Smart LED Car Back Display

Mukul Taneja[1] Sajal Pandey[2] Rajat Negi[3] Prof. Chetan More[4]
[4]Assistant Professor
[1,2,3,4]Bharati Vidyapeeth College of Engineering, India

Abstract— The objective of this project was to develop a display board for conveying of messages between the two drivers of car. The succeeding driver is provided with the option of passing any message to the preceding driver through our device. Our device would be mounted on the rear windshield of the car and can be operated wirelessly through the use of android phone. The user is allowed to give input in text format or voice format whichever he may like. It will also prevent accidents up to a huge amount in the foggy weather or rainy season as we have used red LEDs in the display board which make them visible from a very far distance due to their large wavelength. The message could be easily interpreted by the target's eye due to the loud visibility offered by our device. The device could also be used in the notice sections of many institutions, stores, shops etc for the wide range of applicability it provides.

Keywords: Smart LED, Car Back Display

I. INTRODUCTION

In this project we are proposing a display board which is to be installed in the rear windshield of the car via a specifically designed frame .The display board must be capable of displaying numeric, alphabetical, as well as alphanumeric characters .The display would be a rolling display so there is no limit to length of the character string we give into the input.

The main idea behind this is to establish a medium of communication between the two drivers while driving and with minimum effort as the communication is limited to indicators only. This is extremely important and will revolutionize the driving methods around the world as it will enable the drivers to effectively express themselves and prevent many road related ill-incidents.

The input can be given through an android mobile which will have our specific designed APK pre-installed. The android application will provide us with two input formats either voice or text. The input will be sent to the Arduino nano which will be interfaced with the LED matrix. The connection between the Arduino and android phone would be wireless and Bluetooth operated.

The display board can also be used as a notice board for many commercial purposes as everything is getting digitised nowadays so in order to display the rates of various items in shops and changing the notice any time, we want in real time according to our needs.

The device can also be used for lane changing purposes or taking U-turns in multi-lane highways or roads. It will prove to be of extreme importance in foggy weather and rainy season the display board consist of 16 x 8 red LED panel. And as the colour of LEDs is red it will make it visible through a large distance very clearly.

II. LITERATURE SURVEY

"Android-based Voice Activated Dot Matrix Display" by Satis Vatumalai and A.Oudah. This was a very similar research done as compared to our research. The most common problem associated with LED displays arises from reprogramming it. Most of off-the-shelf ones are somewhat inflexible in terms of updating the message instantly as well as having to re-update messages periodically through wired connection where the user is required to use a computer to change the displayed messages. In this article, an Android operating system-controlled wireless dictated dot matrix display is designed and implemented. The proposed display eliminates the need to have a wired connection and requires only a smart phone to reprogram it.

"Voice Controlled L.E.D Matrix Display" by P.R Naregalkar, Chirag Nangia,Arun Kumar, Apoorv Raj.Speech is the most effective medium for communication among human beings. Without speech, it's very difficult to communicate with each other. For differently abled people who are unable to hear properly it becomes a challenging task for proper communication. This project aims to develop a system that is able to display speech onto a led matrix display screen. This system would be able to convert the speech of a person sent wirelessly via a mobile to the PIC microcontroller and display it on the 7x35 LED MATRIX display.

"Smart Rolling LED Display using Arduino and Bluetooth" by Deeptanuprasad Chakraborty ,Shubham Yadav, Sonal Rathore,Sunil Kumar,Ruchita Aggarwal,Pallavi Chandrakar.This paper presents the overall design of "Smart rolling LED Display using Arduino and Bluetooth" with low cost and user can access multiple applications. If anyone wants to display the message they can send message through using android Bluetooth by using this project. This project deals with advanced wireless Arduino development board. The main objective of this project is to design a wireless board that displays messages sent from android phone user using Bluetooth. The main controlling device of the whole system is Arduino. Matrix LED Display module, Bluetooth module are interfaced to Arduino and android development tool with APK application

III. DESCRIPTION

A. Interfacing

Firstly, an android application was created, this application contained a section for text input as well as separate section for voice input. Certain distinct input buttons are provided in the app. After that the Bluetooth module is interfaced with the android application and the Arduino nano. Arduino nano is programmed in such a way to take inputs from the Bluetooth module and process as per the requirement. Arduino IDE is used in order to program the Arduino The Arduino nano is further interfaced with LED matrix and operated as per the input.

B. Working

The project works in three stages as follows:

1) Transmission:

In the first stage, the message is sent from the Android phone to the Bluetooth receiver in the form of text or voice.
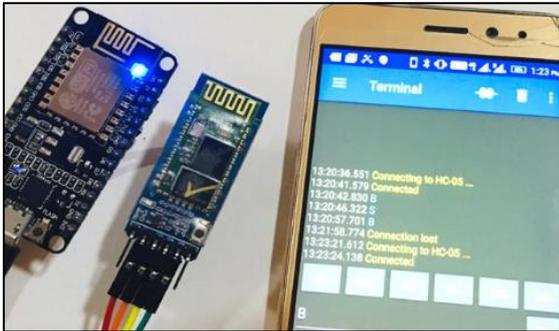

Fig. 1: Interfacing Android device with Bluetooth Module

2) Reception:

In the second stage the Bluetooth receiver receives the message from the Android device in the form of ASCII codes. It forwards the message to the Arduino Nano.
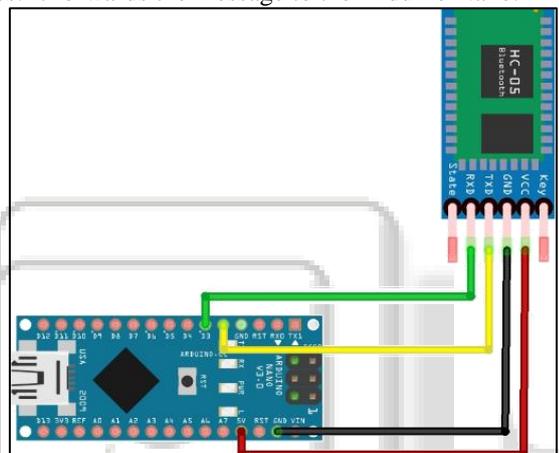

Fig. 2: Interfacing Bluetooth Module with Arduino

3) Display:

In the third and last stage the message from the Arduino is received by the LED matrix module which displays the message.
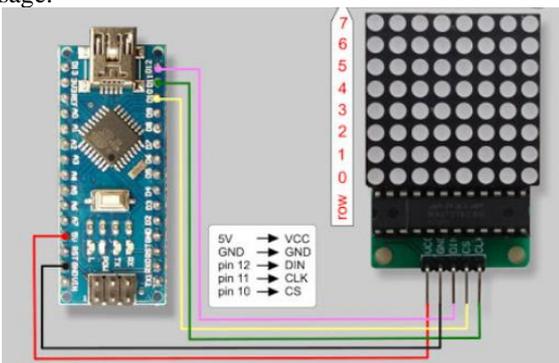
Fig. 3: Interfacing LED Matrix with Arduino

C. Hardware

The following hardware components were used in building the project:

1) Arduino Nano:

Arduino Nano is a microcontroller based on the ATmega 328p. It has inbuilt libraries for controlling electronic devices.
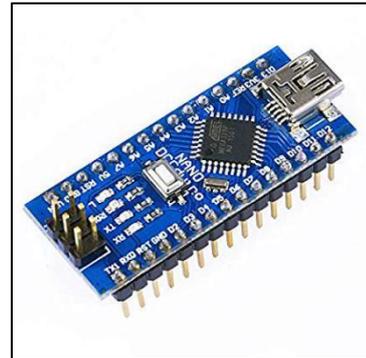

Fig. 4: Arduino Nano

Bluetooth Module (HC-05): HC-05 is used to establish a full duplex connection between the Android device and Arduino Nano. It as a range of less than 100m and follows the IEEE 802.15.1 protocol. It uses Frequency Hopping Spread Spectrum and can be operated in Master, Slave or Master/Slave mode.
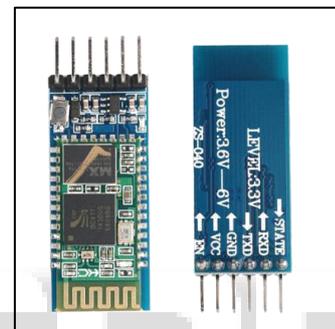

Fig. 5: Bluetooth Module (HC-05)

16x8 LED Matrix Module: It is a two-dimensional arrangement of LEDs in order to display information. The matrix used in this project can be used to display alphanumeric characters. Pre-wired modules are available where 8x8 LED matrix is wired with MAX 7219 IC.
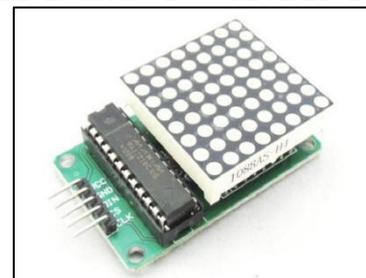

Fig. 6: LED Matrix Module

Power Supply: The power supply is provided by a 12V, 5A adapter which transforms 230V AC to 12V DC.

Fig. 7: Power Supply

D. Software

The following software technologies were used in building the project:

1) MIT app inventor:

It is a free and open-sourced IDE which allows us to create Android applications. It was started by Google and is now maintained by MIT(USA).
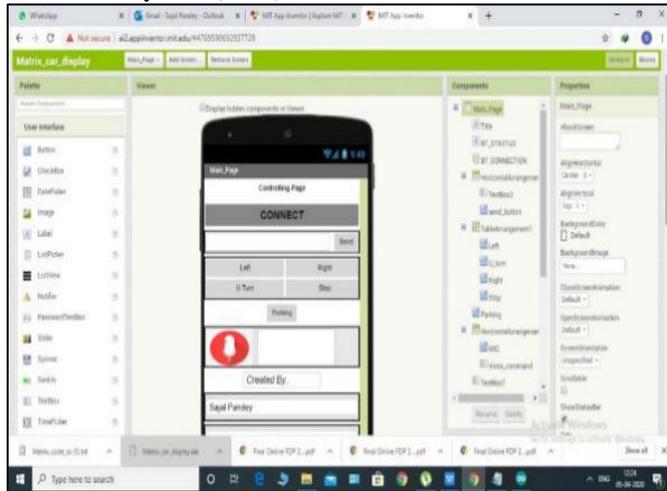
Fig. 8: MIT App Inventor UI

2) Arduino IDE:

It is an application software used to write and upload programs onto Arduino modules. It has a text editor where one writes the code helping the users to create interactive electronic objects. Following is a code snippet defining the LEDs to be lit up for each respective character:

```
{ 4, 8, B00111110, B01000001, B01000001, B00111110,
B00000000, // 0
 3, 8, B01000010, B01111111, B01000000, B00000000,
B00000000, // 1
 4, 8, B01100010, B01010001, B01001001, B01000110,
B00000000, // 2
 4, 8, B00100010, B01000001, B01001001, B00110110,
B00000000, // 3
 4, 8, B01111110, B00010001, B00010001, B01111110,
B00000000, // A
 4, 8, B01111111, B01001001, B01001001, B00110110,
B00000000, // B
 4, 8, B00111110, B01000001, B01000001, B00100010,
B00000000, // C
 4, 8, B00100000, B01010100, B01010100, B01111000,
B00000000, // a
 4, 8, B01111111, B01000100, B01000100, B00111000,
B00000000, // b
 4, 8, B00111000, B01000100, B01000100, B00101000,
B00000000, // c
};
```

3) Android Application:

The Android application has two input settings; Voice or Text. Basic predefined input modules are present on the main screen for seamless communication.
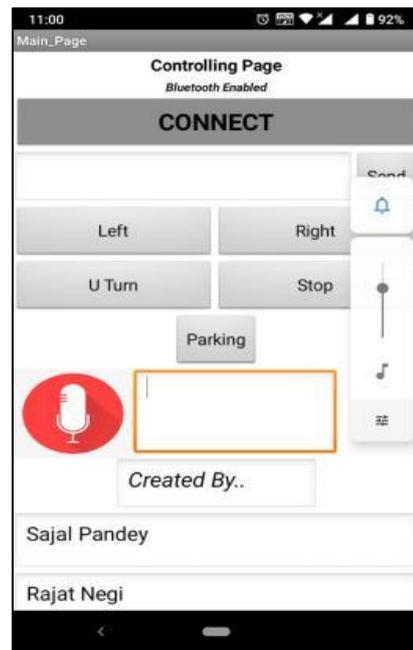
Fig. 9: Android Application UI

IV. RESULT

Using Bluetooth technology to pass information from Android device to the Arduino and further to the LED matrix, the process has been made real time. This technology can be used for various other purposes such as notice boards in schools, colleges etc.

`As visible from the below picture that red LEDs are producing significant amount of light to be clearly visible from large distance and the limitation of characters is also lifted due to the scrolling display.

`The size of the device is also compact so there will be no blockage of rear-view vision for the driver which makes it extremely compatible.
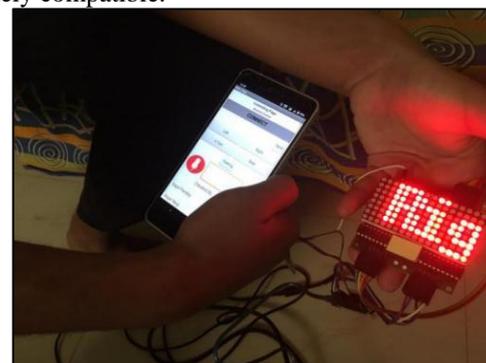
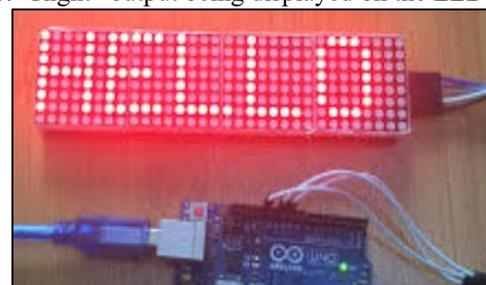Fig. 10: "Right" output being displayed on the LED Module

Fig. 11: "HELLO" output being displayed on the LED Module

Fig. 12: Emoticon output being displayed on the LED
Module