



Voice to Text Based Noticeboard with Integrated Android Application

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Abstract : With the emergence of Digital Technology, it has become efficient to present information on digital devices. Nowadays, the internet serves as the primary communication method globally. Notice boards hold significant importance in conveying messages within organizations. To promote environmentally friendly practices in IT, it is essential to utilize digital media instead of traditional methods such as printing on paper. This research paper introduces a Smart Notice Board powered by Nodemcu. Through this project, an authorized individual can communicate messages or notices remotely on digital devices such as Light Emitting Diodes (LEDs). The proposed system minimizes the need for human resources and saves time. Additionally, the project goes beyond displaying messages on the LED screen by also employing a speaker to audibly transmit the message, making it accessible to individuals with visual impairments.

IndexTerms – smart noticeboard, android app, firebase, lcd display, Java

I. INTRODUCTION

The notice board plays a crucial role in our lives, serving as a central hub for important information. It is commonly found in educational institutions, railway stations, shopping malls, bus stations, offices, and other public spaces. Traditionally, a dedicated person is required to physically post information on the notice board, leading to time loss and reliance on manpower.

Analog notice boards predominantly utilize paper as the medium for information exchange. However, the demand for information is endless, resulting in the extensive use of paper. Additionally, conventional notice boards face challenges such as limited space, difficulties in information retrieval, and the need for regular maintenance.

To address these issues, we propose the implementation of a digital notice board using NodeMCU. This advanced system offers an efficient and eco-friendly alternative to traditional notice boards. It not only displays messages on an LED screen but also verbalizes the information through a speaker. Furthermore, the system ensures that only authorized personnel can send and manage the information.

One of the key advantages of our digital notice board is its inclusivity. It caters to individuals with disabilities by providing audio announcements, ensuring that everyone can access the information. Unlike conventional notice boards, our system focuses on delivering information to people of all backgrounds and abilities, promoting inclusivity and accessibility.

Several approaches have been suggested and implemented to achieve Speech-To-Text (STT) conversion functionality. Initially, the essential characteristics of the input speech are extracted, followed by word and sentence matching using acoustic word models and predefined syntax and sentence semantics. These processes can occur simultaneously and are independent of each other. Finally, the selected modeling technique is employed for language modeling. The proposed interactive voice response (IVR)-based mailing system will incorporate the most effective and accurate methods for STT and Text-To-Speech (TTS) conversion, ensuring seamless communication. Users will be able to manage their email accounts solely through audio commands, enhancing convenience and accessibility. This system has the potential to revolutionize interpersonal interaction, particularly in scenarios involving individuals who speak diverse languages or dialects. The research paper provides a comprehensive evaluation of various methods for STT and TTS conversion and presents a design for an IVR-based mailing system that optimizes email management efficiency and accessibility for users.

In today's fast-paced world, people crave convenience and access to timely information. Whether it's staying updated on global news or seeking convenience in communication, individuals seek out various mediums such as the internet, television, or other sources. Wireless connectivity has gained popularity due to its time-saving benefits and seamless communication capabilities. In light of this, we propose an intuitive notice board system designed to display user-contributed messages in a chronological order based on date and time.

The shift towards digital advertising is evident, with digital screens being utilized in prominent locations like stores, malls, trains, and buses to disseminate information such as platform numbers and ticket details. Individuals have grown accustomed to

having the world at their fingertips, with mobile phones serving as indispensable tools for communication and control on a global scale. Inspired by this trend, our objective is to develop a system capable of receiving spoken messages via cell phones and subsequently showcasing them on electronic boards.

By leveraging the ubiquity of mobile phones and the convenience they offer, our user-friendly notice board system aims to provide an efficient and accessible means of communication and information sharing. Through the integration of spoken message reception and electronic board display, we seek to enhance convenience and streamline communication channels for individuals in various settings.

II. PROBLEM STATEMENT

With the advancement of technology, traditional wall notice boards have become outdated due to several limitations. One major drawback is the limited physical space available on the board, causing messages to overlap and making it difficult for users to read and understand them clearly. Moreover, it becomes challenging to keep track of the latest posts, leading to a lack of information and awareness among users. Additionally, there is no mechanism in place to determine the number of people who have seen a particular post, creating uncertainty about its reach and impact.

Another drawback is the absence of direct communication between the poster and the audience. This can result in confusion and misunderstandings, as there is no opportunity for immediate clarification or feedback. Moreover, the need to frequently check the notice board for new posts can be time-consuming and inconvenient, making it an inefficient method for disseminating information.

In addition to these limitations, the traditional notice board lacks easy accessibility, further contributing to its drawbacks. To address these issues, we propose the implementation of an Online Notice Board system that digitally revolutionizes the conventional notice board and makes it accessible online. By adopting this approach, we aim to overcome the shortcomings associated with the traditional notice board and provide a more efficient and convenient means of sharing information.

To overcome the limitations of traditional notice boards, we propose the Online Notice Board system that brings the notice board experience online. This digital approach offers easy accessibility and addresses the drawbacks of the traditional notice board.

With the Online Notice Board system, posting and accessing information becomes efficient and user-friendly. Messages no longer overlap, ensuring clear and readable content. The latest posts are prominently displayed at the top, eliminating the need to remember previous updates. Additionally, the system provides visibility into the number of views for each post, enabling users to assess its reach and impact. Furthermore, direct communication with the poster is facilitated, promoting clarity and resolving any queries or concerns. The implementation of the Online Notice Board system revolutionizes information sharing, making it convenient and effective for users.

III. LITERATURE SURVEY

The field of computer vision has extensively studied the generation of natural language descriptions from visual input for a considerable period of time. [1] – [3]. Three types may be found in the literature on picture caption generation. Template-based approaches belong to the first category, where the primary focus lies in detecting objects, actions, scenes, and attributes. [4]–[7]. The second category of caption generating systems involves transfer-based approaches. In this method, image retrieval is performed, where visually similar images are retrieved and their captions are used to construct the query image. [8]. The majority of the researchers suggested that neural networks are beneficial in machine translation, as well as caption synthesis using neural language models [10]. Consequently, the system has grown in complexity, incorporating visual component recognizers programmed in formal languages like And-Or Graphs or logic systems. These are subsequently transformed using rule-based systems. The multimodal recurrent neural network is also a component of this advanced system. model proposed by Mao et al. [11] and Karpathy et al. is employed for visual description generation [12]. Vinyals, Oriol, and colleagues employed the NIC model (Neural Image Caption) [1]. They utilized an advanced form of RNN called LSTM [1]. Xu et al. recently proposed that visual attention be summarized in the LSTM model for focusing its gaze on diverse objects during the creation of associated phrases [13]. To generate human-like image captions, neural language models are useful. Except for the most current approaches, the majority of them use a similar encoding decoding architecture, which combines caption production with visual attention [13]. This research primarily focused on the third category of caption generation methods, which involves developing a neural model capable of generating natural language descriptions for images. In this approach, a Convolutional Neural Network (CNN) is employed as the image encoder. The RNN decoder utilizes the last hidden layer of the CNN as input to generate descriptive phrases, following pre-training for the image classification task. The NIC model uses CNN as the encoder and employs a pre-trained CNN to categorize images. The last layer of the CNN serves as input for the Recurrent Neural Network (RNN) decoder, which possesses the ability to generate sentences.

IV. RESEARCH METHODOLOGY

The system consists of seven critical components that work together to achieve its functionality: a Python program for speech recognition, Node MCU, Wi-Fi Module, LCD Display, Serial connection device, Laptop, Speaker, and Power Supply. Among these components, the Node MCU plays a central role and belongs to the AVR microcontroller family. What distinguishes the Node MCU is its built-in Wi-Fi module or source on chip (SOC), which eliminates the need for an additional Wi-Fi module that

is required by other development kits. This integration simplifies the setup process and enhances the system's overall efficiency and performance.

The system allows users to interact with it by providing voice commands through the microphone of a laptop. These commands are processed and converted into text using a specialized program. The resulting text is then sent over the internet and stored in a Firebase database. The Node MCU, acting as the receiver, retrieves the data from the Firebase database and presents it on the LCD display that is connected to the system. This seamless process enables users to effortlessly access and view the information provided by the system.

4.1 Block Diagram

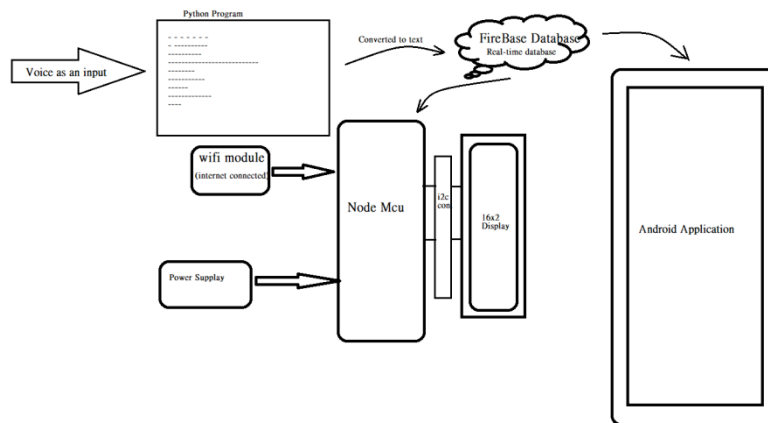


Fig 1.0 Project Working Model

4.2 Working Model

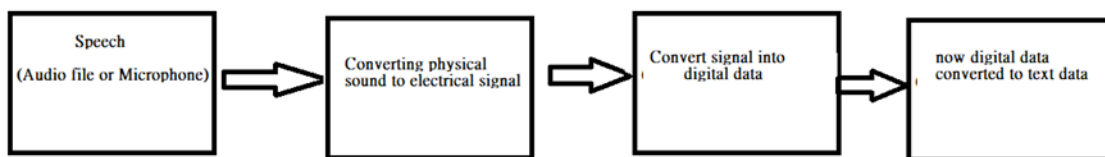


Fig 2.0 Project Working Model

4.4 Hardware Requirement & Specification:

4.4.1 NodeMCU: Node MCU is a firmware based on the LUA programming language that has been designed to work seamlessly with the ESP8266 Wi-Fi chip. This combination offers users a wide range of possibilities to harness the full potential of the ESP8266 chip. With Node MCU being an open-source platform, users have the flexibility to customize and modify the firmware to suit their specific requirements. Additionally, Node MCU provides the opportunity for users to create their own hardware solutions, giving them even more control over their projects.

The ESP8266 Wi-Fi chip, which is an essential component of the Node MCU Dev Kit/board, is a highly cost-effective TCP/IP Wi-Fi chip developed by Espressif Systems. Its affordability makes it an attractive choice for various Wi-Fi-based applications. For users seeking more detailed information about the ESP8266 Wi-Fi Module, dedicated documentation is available to provide comprehensive insights into its features and functionalities. This documentation serves as a valuable resource for users who want to delve deeper into the capabilities of the ESP8266 Wi-Fi Module and explore its potential applications.

4.4.2 WiFi Module: Espressif Systems has developed an affordable Wi-Fi microchip called the ESP8266 module. This module combines a complete TCP/IP stack with microcontroller functionality, making it a valuable tool for connecting microcontrollers to Wi-Fi networks. It uses simple instructions to establish TCP/IP connections, making it easy to integrate with various projects.

The ESP8266 module has dual functionality as both a station and an access point. It can retrieve data from the internet and post it online, which is useful for Internet of Things (IoT) applications. Additionally, it can fetch data from the internet using APIs, showcasing its ability to access a wide range of online information. Overall, the ESP8266 module provides an affordable and user-friendly solution for adding Wi-Fi connectivity to projects.

4.4.3 I2C LCD Display: The LCD screen in question is a 16x2 display with an I2C interface. It has the capability to display up to 162 characters. When working on Arduino projects that involve LCD displays and microcontrollers, it is common to face limited available pins, which can make wiring and connections difficult. However, this specific 16x2 LCD panel utilizes the I2C communication interface. This means that the LCD display only needs to be connected to four pins: VCC, GND, SDA, and SCL. As a result, using the I2C interface frees up at least four digital and analog pins on the microcontroller, allowing them to be used for other purposes.

4.4.4 Serial Communication: The LCD display under discussion is a 16x2 screen that utilizes an I2C interface and can accommodate up to 16*2 characters. When working on LCD display projects with Arduino and microcontrollers, it is common to encounter a shortage of available pins, making the process of soldering and wiring connections challenging. However, with the I2C interface featured on this particular 16x2 LCD panel, only a small number of pins are necessary for its operation: VCC, GND, SDA, and SCL. This means that at least four digital and analog pins on the microcontroller can be conserved and utilized for other purposes.

Serial communication is widely used when parallel communication is impractical due to factors like cable costs or synchronization issues. It enables data transmission over long distances or at low transmission rates. Serial communication has gained popularity because most computers are equipped with one or more serial ports, and connecting an instrument to a computer or establishing a connection between two computers only requires a cable, without the need for additional hardware.

4.4.5 Arduino IDE: The Arduino Integrated Development Environment (IDE) is a comprehensive software application developed in C and C++ to aid in the creation and deployment of software programs for Arduino-compatible boards. It provides a flexible and user-friendly interface that simplifies the tasks of programming, testing, and debugging code specifically tailored for Arduino devices. The Arduino IDE supports the widely-used C and C++ programming languages, ensuring compatibility and allowing developers to leverage their existing knowledge and experience with these languages. By adhering to established coding conventions, the Arduino IDE promotes the development of efficient and readable code. The syntax used in the Arduino programming language closely resembles that of C and C++, facilitating a smooth transition for developers already familiar with these languages, as they can quickly adapt to Arduino programming without significant learning curve.

V. APPLICATION OF NOTICEBOARD:

- a. An online notice board is a virtual platform where users can post a variety of messages and notifications, such as announcements, advertisements, and information.
- b. It is accessible on various digital devices, such as computers, tablets, and mobile phones, making it easy to access and share information.
- c. Online notice boards are highly convenient for users who need to stay informed about updates and changes in their community, workplace, or other settings.
- d. This platform is especially useful for people who cannot physically be present at a location, such as remote employees, students, or customers.
- e. By using an online notice board, organizations and businesses can save time and resources by communicating important information to their audience quickly and efficiently.
- f. This initiative can benefit both existing and new users, as it allows them to stay connected and informed about relevant events, activities, and news.

VI. RESULTS AND DISCUSSION:

To evaluate the performance of the proposed system, an experiment was conducted. The system consists of three main components: a Node MCU, a Python program, and an LCD display. The Node MCU plays a crucial role as a wireless receiver, enabling seamless communication between the Python program and the LCD display. It operates on a 3.3V power supply to ensure optimal functionality.

During the testing process, a user initiates the system by submitting a notice through the Python program. The program captures the user's voice input as the initial step. To convert the voice input into text, a sophisticated speech-to-text conversion algorithm is utilized. This algorithm efficiently transforms spoken words into written text.

The Node MCU quickly retrieves data from a database and displays the notice on the LCD screen. This wireless process allows for real-time notice display without any physical connections. The system uses a speech-to-text conversion algorithm, eliminating the need for manual input and making it more user-friendly. Users can speak their messages instead of typing them. Wireless communication adds versatility as notices can be displayed from a distance without physical connections. Overall, the system is efficient, user-friendly, and has potential applications in various settings. The experiment provides valuable insights into its performance.

VII. CONCLUSION:

The introduction of wireless technology has revolutionized communication, bringing forth enhanced efficiency and speed in our connections. By integrating this technology into notice boards, numerous benefits can be realized, including simplified message display and reduced maintenance requirements. Consequently, wireless notice boards have become invaluable tools in a wide range of settings, such as educational institutions, workplaces, transportation hubs, and even for personal use.

Wireless notice boards offer significant improvements to communication by enabling instant and effortless display of messages in real-time. Users can easily share announcements, news updates, and various types of information through digital devices like smartphones, tablets, and computers. This online notice board initiative provides a versatile and effective method of communicating vital information to a broad audience. It caters to both existing users and newcomers, allowing them to conveniently access the notice board from any location and at any time.

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