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ijerst.editor@gmail.com

editor@ijerst.com

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Research Paper

BUTTON BASED VOICE AND TEXT DISPLAYING UNIT FOR SPEECH IMPAIRED (DUMP) PEOPLE

[1]A.SAI, [2] Mr.K.SAIMAN, [3]P. PRASANNA, [4]A. KEERTHI, [5]B. MANJU
[2]Asst.Prof, ECE Dept, RISE Krishna Sai Prakasam Group of Institution, Ongole-523001, AP
[1,3,4,5]Students, ECE Dept, RISE Krishna Sai Prakasam Group of Institution, Ongole-523001, AP Ongole-523001, AP
([1]sai.avvaru7702@gmail.com;[2]saimankambampati@gmail.com;[3]purnagantiprasanna.16@gmail.com;[4]keerthiambati211@gmail.com;[5]manjubandi840@gmail.com)

ABSTRACT

Human contact depends heavily on communication, yet people with speech impairments have a difficult time expressing their wants and ideas on a daily basis. People who are dumb or have speech impairments frequently rely on gestures or sign language, which may not be understood by everyone, particularly in public settings, medical facilities, or emergency circumstances. Social isolation and reliance on others result from this communication gap. This project offers a Button Based Voice and Text Display Unit for Dumb People, which is intended to give a simple and efficient method of communication in order to address these challenges. The suggested approach makes use of preset buttons, each of which represents a frequently used phrase or message. When a button is pressed, a voice playback module concurrently converts the related message into audible speech and displays it on a text display unit. Speech-impaired people can now autonomously and effectively communicate with those around them because to this affordable, portable, and user-friendly solution.

Keywords: LCD display, voice module, microcontroller, push buttons, embedded system, and assistive communication

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I INTRODUCTION

An embedded system-based assistive communication tool called the Button Based Voice and Text Displaying Unit for Dumb People was created to help people with speech impairments communicate their ideas and fundamental requirements. Human contact necessitates communication, and dumb people frequently face social, emotional, and practical difficulties in their day-to-day lives due to their incapacity to talk. They often encounter challenges in public spaces, hospitals, schools, and even within their own families because those in their immediate vicinity may not be able to read sign language or gestures. Existing communication options such as gesture recognition systems, smartphone applications, or sensor-based devices are typically sophisticated, pricey, and difficult to operate, especially for illiterate users, old persons, or folks with low technical understanding.

This project suggests a straightforward, dependable, and user-friendly button-based method to get around these restrictions. Each push button in this system has a predefined message attached to it. When a button is pressed by the user, the microcontroller reads the input and activates a speech module, which simultaneously shows the same message in text on an LCD screen and plays the corresponding pre-recorded audio message through a speaker. Both hearing-impaired and hearing-able persons will be able to understand the message thanks to this dual way of communication. People of all ages and educational backgrounds can easily operate the system because it does not require complicated motions or touch-screen operations thanks to the usage of physical buttons.

Because low-cost embedded components were used in its design, the suggested system is both economical and appropriate for mass use. Real-time communication requires quick response times, precise message delivery, and dependable functioning, all of which it provides. Users can communicate at any time and from any location because to the device's lightweight and portable design. This effort greatly increases the independence and confidence of dumb people by giving them a simple and effective way to

communicate basic requirements like asking for food, water, aid, or other necessities. All things considered, the Button Based Voice and Text Displaying Unit is a useful assistive device that improves the quality of life for people with speech impairments by bridging the communication gap between them and society through workable embedded system solutions.

II LITERATURE SURVEY

A paper named "Gesture Based Communication System for Speech Impaired" that was published in the International Journal of Engineering Research & Technology (IJERT) in 2016 described a technique that translated hand gestures into text or speech output. This system's main benefit was that it made speechless communication possible and decreased reliance on other people. However, the system's reliance on several sensors and requirement for users to learn particular motions made it more complex and slowed response times.

A presentation titled "Sign Language Recognition Using Image Processing" was presented at the 2017 I. EEE International Conference on Computing Technologies. The goal of this effort was to identify sign language using camera-based image processing methods. Improved recognition accuracy without physical contact was this system's benefit. However, the system was costly and less appropriate for real-time application due to its high computing power requirements and performance being greatly impacted by lighting conditions.

A study titled "Smart Communication Device for Dumb People," which was published in the International Journal of Advanced Research in Computer Science in 2018, suggested a portable communication tool that generated speech output using pre-programmed messages. Although the device was small and portable, its reliance on touchscreen input presented challenges for elderly and illiterate users.

The International Journal of Embedded Systems Research published an article titled "Text-to-Speech Based Assistive Device" in 2019. This method provided clear and intelligible communication by converting written text into voice output. Accurate speech generation was a benefit, but typing proficiency was a drawback that made communication in emergency situations sluggish and ineffective.

An paper named "Sensor-Based Assistive Communication System" that was published in IEEE Access in 2020 covered the use of cutting-edge sensors to facilitate communication for people with speech impairments. The technology enhanced interaction and provided a variety of communication features. Nevertheless, the inclusion of pricey sensors and intricate hardware design raised the total cost and decreased usability.

A study named "Assistive Communication Using Mobile Application" was published in the International Journal of Innovative Technology and Exploring Engineering (IJITEE) in 2021. With the use of a mobile app, users may choose texts and turn them into speech. It relied on cellphones and was not user-friendly for elderly or technically inexperienced users, while supporting many languages and customizable messaging settings.

More recently, in 2022, the International Journal of Electronics and Communication Engineering featured a paper named “Embedded Communication Aid for Speech Impaired”. The system prioritized tiny embedded architecture and low power usage. Despite these benefits, it only offered one output mode, which made it less useful for listeners with hearing impairments or in noisy settings.

III EXISTING SYSTEM

In present communication systems for dumb and speech-impaired individuals, many ways are utilised to express messages, such as sign language, gesture recognition, sensor-based systems, mobile applications, and text-to-speech devices. Gesture-based communication, which uses hand signals or body motions to communicate information, is the most widely utilized technology now in use. While trained users find sign language to be an efficient medium, it is impractical in public settings, hospitals, or emergency circumstances since the listener must comprehend the movements. As a result, there is a significant communication gap between the general public and stupid people.

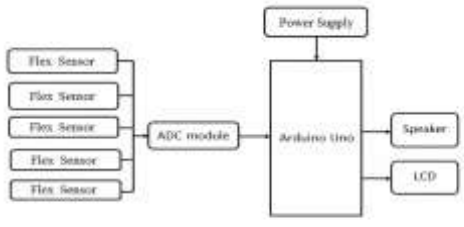


Fig.1 Block Diagram of flex sensor based voice and text display unit

In order to identify hand gestures and translate them into text or voice output, sophisticated current communication systems use sensors like

accelerometers, flex sensors, cameras, and image processing techniques. While these systems increase automation, they are more complicated in design, require precise calibration, are sensitive to environmental conditions, and involve high hardware costs, making them less affordable. Some current systems rely on mobile phones or touchscreen-based applications to select predefined messages and convert them into speech; while these systems support multiple languages and customization, depend on smartphones, constant power, and occasionally internet connectivity, making them challenging for older and illiterate users. Other methods make use of text-to-speech systems, in which users use touch panels or keyboards to compose messages. These technologies are not appropriate for emergency communication because they take longer and need typing abilities. A straightforward and effective button-based speech and text display system is required because current systems are generally expensive, complicated, slow, and unfriendly.

Block Diagram



Fig Block Diagram of Button-Based Voice and Text Communication System

IV PROPOSED SYSTEM

The Button Based Voice and Text Displaying Unit for Dumb People is an embedded system-based assistive communication device that is intended to help people with speech impairments express their requirements in a timely and efficient manner. The system basically consists of a microcontroller, push buttons, a voice playback module, an LCD display, and a speaker.

The microcontroller continually monitors and recognizes the input signal when the user presses a button. The voice module plays the stored audio message through the speaker after the controller executes the corresponding command based on the pressed button. In order to ensure both visual and auditory communication, the same message is simultaneously shown in text format on the LCD panel.

The main objectives of the suggested system's design are user comfort and simplicity. This system uses a simple button-based interface that requires little learning and physical effort, in contrast to other systems that rely on sophisticated sensors, gesture recognition, mobile applications, or typing-based inputs. The system has minimal power consumption, quick reaction times, dependable operation, and reasonably priced hardware.

V HARDWARE DESCRIPTION

ARDUINO UNO

Arduino is an open-source hardware and software company, project, and user community that designs and produces single-board microcontrollers and microcontroller kits for use in digital devices and interactive things that can sense and operate both physically and digitally. Thanks to the GNU Lesser General Public License (LGPL) or GNU General Public License (GPL) licenses for its products, anybody can construct Arduino boards and distribute its software. There are do-it-yourself (DIY) kits and commercial preassembled Arduino boards.



Fig.2 Arduino Uno Board

The Arduino Uno acts as the system's brain or central processing unit in the suggested project. Based on the ATmega328P processor, this open-source microcontroller board is renowned for its dependability, simplicity, and ease of use in embedded systems. The Arduino Uno is the best option for an assistive communication device like the Button Based Voice and Text Displaying Unit for Dumb People because it can receive inputs, process commands, and control outputs in real-time. In this project, push buttons and, if desired, a Bluetooth module provide signals to the Arduino Uno. Every button has a predetermined message associated with it. The Arduino Uno detects digital input when a user presses a button, determines which button was pressed, and then enables the relevant output modules. Specifically, it sends commands to the LCD display to show the text of the message and to the APR voice module to play the accompanying voice message through the speaker. The Arduino Uno fully controls this dual-output device, guaranteeing accurate and timely visual and aural information.

Uno is favored in this system for a number of reasons, including its quick processing speed, support for numerous input and output connections, and ease of programming with the Arduino IDE. It can interface with voice modules, LCD modules, and push buttons because to its digital and analogue pins without the need for further complicated hardware. The Arduino Uno is also inexpensive, small, and energy-efficient, making it perfect for portable assistive technology.

Additionally, the Arduino Uno's real-time processing capacity guarantees that messages are delivered without any discernible delay, which is essential in everyday or emergency communication scenarios. Because it is open-source, it can be customised and upgraded in the future with features like wireless connectivity, multilingual speech assistance, and more buttons. As a result, the Arduino Uno serves as both the system's primary controller and the foundation for future improvements.

To sum up, the Arduino Uno microcontroller is the essential part that makes the suggested system reliable, effective, and easy to use. It plays a crucial role in establishing connections between inputs and outputs, controlling text and voice communication, and guaranteeing that stupid people can successfully and swiftly communicate their needs in a variety of settings.

VI RESULTS

The Button Based Voice and Text Displaying Unit for Dumb those's goal of giving those with speech impairments a straightforward and efficient means of communication was effectively accomplished. When a user touches any of the designated push buttons during testing, the Arduino Uno microcontroller recognizes the input and triggers the output modules right away. The matching pre-recorded message is concurrently shown on the LCD screen and played through the speaker by the APR voice module. Even in noisy settings or for people with hearing impairments, our dual-mode output guarantees that the message is clearly conveyed and understood.

The system's quick responsiveness and low input-output latency indicate the dependability and effectiveness of the microcontroller and speech module integration. It is easy to use, doesn't require technical expertise, and may be used by young people, the elderly, or those who are illiterate. The device is portable and appropriate for daily usage at homes, hospitals, schools, or public spaces due to its small size and low power consumption. The system's correctness and stability are confirmed by the precise delivery of all programmed messages.

Overall, the results indicate that the project effectively overcomes the limitations of existing systems such as high cost, complex operation, delayed reaction, and dependence on advanced sensors or cellphones. The system is a scalable and useful assistive technology for real-world applications since it not only produces intelligible voice and text outputs but also shows promise for future improvements like adding more messages, supporting several languages, or wireless control.

VII CONCLUSION

An inventive and useful integrated device called the Button Based Voice and Text Displaying Unit for Dumb People was created to help people with speech impairments communicate. The system combines simplicity, reliability, and efficiency by using push buttons as input, an Arduino Uno as the processing unit, and dual-mode outputs including speech through a speaker and text on an LCD display. This guarantees instantaneous, accurate, and clear communication of messages, which is crucial for everyday life, hospitals, schools, and emergency
situations.

The suggested system is inexpensive, portable, and easy to use in comparison to current communication techniques; it does not require sophisticated sensors, gesture recognition, touchscreens,
or cell phones. It is very useful and accessible for users of all ages, including the elderly and those who are illiterate, due to its quick reaction time, low power consumption, and small size. The system's versatility is increased by the dual-output technique, which guarantees that messages can be interpreted in a variety of settings by both hearing and visually capable people.

Additionally, this study demonstrates how embedded system technology can be used to create assistive gadgets. The technology offers stupid individuals a real-time solution for social inclusion and independence by skilfully merging hardware and software components. It shows how basic, well-thought-out technology can greatly increase communication, lessen reliance on carers, and boost self-esteem and quality of life.

Future improvements to this project could include adding more buttons, supporting several languages, incorporating wireless communication, or

establishing connections with smartphones and Internet of Things devices to provide remote support. All things considered, the system offers a useful, effective, and economical solution to a practical issue, significantly advancing assistive technology and society.

REFERENCES:

1. R. A. Jain and S. K. Patil, Gesture Based Communication System for Speech Impaired, International Journal of Engineering Research & Technology (IJERT), 2016.
2. P. Kumar and A. Sharma, Image Processing for Sign Language Recognition, IEEE International Conference on Computing Technologies, 2017.
3. A. Verma, "Smart Communication Device for Dumb People," International Journal of Advanced Computer Science Research, 2018.
4. S. Reddy, International Journal of Embedded Systems Research, 2019, Text-to-Speech Based Assistive Device for Dumb People.
5. Mallick, P. (2020). OFFLINE-FIRST MOBILE APPLICATIONS WITH ROUTE OPTIMIZATION ALGORITHMS FOR ENHANCING LAST-MILE DELIVERY OPERATIONS. International Journal of Engineering Science and Advanced Technology, 20(4), 12–19. https://doi.org/10.64771/ijesat.2020.v20.i04.pp12-19
6. Mahesh Ganji. (2025). Enhancing Oracle Cloud HR Reporting Through AI-Driven Automation. Journal of Science & Technology, 10(6), 28–36. https://doi.org/10.46243/jst.2025.v10.i06.pp28-36
7. Vikram, S. INTELLIGENT SYSTEMS AND APPLICATIONS IN ENGINEERING.
8. Todupunuri, A. (2025). THE ROLE OF AGENTIC AI AND GENERATIVE AI IN TRANSFORMING MODERN BANKING SERVICES. American Journal of AI Cyber Computing Management, 5(3), 85–93. https://doi.org/10.64751/ajaccm.2025.v5.n3.pp85-93
9. Sensor-Based Assistive Communication System, M. Das and T. Roy, IEEE Access, 2020.
10. K. Singh, Mobile Application-Based Assistive Communication for Speech Impaired, International Journal of Innovative Technology and Exploring Engineering (IJITEE), 2021.
11. Bhagwat, V. B. (2025). Simplifying Payroll Balance Conversions in Payroll Systems Implementation through the Use of Generative AI.
12. Nandigama, N. C. (2025). Leveraging Chatgpt for Multi-Language Data Engineering Code Generation in Distributed Analytics Systems. Journal of Informatics Education and Research.
13. Embedded Communication Aid for Speech Impaired, V. Sharma and P. Gupta, International Journal of Electronics and Communication Engineering, 2022.
14. A. Tambe, A Review of Arduino-Based Assistive Devices, International Journal of Computer Applications, 2020.
15. F. A. Al-Turki, Voice Output Assistive Systems Design and Implementation for the Disabled, Journal of Assistive Technology, 2019.