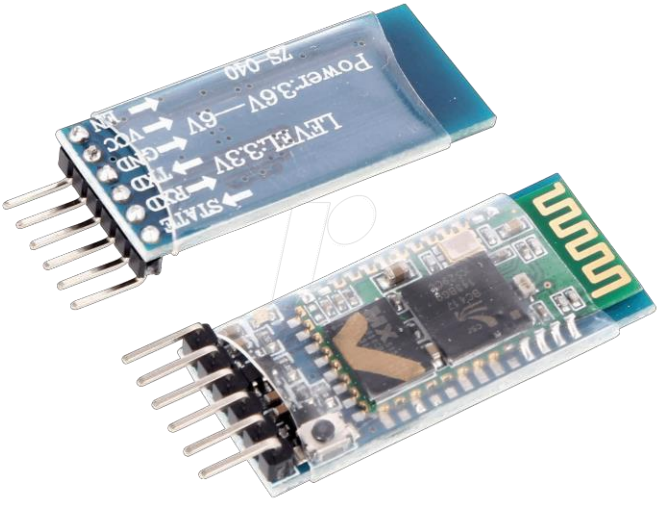
3.3.2 Hardware requirements: -

Arduino UNO: -

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.

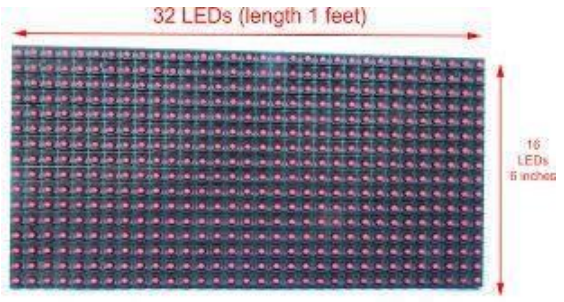
HC-05 Bluetooth Module: -

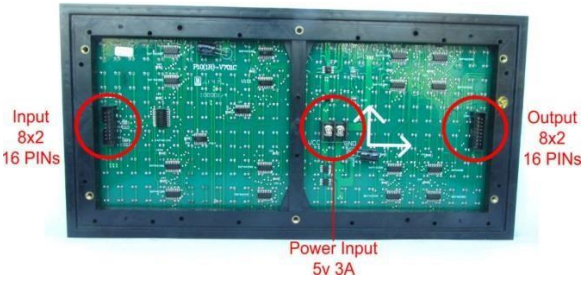
The Bluetooth module HC-05 is a MASTER/SLAVE module. By default, the factory setting is SLAVE. The Role of the module (Master or Slave) can be configured only by AT COMMANDS. The slave modules cannot initiate a connection to another Bluetooth device, but can accept connections. Master module can initiate a connection to other devices.



DMD P10

P10 32x16 (Total 512 LEDs) LED Display module is the easiest way to put together any size of Outdoor or Indoor LED display sign board. This panel is having total 512 high brightness Red led's mounted on a high quality plastic housing designed for best display results. Any number of such panels can be combined in different fashions in order to realize LED sign board/ Graphics Board of any size.





Chapter 4

SYSTEM DESIGN

4.1 Circuit Diagram

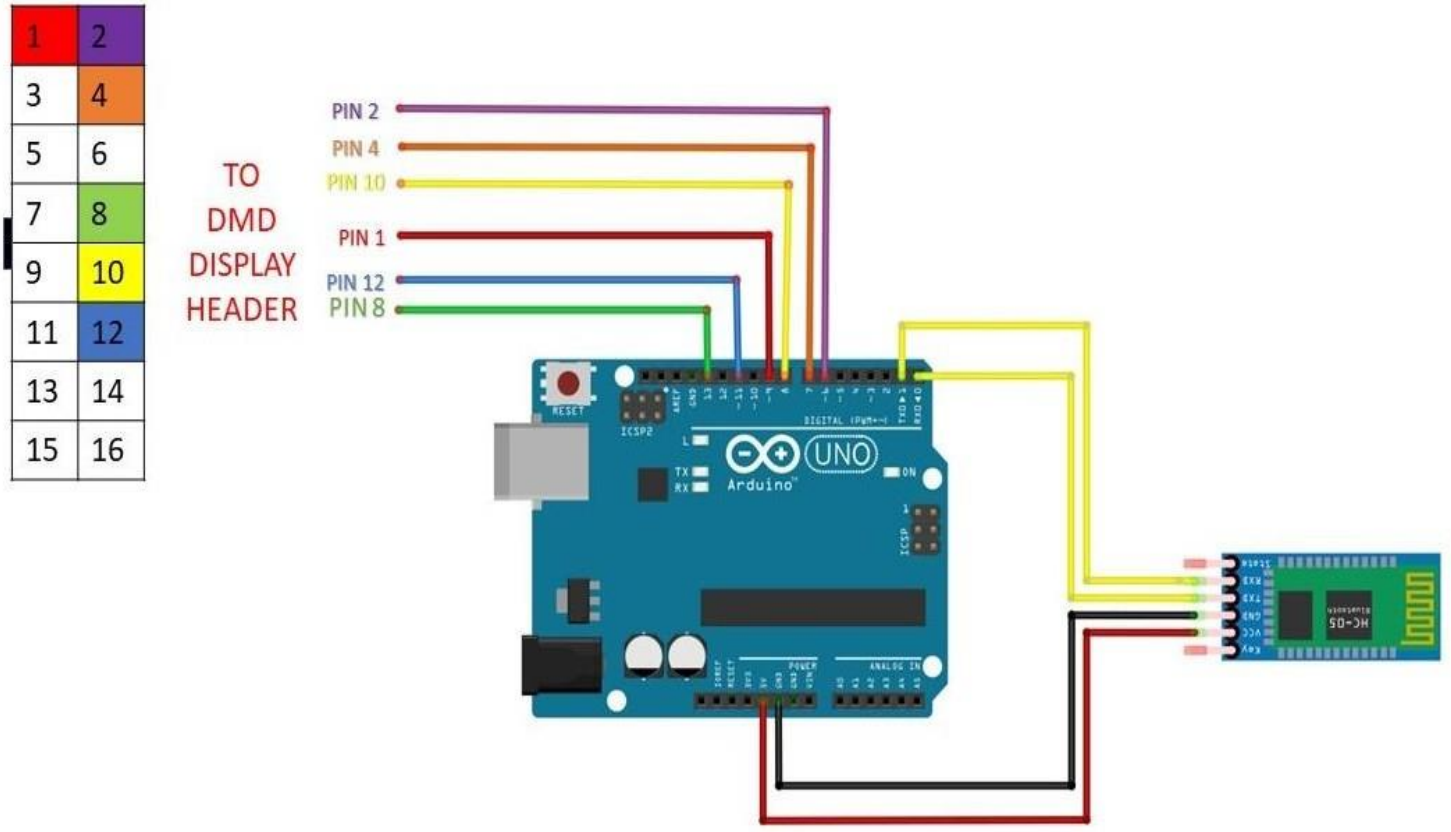


Fig 4.1.1: - Circuit Diagram of Entire Interconnected System

4.2 User interface design

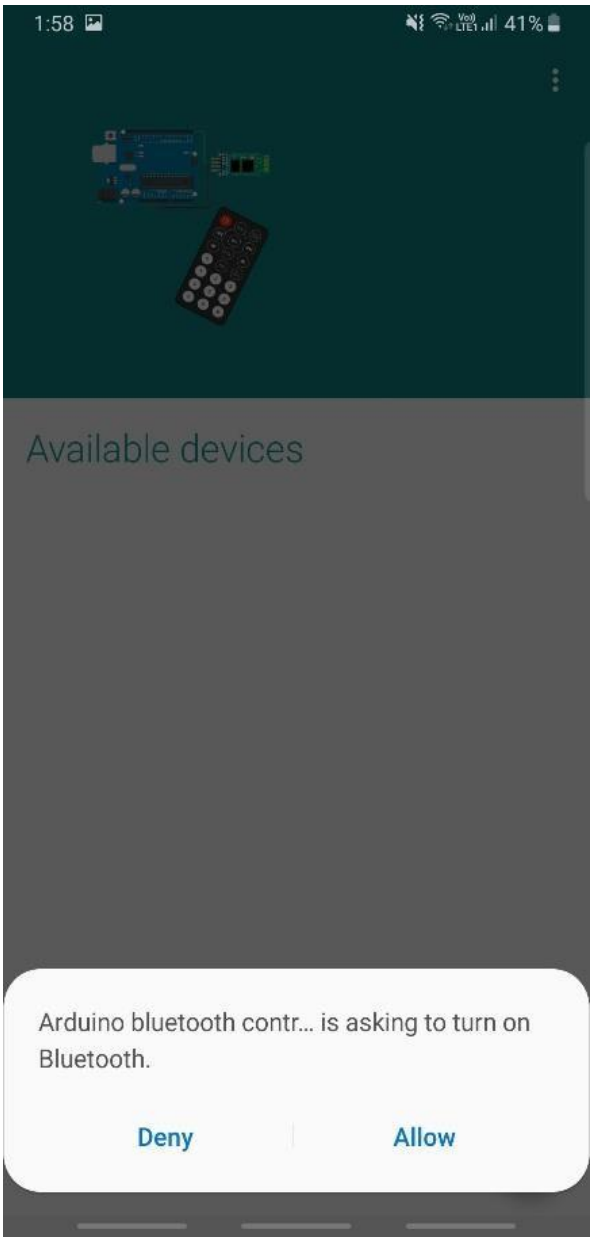


Fig 4.2.1: - Turn on Bluetooth

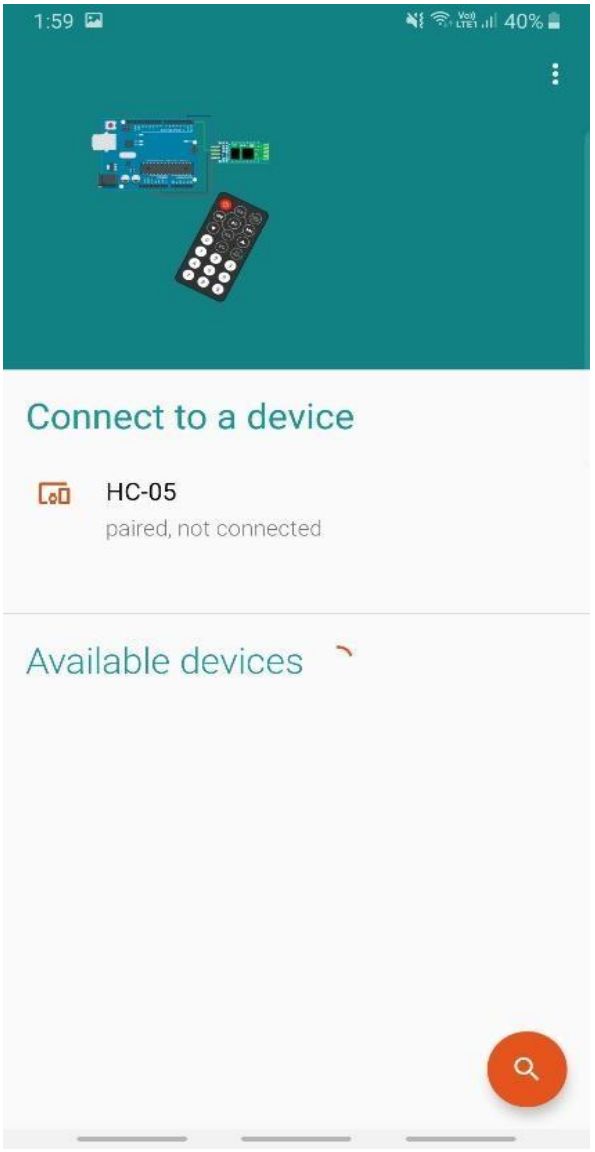


Fig 4.2.2: - List of available Bluetooth devices

Fig 4.2.3:- Message which is sent via terminal window

4.3 Hardware Implementation

HC 05/06 works on serial communication. The Android app is designed to send serial data to the Arduino Bluetooth module when the message is typed and sended on the app. The Arduino Bluetooth module at the other end receives the data and sends it to the Arduino through the TX pin of the Bluetooth module (connected to RX pin of Arduino).

4.3.1 Bluetooth Connection: -

Connect the TX of the Bluetooth module to the RX (D0) pin of the Arduino and RX of Bluetooth module to TX (D1) of Arduino UNO.

You can also change the Password and Name of the Bluetooth module using AT command to change the password and name connect TX of Bt. module to TX of UNO and RX to RX and Open Arduino IDE and open Serial monitor Type AT command. You can find all AT command of HC-05 Module on internet “search for 'AT command of HC-05' on google" It unable to upload the program while Bluetooth is connected to the Arduino.

4.3.2 Circuit: -

Connect the DMD pins as shown in the circuit diagram and connect the Vcc and GND of the panel using wires.

P10 DMD PINS	ARDUINO PORT
OE	D9
A	D6
B	D7
C	NO CONNECTION
CLK	D13
SCLK	D8
R	D11
GND	GND OF ARDUINO

Chose the board type and serial port and click upload...after uploading the sketch connect the Bluetooth module and you are ready to send message using smartphone.

4.4 Software Implementation

Arduino IDE is used to program, compile and upload the program on to the flash memory of the Arduino board.

Upload the Program

Before uploading sketch to Arduino disconnect the Bluetooth module from Arduino to avoid compiling error. Download the zip file which contents Timer One and DMD library and the Arduino Sketch, and extract the zip file. Copy the libraries to the library folder of Arduino and open the Arduino sketch. You can change the max characters length and message on the program as your requirement.

Installing App and Connecting Power Supply

Now connect the 5-volt DC power supply to LED panel and power it on if it is working perfectly. Then install the Bluetooth control app. Open and connect with Bluetooth module and you are ready to send message.

Chapter 5

SIMULATION

5.1 Cup Carbon

CupCarbon is a Smart City and Internet of Things Wireless Sensor Network (SCI-WSN) simulator. Its objective is to design, visualize, debug and validate distributed algorithms for monitoring, environmental data collection, etc., and to create environmental scenarios such as fires, gas, mobiles, and generally within educational and scientific projects. Not only it can help to visually explain the basic concepts of sensor networks and how they work; it may also support scientists to test their wireless topologies, protocols, etc. CupCarbon offers two simulation environments. The first simulation environment enables the design of mobility scenarios and the generation of natural events such as fires and gas as well as the simulation of mobiles such as vehicles and flying objects (e.g. UAVs, insects, etc.). The second simulation environment represents a discrete event simulation of wireless sensor networks which takes into account the scenario designed on the basis of the first environment. Networks can be designed and prototyped by an ergonomic and easy to use interface using the OpenStreetMap (OSM) framework to deploy sensors directly on the map. It includes a script called SenScript, which allows to program and to configure each sensor node individually. From this script, it is also possible to generate codes for hardware platforms such as Arduino/XBee. This part is not fully implemented in CupCarbon, it allows to generate codes for simple networks and algorithms. CupCarbon simulation is based on the application layer of the nodes. This makes it a real complement to existing simulators. It does not simulate all protocol layers due to the complex nature of urban networks which need to incorporate other complex and resource consuming information such as buildings, roads, mobility, signals, etc.

5.2 Simulation

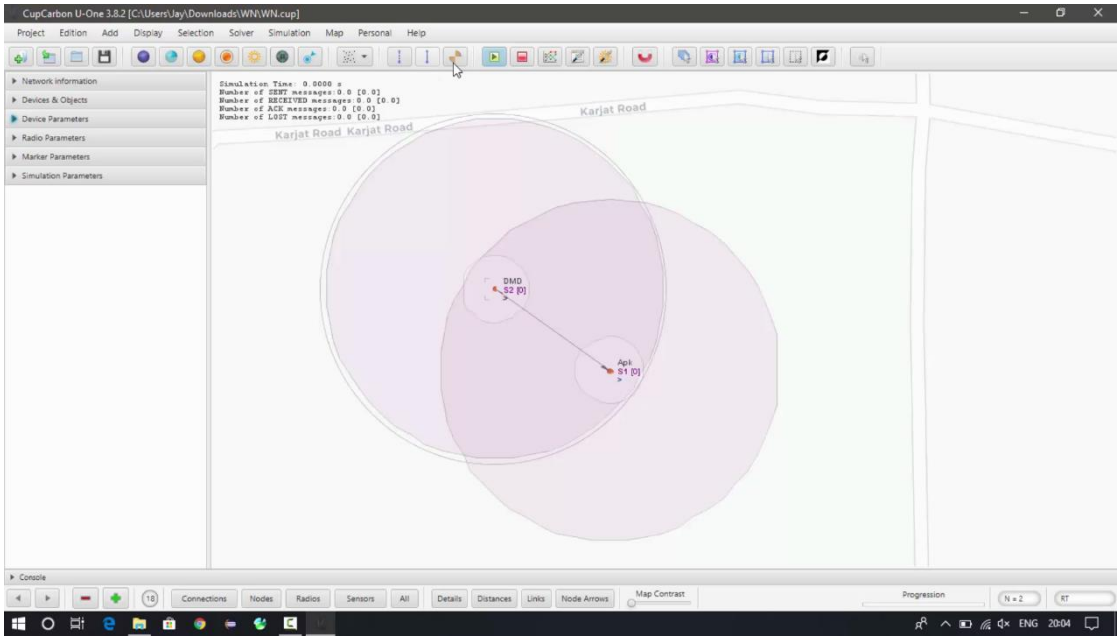


Fig 5.2.1:- Add two sensor nodes on the map.

Add two sensor nodes on the map. Write the SenScript of the transmitter which is apk for sensor node 1 and receiver which is dmd for sensor node 2. Then assign the SenScript file to the sensor nodes.

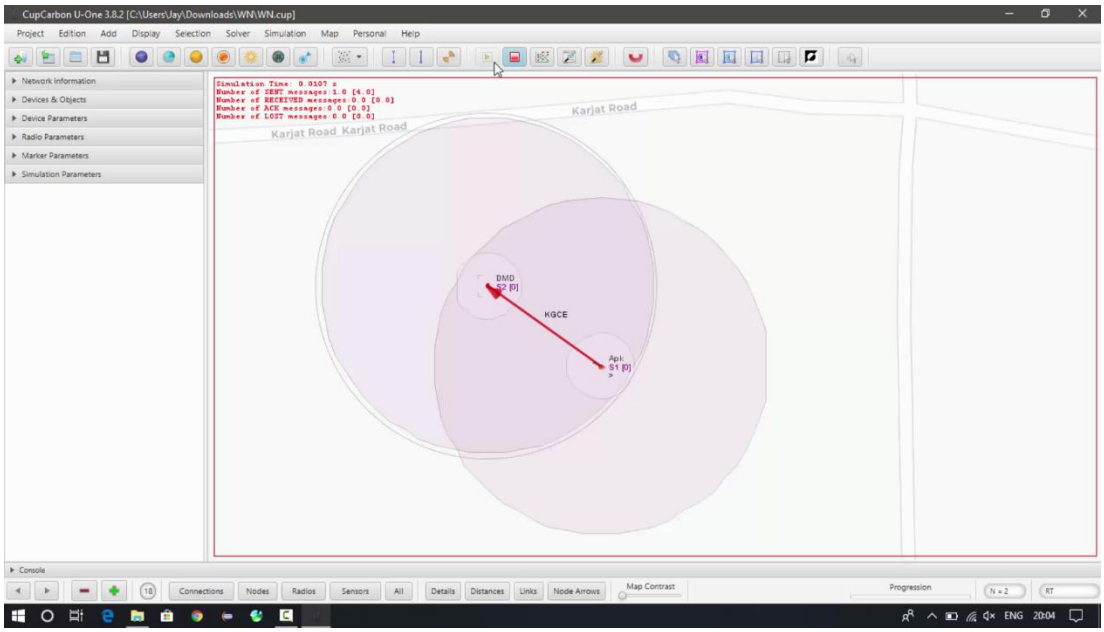


Fig 5.2.2: - Run the simulation.

Run the simulation by just clicking on Run Simulation button.

The red arrow shows the sent message and the value on the middle of the arrow represents the actual message.

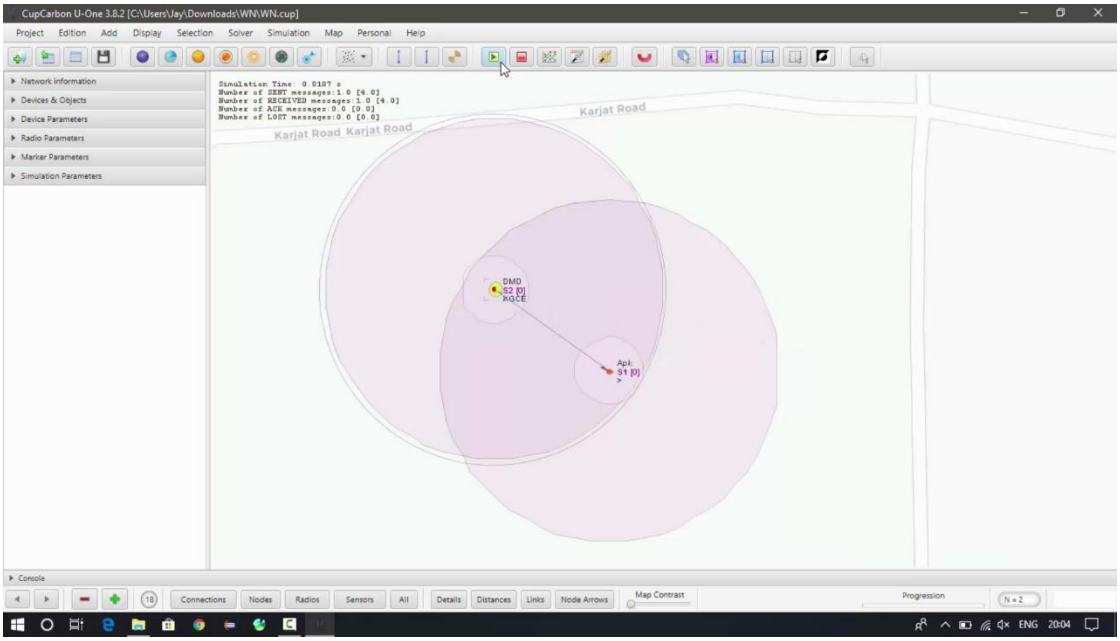


Fig 5.2.3:- Message send successfully.

After transmitting message from first sensor node (apk). It will received by another second sensor node (dmd). Then futher message display which is received by second node.

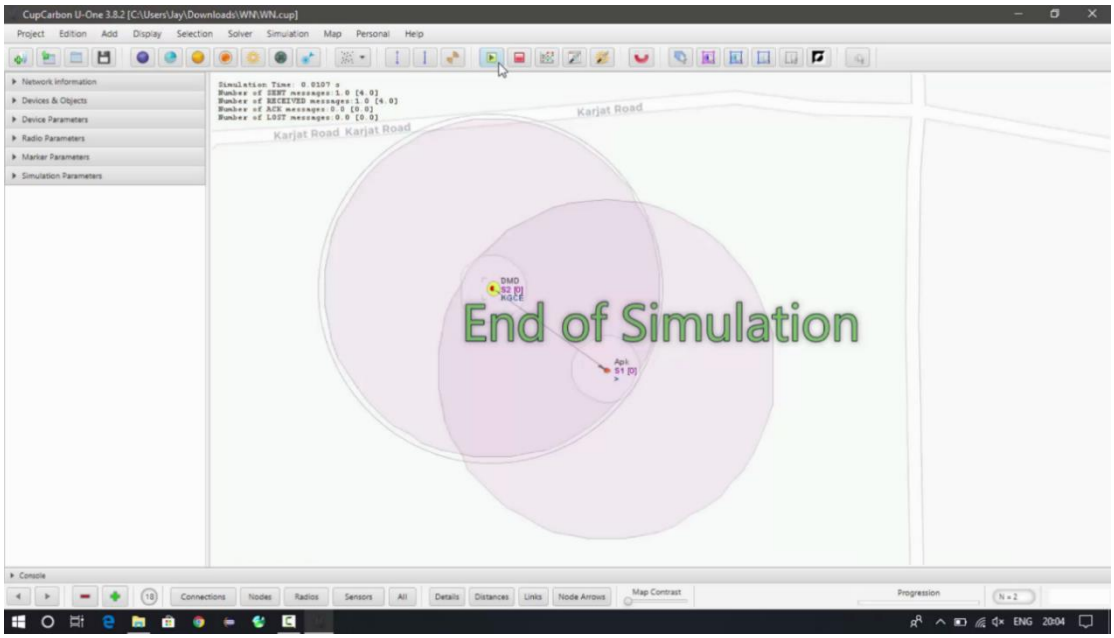


Fig 5.2.4:- End of simulation

The message received by second senor node (dmd) is display continuously until next message will received.

Sensor node that will send message to another sensor node. The receiver will be marked if it receives message and display it.

Step 1. Create a new project: this can be done either by clicking on the “New project” icon of the toolbar or on the menu Project à new project.

Step 2. Add two sensor nodes on the map: click either on the Add Sensor icon of the toolbar or from the menu bar (Add à Add Sensor Node). Then, click on the map where you want to add the sensor nodes so that they can communicate (i.e., There exists a link between the two sensor nodes).

Step 3. Write the SenScript of the transmitter which is apk (sensor node 1): The SenScript of the transmitter can be obtained directly from the SenScript window by clicking on the menu button Transmitter, which must be completed by adding the id of the receiver in the command send. Save the file with the name apk.

Step 4. Write the SenScript of the receiver which is dmd (sensor node 2): The SenScript of the receiver can be obtained directly from the SenScript window by clicking on the menu button. Save the file with the name dmd.

Step 5. Assign the SenScript file to the sensor nodes: Select the sensor node 1 on the map (1). Go to Device Parameters in the left part of the main window (2). Then, select the apk.csc file in the field Script file (3). And then, click on the apply button just in the right (4). Do the same procedure for the second sensor node by choosing the SenScript file dmd.csc. After doing this, the center of each sensor node will be colored in orange and the name of the assigned SenScript file will be displayed on the sensor node in gray color.

Step 6. Configure the simulation parameters: To visualize the result of the simulation, the arrows correspond to the send messages.

Step 7. Run the simulation: Just click on Run Simulation button.
The red arrow shows the sent messages. The value in the middle of the arrow represents the sent message.

Chapter 6

RESULT

6.1 Working

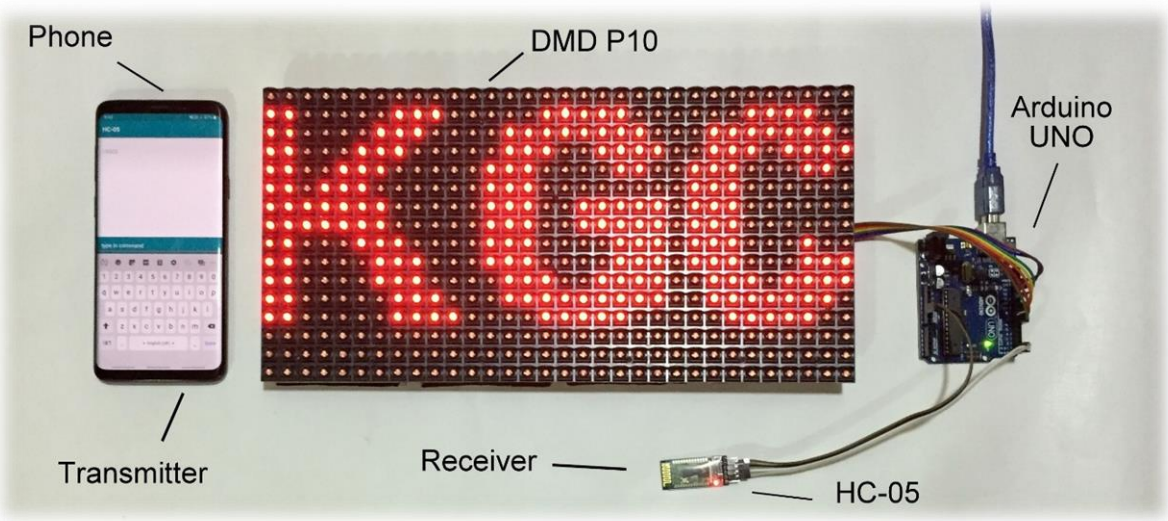


Fig 6.1.1 :- Actual System

Turn on the bluetooth on smartphone and search for “HC-05” connection. Than connect to the HC-05 connection and start the bluetooth terminal app. Wait for the P10 module to display INITALIZATION SUCCESSFUL message to display. Once the P10 is ready than enter the required message on to the terminal and send. They Bluetooth module will receive the message and process it in the Arduino UNO and transfer it to the P10 module to display.

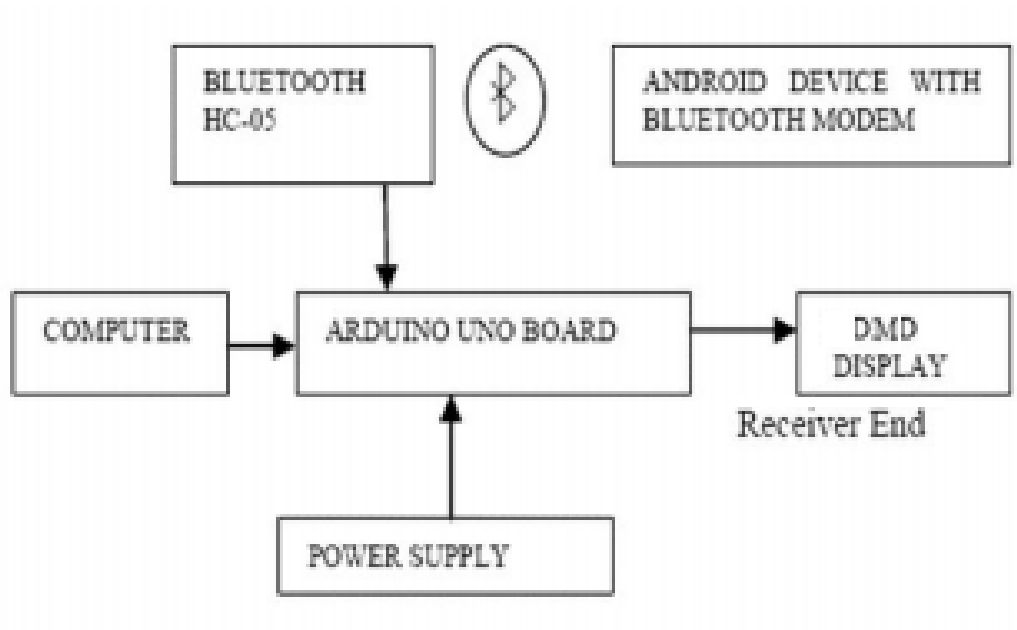


Fig 6.1.2 :- Block diagram of system connection

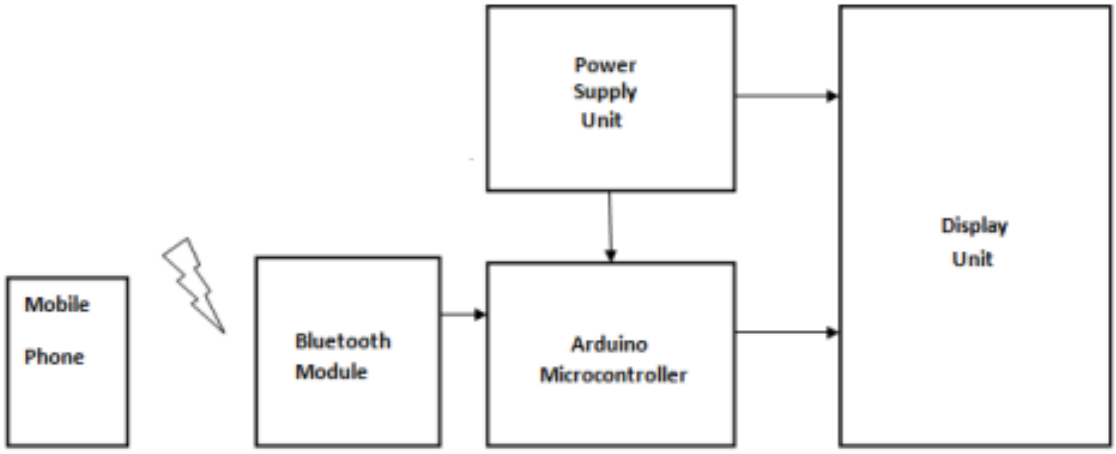


Fig 6.1.3 :- System architecture of wireless display system

6.2 Flow Chart

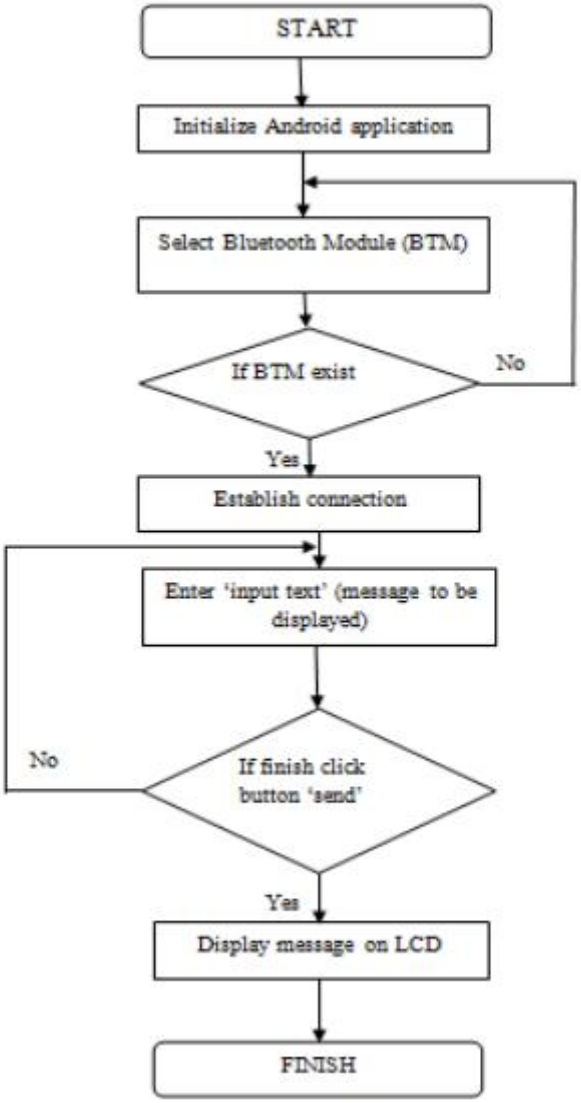


Fig 6.2 :- Flow chart of wireless display system

6.3 Result

When the entire system was connected and tested, it functioned as designed without any noticeable problems. The Bluetooth module responded to commands being sent from the android application appropriately and in a timely manner, it was able to display the information as shown in Figure 6.1.1. The system displayed 100 characters on the DMD within the range of 10m as designated by the Bluetooth datasheet.

A Bluetooth based message display system was carefully designed and implemented in this work. The design proved to be efficient and cost-effective. After successful implementation, messages sent from an android mobile phone via the mobile application were received by the Bluetooth module and consequently, the messages were instantly displayed on the LDC display. The design was implemented via a wireless network which eliminates both the unnecessary wired connections and the task of manual reprogramming of the microcontroller whenever a new message has to be displayed.

6.4 Conclusion

Now a days every advertisement is going to be digital. The big shops and shopping centers are using the digital moving displays now. In Railway station and bus stands everything from ticket information to platform number etc. is displayed on digital moving displays. But in these displays if they want to change the message they have to go to the place of the display and connect the display to PC or laptop. Suppose the same message is to be displayed in main centers of cities to display critical messages then we have to go there with a laptop and change the message by connecting it to the display board. This project can be used mainly to display something crucial within a matter of seconds. So, keeping this in mind we are designing a new display system which we can access remotely, thus utilizing Bluetooth technology.

This project is a remote notice board with modem connected to it, so if the user wants to display some messages, he will send the messages in SMS format. The modem in the display system will receive the message and update the display according to the message. For every message received, the system will check for the source number and if the source number is correct the controller will display the message. The outcome of this project is an embedded system providing wireless transmission from one point to the other via a Bluetooth network. This system not only eliminates the shortcomings of the previous methods used to inform the masses but also is a reliable and fast medium for data transmission. Apart from the wide applications already mentioned, it has wide scope for further enhancements in the field of embedded systems where telecommunication is a vital part of the system and there by holds the power to change the face of present communication systems.

6.5 Limitations of the System

Display unit must have the network to receive the message wirelessly. As the Bluetooth module has a limited range of 9 mtr. The user needs to be within that range to send any message to be displayed. Android application is required for sending the message