

Android Speech Recognition Based Voice Command Notice Board

^[1] Manikandan J, ^[2] Sunaina K Bari, ^[3] Dimple Prasad Hari, ^[4] Suchithra P, ^[5] Chaitra N C
^[2,3,4,5] UG Scholars, Department of CSE, SSCE, Bangalore
^[1] Professor, Department of CSE, SSCE, Bangalore

Abstract— In this paper, the development of simple and low cost Android based wireless notice board is presented. The 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.

Keywords: android; bluetooth; microcontroller; wi-fi; wireless notice board

I. INTRODUCTION

Smart phones are playing vital role in human life. They are easy to use, promising and durable devices that help in performing day to day tasks. Embedded systems using wireless technologies are widely used for communicating with peripheral devices. Implementation of the GSM based wireless communication for different applications are proposed in [1-5]. GSM based wireless notice board has been developed in [6], [7].

In this paper, the development of a simple and low cost wireless Android based notice board is presented. The proposed system uses either Bluetooth or Wi-Fi 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 microcontroller board at the receiver end. For this purpose, a low cost microcontroller board (Arduino Uno) 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, paper, printer ink and cost for manual changing of the notices.

II. SYSTEM DESCRIPTION

The simple and low-cost wireless Android based notice board system is developed to remotely send the desired

information instantly to the intended users using either Bluetooth or Wi-Fi transceiver modules interfaced with a low cost Arduino UNO microcontroller board. The communication mode (Bluetooth or Wi-Fi) is selected for data communication using the corresponding transceiver module with the microcontroller. Arduino UNO microcontroller board is programmed [8], [9] as a client using Arduino software to receive the message from remote user either in Bluetooth and Wi-Fi based wireless communication technology [10]. The system block diagram is shown in Fig. 1.

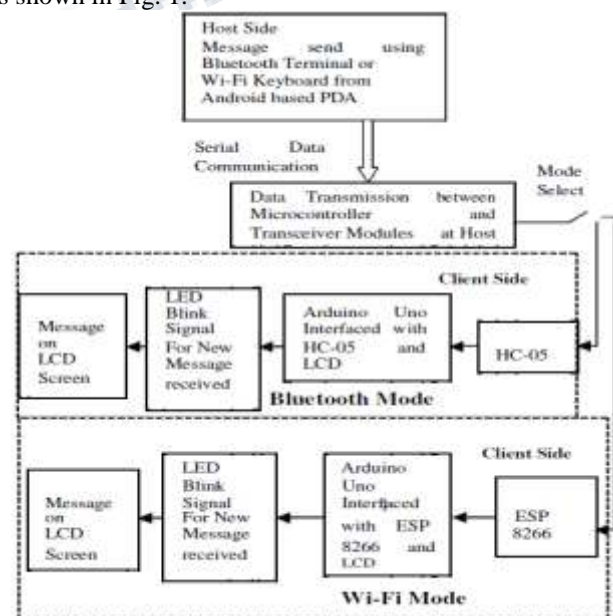


Fig. 1. System Block Diagram

III. WIRELESS COMMUNICATION FOR ANDROID BASED NOTICE BOARD

From the communication mode selected by the user, Bluetooth or Wi-Fi based wireless communication for Android based notice board is used. The Android based software application program for Bluetooth and Wi-Fi communication in the proposed system are explained below.

a. Bluetooth Terminal

Bluetooth Terminal is an Android application program that enables the Android PDA's to communicate simply with a Bluetooth device via a terminal. Bluetooth Terminal application program therefore enables the Android PDA to transmit (or receive) the messages in either hexadecimal (hex) or string format to (and from) the connected Bluetooth devices. At the receiver end, the HC-05 module is interfaced with microcontroller that is programmed to store the received message and display that to the LCD screen.

b. Wi-Fi keyboard

Wi-Fi keyboard application program for Android the enables the Android based PDA's to send the string to the Wi-Fi device. At the receiver end of the developed system, the Wi-Fi transceiver module (ESP 8266) communicates with Wi-Fi keyboard application program installed on Android PDA via Wi-Fi network. ESP 8266 module is interfaced with microcontroller that is programmed to store the received message and display that to the LCD screen.

IV. HARDWARE IMPLEMENTATION

The microcontroller board (Arduino UNO) is programmed in a manner that on its correct initializing with LCD and transceiver module, welcome message will be displayed on LCD. The user selected communication mode (Bluetooth mode or Wi-Fi mode) is also displayed on the LCD screen as the corresponding transceiver is connected. Every Bluetooth device has their unique Media Access Control address (MAC) address. MAC address is a unique identifier assigned to network interfaces for communications on the physical network segment. The interfacing of Android based PDA with wireless notice board in Bluetooth communication mode using Bluetooth transceiver HC-05 is shown in Fig. 2.

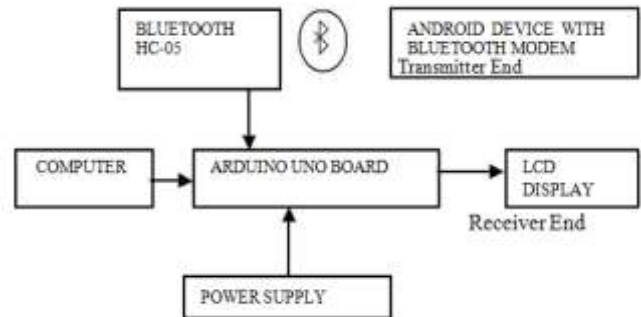


Fig. 2. Bluetooth Communication for Android based Wireless Notice Board

Android based wireless notice board interfaced in Wi-Fi communication mode using Wi-Fi transceiver ESP 8266 is shown in Fig. 3.



Fig. 3. Wi-Fi Communication for Android based Wireless Notice Board

V. SYSTEM IMPLEMENTATION

Using the developed system, two different applications of displaying messages on a remote digital notice board and wireless staff/person calling has been implemented and described below.

1. Android based Wireless Notice Board using Bluetooth communication

Using the Bluetooth interface a Personal Area Networks (PANs) has been created in the range between 10-15 meters. Bluetooth uses the 2.45 GHz frequency band for connection. A HC-05 Bluetooth module has been interfaced with the microcontroller board (Arduino UNO) using serial communication. The module's Media Access Control address is used by Android application program (Bluetooth Terminal) which allows only this device to communicate with the smartphone for controlling the external devices. The interconnection of Android PDA with the external Bluetooth devices like HC-05 Bluetooth module, using Bluetooth terminal for transmitting or receiving the

data in form of hex or string. Using the android based wireless notice board in Bluetooth communication mode the user can send the alphanumeric text message instantly once the connection is established between Android based PDA and Bluetooth device (HC-05). The notice on the LCD display can be changed at any time by resending the new message from PDA using android application program that is Bluetooth technology. The new message will overwrite the previous message making the system very simple and easy to use. The implementation of Android based wireless notice board using Bluetooth communication is shown in Fig. 4 below.

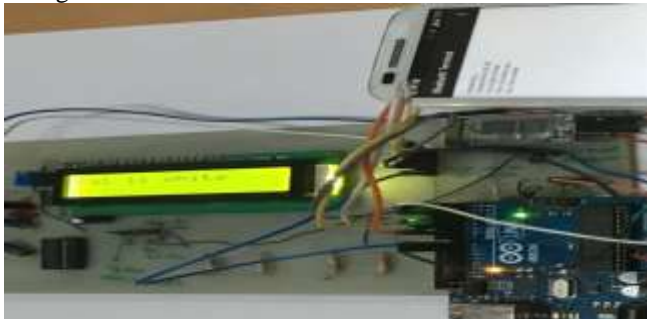


Fig. 4. Android based wireless notice board using Bluetooth communication

For communication in WI-Fi mode, ESP 8266 module is interfaced with microcontroller board that is programmed with AT commands to receive the user messages at an enhanced range of 200-250 meters from the Android PDA. By using the Wi-Fi communication technique, although the range of receiving messages on wireless notice board is improved but it adds to the system cost by requiring an additional power supply of 3.3 volts as the power taken by receiving a data packet is much more than the Bluetooth communication, so the system requires a tradeoff between more range and added cost. The complete system assembly for receiving the message from the Wi-Fi Keyboard at the Android based PDA is shown in Fig. 5.

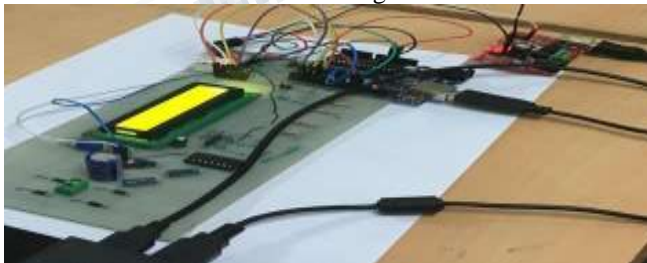


Fig. 5. Android based wireless notice board using Wi-Fi communication

The ESP 8266 module communicates with Wi-Fi keyboard application program installed on Android PDA via Wi-Fi network. The implementation of Android based wireless notice board using Wi-Fi communication for displaying different messages is shown in Fig. 6 below.

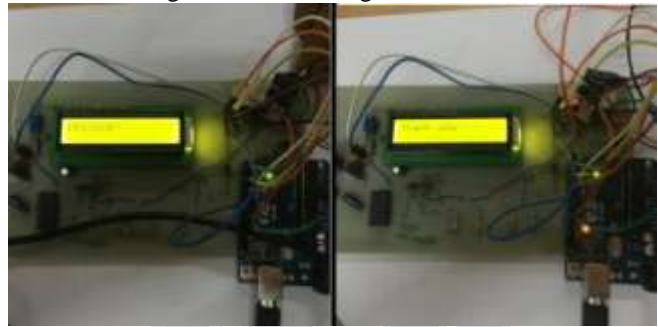


Fig. 6. Implementation of wireless notice board using Wi-Fi communication

2. Android based Person Calling system

Using the developed system, the nurse/office staff or person calling system has also been implemented by programming the microcontroller to get the specified key of the person. In the implementation mode if the received character key from the Android PDA matches with the stored character in the flash memory of microcontroller then the specific person will be called. The microcontroller is programmed to keep on checking the received serial data from Android PDA after every 30 seconds. For not receiving of any specified or stored character key a Known message of "Welcome to Amity" will be displayed. The wireless calling system in idle state is shown in Fig. 7.



Fig. 7. Wireless Calling System in Idle state

On receiving a specified character key like “1”, the microcontroller compares it with the stored key and displays the corresponding message for calling specific person on the LCD as shown in Fig. 8 and 9.



Fig. 8. Wireless calling of person specified by known character



Fig. 9. Wireless calling of person

A visual alert is also generated by blinking of the LED for 1 minute using the inbuilt LED (Pin 13) of the Arduino UNO microcontroller board. The provision for audio alert using buzzer can also be added to the system at an added cost. Once the person has reported, to desired location the serial buffer register of microcontroller can be cleared by sending the specific character key and the system will get ready for receiving next character key.

VI. CONCLUSIONS AND FUTURE SCOPE

In this paper the technological advancement of the notice board is proposed that will help in saving time and resources and making the information available instantly to the intended person. The system is simple, low cost and easy

to use that interacts with the intended users instantly. This system can be used in various applications like banking, schools, restaurants offices, hospitals, score boards for sports etc. The voice calling feature can be added with the proposed system as a further enhancement for using the system in railways, airport or bus stations.

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