

Voice Recognition Notice Board

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Abstract—Now-a-days advertisement is going digital. The big shops and the shopping centers use digital displays now. This gave us the idea to use mobile Phone for sending voice message and then display it on an electronic board. The Display System is aimed at the colleges and universities for displaying day-to-day information continuously or at regular intervals during the working hours. Being wireless based system, it offers flexibility to display flash news or announcements faster than the programmable system. It presents voice based display board incorporating the widely used Wi-Fi module to facilitate the communication of displaying message on display board via user's mobile phone.

Keywords--Node MCU, Android Phone, Arduino IDE, MATLAB, ESP8266 Wi-Fi module.

I. INTRODUCTION

In this world everyone needs a comfortable living life. In today's world of connected less, people are becoming accustomed to easy access to information. Whether it's through the internet or television, people want to be informed and up-to-date with the latest events happening around the world. Now a day's people prefer wireless connection because they can interact with people easily and it require less time. The main objective is to develop a notice board that displays message sent from the user. This proposed user friendly system, can receive and display notice in a particular manner with respect to date and time which will help the user to keep tracking of notice in the board every day.

Day to day life advertisement is going digital. The big shops and the shopping centers use digital displays now. Also, in trains and buses the information like platform number, ticket information is displayed in digital boards. People are now adapted to the idea of the world at its finger-tips. The use mobile Phones have increased drastically over years. Control and communication has become important in all the parts of the world. This gave us the idea to use mobile Phone for sending voice message and then display it on an electronic board.

The Display System is aimed at the colleges and universities for displaying day-to-day information continuously or at regular intervals during the working hours. Being wireless based system, it offers flexibility to

display flash news or announcements faster than the programmable system. Wireless-based display system can also be used at other public places like schools, hospitals, railway stations, gardens etc. It presents voice based display board incorporating the widely used Wi-Fi module to facilitate the communication of displaying message on display board via user's mobile phone.

This paper is built around the AVR microcontroller from Atmel. This microcontroller provides all the functionality of the display and wireless control. The display system consists of a display toolkit which can be programmed from an authorized mobile phone. It receives the SMS, validates the sending Mobile Identification Number (MIN) and displays the desired information after necessary code conversion and audio play also implemented here. The system is easy, robust, to use in normal life by anyone at anyplace with less errors and maintenance. As engineer's main aim is to make life simple with help of technology, this is one step to simplify real time noticing.

II. METHODOLOGY

This system consists of seven major components, they are Android phone, Node MCU, Wi-Fi Module, LCD Display, Serial communication device, Laptop, Speaker and Power Supply.

Node MCU is belongs to AVR microcontroller family. Node MCU is heart of this Project why because it performs major role i.e it support the analog signal its features. It consists of Wi-Fi module inbuilt in other words source on chip(SOC) and it is differ from other microcontroller why because for other development kit we need Wi-Fi module as separate unit but in Node MCU it is inbuilt.

The user send their notice or message through Google assistant which connects notice or message to the Adafruit website, through that website message is get transferred to the respective Node MCU. Wi-Fi module present in Node MCU receives the analog information when the both IP addresses of Wi-Fi module and the Adafruit website is matched.

Then received message is converted into text message by the Node MCU then it is displayed on LCD Board. And converted test message transferred to the Laptop via serial communication device. The received information is again

converted into speech signal by the code. Then the Speech signal is displayed through Speaker.

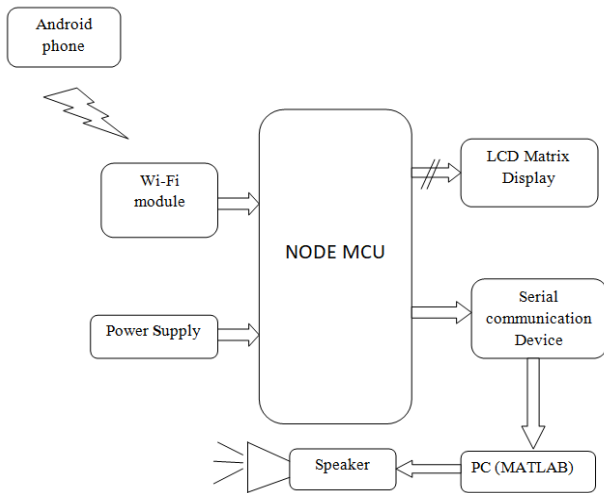


Figure 1: Block Diagram

III. ALGORITHM OF PROPOSED SYSTEM

Flow Chart: Flow chart for the this system is shown in Figure 2. First, we have initialize all the devices , after initialization of the all devices have to include the Adafruit library and ESP8266 Library to initialize the Node MCU, which is inbuilt in Node MCU and Adafruit library for the API's which are used to linking the applications because we are using third party library, we can't purchase it and it is open source available in google library. Then we have to include the LCD library also. For serial communication we need to set the baud rate to 9600. After that whatever voice notice is sent by the authorized user to Node MCU through android phone is received by the Wi-Fi module which is present on the Node MCU. If there is ant Wi-Fi data the serial execution is done in LCD screen. After that serial execution, if serial execution done then only execution of voice data will take place, if not then it will for serial execution. This is execution flow of system here.

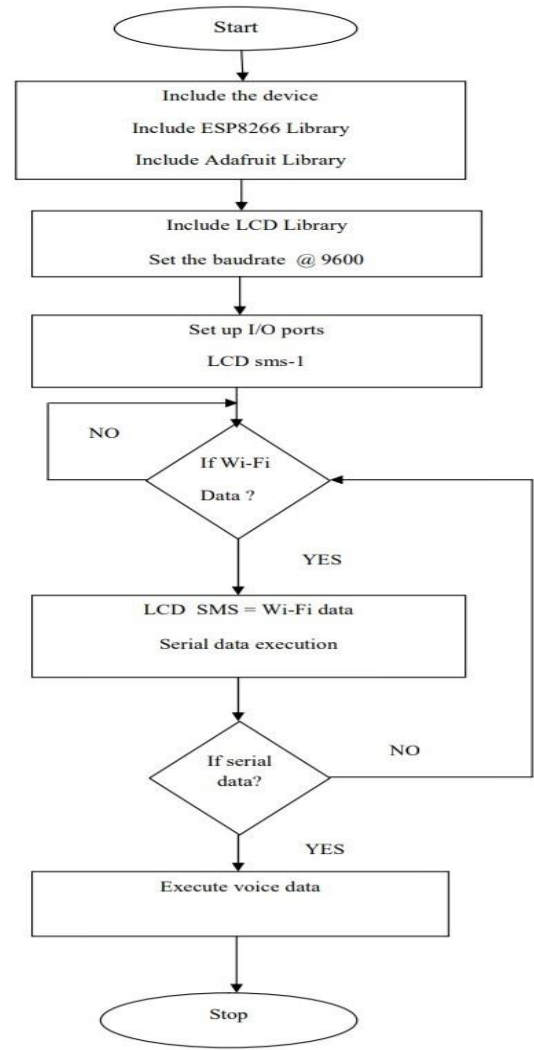


Figure 2 : Flow chart

1. HARDWARE SPECIFICATION

1. **Node MCU** : Node MCU is an open source LUA based firmware developed for ESP8266 Wi-Fi chip. By exploring functionality with ESP8266 chip, Node MCU firmware comes with ESP8266 Development board/kit i.e. Node MCU Development board. Since Node MCU is open source platform, their hardware design is open for edit/modify/build. Node MCU Dev Kit/board consist of ESP8266 Wi-Fi enabled chip. The ESP8266 is a low-cost Wi-Fi chip developed by Espressif Systems with TCP/IP protocol. For more information about ESP8266, you can refer ESP8266 Wi-Fi Module. The features of ESP8266 are extracted on Node MCU Development board. Node MCU (LUA based firmware) with Development board/kit that consist of ESP8266 (wifi enabled chip) chip combines Node MCU Development board which make it stand-alone device in IOT applications. There is Version2 (V2) available for Node MCU Dev Kit i.e. **Node MCU Development Board v1.0 (Version2)**, which usually comes in black colored PCB. Node MCU Dev Kit has **Arduino like** Analog (i.e. A0) and Digital (D0-D8) pins on its board. It supports serial communication

- protocols i.e. UART, SPI, I2C etc. Using such serial protocols we can connect it with serial devices like I2C enabled LCD display, Magnetometer HMC5883, MPU-6050 Gyro meter + Accelerometer, RTC chips, GPS modules, touch screen displays, SD cards etc.
2. *Wi-Fi module*: It is a low-cost Wi-Fi microchip, with a full TCP/IP stack and microcontroller capability produced by Espressif System. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes style commands. ESP8266 is a very user friendly and low cost device to provide internet connectivity to our projects. The module can work both as a Access point (can create hotspot) and as a station (can connect to Wi-Fi), hence it can easily fetch data and upload it to the internet making **Internet of Things** as easy as possible. It can also fetch the data from the Internet using APIs hence your project could access any information that is available in the internet, Thus making the microcontroller smarter.
 3. *I²C LCD Display*: This is an 16*2 LCD display screen with I2C interface. It is able to display 16*2 characters. Usually, Arduino LCD display projects will run out of pin resources easily, especially with the microcontroller. And it is also very complicated with the wire soldering and connection. This I2C 16*2vLCD screen using an I2C communication interface. It means it only needs 4 pins for the LCD display: VCC, GND, SDA, SCL. It will save at least 4 digital/analog pins on controller.
 4. *Serial communication device*: Serial communication is a common method of transmitting data between a computer and a peripheral device such as a programmable instrument or even another computer. Serial communication transmits data one bit at a time, sequentially, over a single communication line to a receiver. Serial is also a most popular communication protocol that is used by many devices for instrumentation; numerous GPIB-compatible devices also come with an RS-232 based port. This method is used when data transfer rates are very low or the data must be transferred over long distances and also where the cost of cable and synchronization difficulties make parallel communication impractical. Serial communication is popular because most computers have one or more serial ports, so no extra hardware is needed other than a cable to connect the instrument to the computer or two computers together.
 5. *Android Phone*: The Android phone is used for sending the voice notice or any message to the notice board with the help of the Google assistant. With this Google assistant, our voice message is connected to Adafruit website, Adafruit website is responsible for sending the voice notice to the respective microcontroller which is connected to the Notice board.
 6. *Laptop*: The laptop device is required to convert the text message into the voice signal. In laptop we are going to install the MATLAB 13 version software in that we are writing MATLAB code for text to voice conversion, then it deliver to the speaker.
 7. *Speaker*: Regardless of their design, the purpose of speaker is to produce audio output that can be heard by the listener. Speakers are transducers that convert electromagnetic waves into sound waves. The speakers receive the audio input from a device such as a computer or an audio receiver.

2. SOFTWARE SPECIFICATION

1. *Adafruit.io*: is a cloud service-that just means we run it for you and you don't have to it over the Internet. It's meant primarily for storing and then retrieving data but it can do a lot more than just that. It is a system that makes data useful. Our focus is on ease of use, And allowing simple data connections with little programming required. IO includes client libraries that wrap our REST and MQTT API's. IO is built on Ruby on Rails, and Node.
2. *Arduino IDE* : The Arduino Integrated Development Environment (IDE) is a cross-platform application that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the wiring project, which provides many common input and output procedures.
3. *Embedded C*: Embedded C programming typically requires nonstandard extension to the C language in order to support enhanced microcontroller features such as fixed point arithmetic, multiple distinct memory banks, and basic I/O operations.
4. *MATLAB*: MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. MATLAB is an interactive system whose basic data element is an array that does not require dimensioning. This allows you to solve many technical computing problems, especially those with matrix and vector formulations, in a fraction of the time it would take to write a program in a scalar non interactive language such as C or Fortran.

3. RESULT

The Experiment was conducted for the proposed system. The Node MCU is powered with the 3.3V power supply. User sends the notice through Android phone and the Node MCU which has the inbuilt wifi receives the sent notice. Node MCU converts the notice into text format and it is displayed on LCD screen. And Text is transferred to Laptop through serial communication device, MATLAB code converts the text into Speech signal. Then speech signal is displayed on speaker with in few seconds.



Figure 3: Experimental setup

4. CONCLUSION

Voice controlled e-notice board is designed and demonstrated using Node MCU and ESP8266 Wi-Fi module. LCD 16X2 is used for display purpose. Google voice assistance is used for voice SMS communication. MATLAB based voice announcement is demonstrated.

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