Digital Notice Board Based on IOT

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Abstract **- This project presents a digital notice board using IoT module. The idea behind this project is to provide its users with a simple, fast and reliable way to put up important notices in an LED where the user can send a message to be displayed in the LED. The message can be sent through an android application designed in this project, through the IoT module. So, notices can be put up in an LED display from any location in the world. It uses a microcontroller for system control, IoT based technology for communication and sends the message through the android application. The project consists of Arduino UNO board, IoT module, an LED, and an android application for user interface with the hardware. This device can be used anywhere irrespective of the place of deployment provided mobile network connectivity is available.**

Index Terms **- IOT, Speech to Text, LED Matrix, Google Assistant, Arduino.**

INTRODUCTION

In the contemporary world of overwhelming connection, we are so focused on the ease of accessing information. By the virtue of the internet or newspapers, we love keeping ourselves updated and informed. Notice boards are the primary thing in any institutions or public utility places like bus stations, railway stations, colleges, malls etc. Now a days, papers or wired notice board displays serves for the purpose. A specific person is assigned the task for pasting the notice. This not only calls in for extra labour charges as well as consumes a whole lot of time. In the current era where ease of access has always been at the top place in the catalogue of development, need to deliver the message faster is very crucial. This project enables us to communicate without even having someone's contact details or neither needed to have any account with the system hence is better than any online services available till date. The range it provides is its biggest capability. With routers as repeaters, it can service an entire organization located at one place. With furthermore work removing the complexity 'n' no. of classrooms can be delivered with the separate messages to be displayed by having all the tabs representing the classes in only one app. Hence this paper is based on an ingenious rather an exhilarating manner of directing messages to the peers or common folks by employing a wireless electronic display board which is synchronized using an android app.

This is a project that displays messages that the user desires, on an LED Display Matrix. The Display consists of 256 LED lights, sequentially arranged in 8 rows and 32 columns (8*32). Apart from the display, the project consists of a Node MCU controller which helps the system to connect to the Wi-Fi. This system makes use of Google Assistant to accept speech inputs from user, through user's Android smartphone. User needs to login into their Google account. A USB cable acts as the power cable for the system. The speech input is converted into a text display in an alpha-numeric format which is predefined. The displayed message will either scroll or remain static, based on the size of display and length of message. This project can widely use in offices, schools, educational institutions as well as government and corporate offices to display important notices and messages. This can prove to help users save a lot of time as against the use of traditional pin and paper notice display.

RELATED WORK

This system has a transmitter and a receiver section. The transmitter section consists of the android phone with the app through which the conveyor says through our self-developed open-source speech to text application for android. For easy transfer of the message Ethernet shield stacked with the Arduino-Uno is installed at the receiver side. The Ethernet shield does the internet connection with excellent ease.

This set up is empowered with Wi-Fi router working as a repeater and is connected to an internet source. A speech to text application is employed for the conversion of the said data speech to the message to be displayed. The converted message is then transferred to the receiver section via Arduino-Uno. The whole setup continuously checks if there was any message, it opens the message and saves it in the memory until the command for reception of next message is given using the soft key in app. The display is programmed in such a way that it appears like a blank screen (Kiosk mode) and displays the notifications when they arrive. The text message currently can be displayed until next data reception request. Updating of the new information will be as soon as the arrival of a new message.

This paper carries out a detailed review of the various techniques employed in the recent years in GSM technology. It discusses the current innovations in technology, and within this context, the operation of wireless electronic display boards using GSM technology has been reviewed. The important techniques used in past are also tabulated. Various technical papers and articles on wireless technology have been analyzed. The paper takes an inquisitive approach to the proposals and prototypes of an electronic display board obtained using GSM, which can be used in public areas for information dissemination. Although this review paper cannot be all-inclusive, it may serve as a reference for further analysis in the domain of GSM and its application in wireless notice boards.[1] The paper describes the design and development of an alarm device that can disseminate disaster early warnings to threatened communities over the GSM network. The device is capable of generating audible, high-volume alarms, flashlights and turning on an in-built radio in response to a warning message from an authorized entity via GSM s short message service (SMS) or cell broadcast (CB) [2]. The limitations of each security technology combined with the growth of cyber-attacks impact the efficiency of information security management and increase the activities to be performed by network administrators and security staff. Therefore, there is a need for the increase of automated auditing and intelligent reporting mechanisms for the cyber trust. Intelligent systems are emerging computing systems based on intelligent techniques that support continuous monitoring and controlling plant activities. Intelligence improves an individual's ability to make better decisions. This paper presents a proposed architecture of an Intelligent System for Information Security Management (ISISM)[3]. This paper introduces a kind of intelligent communications dispatch terminal equipment. The equipment is applied to taxi. Its core technology is GSM short message module. The paper describes the overall design of this application in detail. And it studies the power system in terminal blocks, the overall circuit design, short message sending and receiving control. The module of taxi communications scheduling provides an economical and practical technical project for vehicles tracking, call and management [4]. This dissertation reports on the opportunities for GSM-based positioning techniques anno 2008. Practically, this means that both the typical structure of dense (sub)urban networks and the possibilities of modern handsets are taken into account.

The potential of the techniques under study is every time evaluated for the stringent demands of the upcoming generation of location-based services (LBS). Though privacy issues are not explicitly dealt with, it is noteworthy that all developed techniques focus on a terminal-based implementation. This means that a user keeps full control over his position information. This work shows that GSM-based positioning techniques – especially in a terminal-based implementation – have their use within a context of location-based services [5]. Notice board is primary thing in any institution or organization or public utility places like bus stops, railway stations or parks. But sending various notices day to day is a tedious process. This paper deals with advanced notice board. It presents an SMS based notice board incorporating the widely used GSM to facilitate the communication of displaying message on notice board via user's mobile phone. Its operation is based on microcontroller ATMEGA32 programmed in assembly language [6].

SYSTEM ARCHITECTURE

he proposed system uses IOT based wireless serial data communication in displaying messages on a remote digital notice board. Android based Application programs available for Bluetooth and Wi-Fi communication for personal digital assistant (PDA)

devices are used for transmitting the alpha-numeric text messages. Using the Bluetooth or Wi-Fi based serial data communication technique, the corresponding transceiver module has been interfaced with Wireless notice board at the receiver end. For this purpose, a low-cost wireless notice board is programmed to receive alphanumeric text messages in any of the above selected communication modes. The proposed system will help in reducing the human effort.

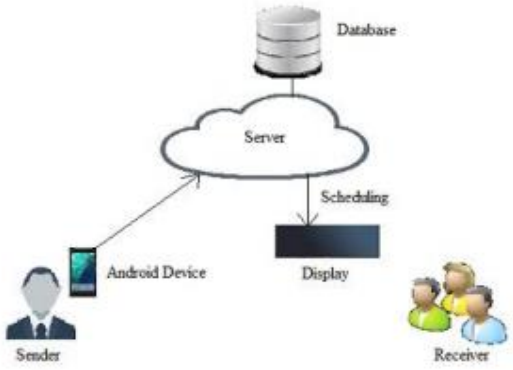

Figure1. System Architecture

METHODOLOGY

A transmitter is an equipment, which converts a physical message into an electrical message. A receiver on the other hand is an equipment which converts the electrical signal back to the physical signal. The electrical signal from the transmitter is conveyed to the receiver through a particular channel, either it could be a wired communication or wireless mode of communication channel. As our project is based on an android application, we are using Wi-Fi module, a wireless mode of communication While the user sends the message from the mobile, the remote operation is achieved by any smart phone/Tablet etc., with Android OS, upon a GUI (Graphical User Interface) based voice operation. Transmitting end uses an Android application device remote through which commands are transmitted. At the receiver end, these commands are converted to texts used which are displayed on a P10 LED - interfaced to the Arduino. Serial communication data sent from the Android application is received by a Wi-Fi receiver interfaced to the Arduino. The program on the Arduino refers to the serial data to display the received data on a P10 LED.

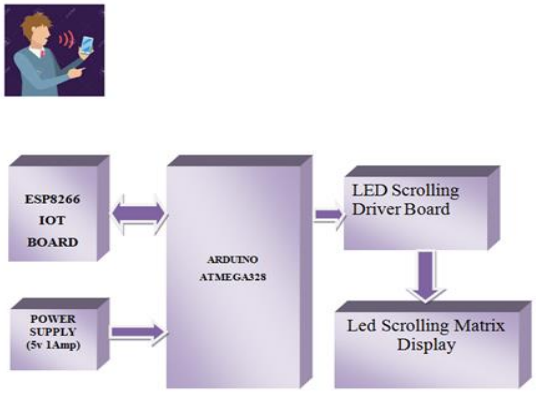

Fig 2. Block Diagram

Hardware Requirements

- Arduino Uno R3
- Esp8266 Iot Modem
- Power Supply Unit
- Led Drivers
- Led Scrolling Display

Software Requirement

- ARDUINO IDE
- Embedded C

HARDWARE IMPLEMENTATION

Arduino UNO

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by arduino. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under Common Creative Attribution Share-Alike 2.5 license and is available on the arduino website. Layout and production files for some versions of the hardware are also available. "UNO" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The UNO board and version 1.0 of arduino Software (IDE) were the reference versions of arduino, now evolved to newer releases. The UNO board is the first in a series of USB

arduino boards, and the reference model for the arduino platform. The ATmega328P on the arduino UNO comes preprogrammed with a boot loader that allows uploading new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The UNO also differs from all preceding boards in that it does not use the FTDI USB-toserial driver chip. Instead, it uses the Atmega16U (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

Fig -2: Arduino Board

NodeMCU

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term" NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project and built on the Espressif Non-OS SDK for ESP8266. Since NodeMCU is open-source platform, their hardware design is open for edit/- modify/build. NodeMCU Dev Kit/board consist of ESP8266 wifi enabled chip. The ESP8266 is a low-cost Wi-Fi chip developed by Espressif Systems with TCP/IP protocol. F There is Version2 (V2) available for NodeMCU Dev Kit i.e. NodeMCU Development Board v1.0 (Version2), which usually comes in black colored PCB.

ESP8266 module is low-cost standalone wireless transceiver that can be used for endpoint IoT developments. To communicate with the ESP8266 module, microcontroller needs to use set of AT commands. Microcontroller communicates with ESP8266-01 module using UART having specified Baud rate.

Dot Matrix

LED dot matrix display is used to display any messages that are key-in by user. The LED dot matrix that is used in this project consists of 2 blocks and 8X8 matrixes. The position of the least significant bit (LSB) and most significant bit (MSB) of the display need to be initialized. Initially, the first column for LED display blocks is lit up. It is followed by second column while the other column is lit off. The process will continue until the last column. Then the process is repeated to produce a character or word in accordance to user request. The lit off the LED is so fast, so that all of the LED looks like lit up at the same time. The latch played the major role in controlling the data into rows and columns for the LED. This process is controlled by software written in assembly language for microcontroller MC68HC11A1. For example, to display B in the dot matrix, a set of hex numbers of instructions must be given to the microcontroller for rows and columns. The numbers are $81, $B5, $B5, $CB for rows and $C3 for columns. Logic 0 will lit up the LED on the Dot Matrix. Figure 3.2 is an example of dot matrix display.

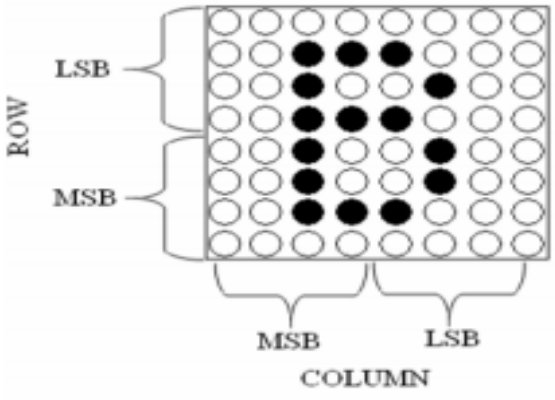

Fig 3: Dot Matrix Display

Power Supply

The Voltage Transformer can be thought of as an electrical component rather than an electronic component. A transformer basically is very simple static (or stationary) electro-magnetic passive electrical device that works on the principle of Faradays law of induction by converting electrical energy from one value to another. The transformer does this by linking together two or more electrical circuits using a common oscillating magnetic circuit which is produced by the transformer itself. A transformer operates on the principals of electromagnetic induction, in the form of Mutual

Induction. A voltage regulator is an electronic circuit that provides a stable DC voltage independent of the load current, temperature and AC line voltage variations. A voltage regulator may use a simple feed-forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

Android Application

App Inventor for Android is an open-source web application originally provided by Google, and now maintained by the Massachusetts Institute of Technology (MIT). It allows newcomers to computer programming to create software applications for the Android operating system (OS). It uses a graphical interface, very similar to Scratch and the StarLogo TNG user interface, which allows users to drag-and-drop visual objects to create an application that can run on Android devices. In creating App Inventor, Google drew upon significant prior research in educational computing, as well as work done within Google on online development environments. App Inventor and the projects on which it is based are informed by constructionist learning theories, which emphasizes that programming can be a vehicle for engaging powerful ideas through active learning. MIT App Inventor is also supported with the Firebase Database extension. This allows people to store data on Google's firebase.

RESULTS AND DISCUSSION

The following snapshots and graphs define the results or outputs that we will get after step-by-step execution of each proposed protocol for different values.

Figure 4: Front end of the app

The above screenshot shows the front end of the android application. It consists of two text boxes. One for entering the ip address of the local host to get connected and other box is used to type text which text user like to display on matrix display. The screenshot in Figure 4 shows us how a simple word was displayed in dot matrix from left to right. Here the user had typed the msg which to be displayed in the textbox in the app which we can observer in the figure. Here both mobile and hardware device are connected to same hot spot. The message transfer was happened here by using SPI protocol.

The screenshot in Figure 5 shows us how a digit were displayed in dot matrix from left to right. Here the user had typed the msg which to be displayed in the textbox in the app which we can observer in the figure. Here both mobile and hardware device are connected to same hot spot. The message transfer was happened here by using SPI protocol.

how a message was displayed in dot matrix from right to left. Here the user had typed the msg which to be displayed in the textbox in the app which we can observer in the figure. Here both mobile and hardware device are connected to same hot spot. The message transfer was happened here by using SPI protocol. WiFi based Digital Notice Board system makes user easy to type and display the required content. It works based on SPI protocol.

Fig 5. Experimental Setup

CONCLUSION

The prototype of the proposed WI-FI based electronic notice board was successfully designed. It can be easily integrated with all general-purpose display board thus proving its mobility. The message is transferred using wireless technology and is eventually obtained on the LED matrix. Thus, we are using modern technology to replace conventional display boards the android app interface can make this system even more user friendly and popular. The system accepts the message from app to be displayed in the form of Short Message Service (SMS) stores it, checks for its validation and then displays it on the display unit if it meant for that particular display unit, it decided based on IP address. This system supports only one message at a time. The proposed system can be efficiently used for transfer of message instantly on campus. The WI-FI based smart electronic notice board is efficiently designed. the smart electronic notice board system accepts new SMS, validate it, store it and display it on 8X8 LED panel.

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