

Android Based Examination System for Visually Challenged People Using Speech Recognition

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ABSTRACT

The simple task of writing exam becomes very difficult for visually impaired students. In this project we provide a smart electronic system for blind people which will be useful to write their exams. Our System is intended to provide a voice based questionnaire to the blind people and the answers will be captured through voice and converted to text via ANDROID app and valuation of the keywords are done there and the converted text will be passed to the LCD screen where they can print the document and evaluate the result. The overall result is again declared as voice output. Thus the system will help the physically challenged to effectively take up their exams.

Keywords- Speech recognition, blind people, android application.

1. INTRODUCTION

Blind people confront a number of visual challenges everyday –from reading the label on a frozen dinner to figuring out if they're at the right bus stop. Many tools have been introduced to help address these problems using computer vision but providing the same tools through a simple mobile is a necessity of the time. In today's world the learning capability is judged by means of examinations. They are very important in every sector of education system has increased. These exams should be very easily available and accessible for all the students. This simple task becomes really tedious for blind and visually impaired students.

This paper is a very important need in today's world. It can be used to make examination experience easy for visually impaired people. This is better than many other options available till date for visually challenged people. Making use of Braille, Providing human support and giving extra time to complete the same task are some available methods to help visually impaired people to take the tests. This paper will help innovate a new way that will help blind and visually impaired people to take the test on their own without using anyone's help.

The key focus of application is to provide students with an ability to interact with the system through speech.

The application automates the examination process through reading out questions to the user and receiving their input orally.

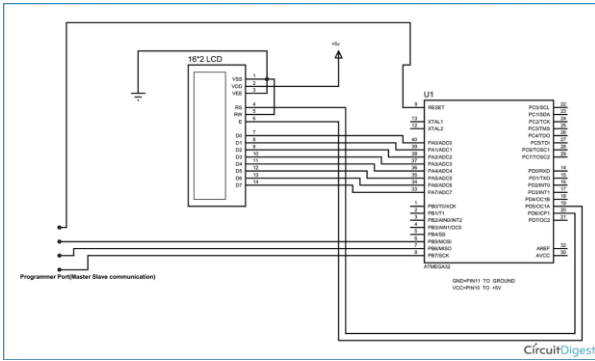
Technology of voice recognition will be used for solving the tests. Hence this application will allow visually impaired people to appear for test in more convenient and efficient

2. TECHNIQUES USED:

2.1 LCD INTERFACING WITH ATMEGA32 MICROCONTROLLER:

To establish a good communication between human world and machine world, display units play an important role. And so they are an important part of embedded systems. Display units - big or small, work on the same basic principle. Besides complex display units like graphic displays and 3D displays, one must know working with simple displays like 16x1 and 16x2 units. The 16x1 display unit will have 16 characters and are in one line. The 16x2 will have 32 characters in total 16 in 1st line and another 16 in 2nd line.

Here one must understand that in each character there are $5 \times 10 = 50$ pixels so to display one character all 50 pixels must work together. But we need not to worry about that because there is another controller (HD44780) in the display unit which does the job of controlling the pixels. (you can see it in LCD unit, it is the black eye at the back).



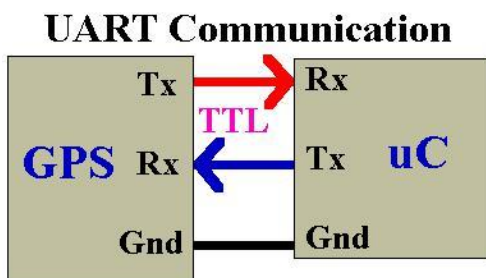
2.2UART COMMUNICATION

The UART, or Universal Asynchronous Receiver / Transmitter, is a feature of microcontroller useful for communicating serial data (text, numbers, etc.) to PC. The device changes incoming parallel information (within the microcontroller/PC) to serial data which can be sent on a communication line. Adding UART functionality is extremely useful for robotics. With the UART,you can add an LCD, Bluetooth wireless; debugcode, test sensors.

3.OTHER TERMINOLOGY

3.1TX AND RX:

As you probably guessed.Tx represents transmit and Rx repeset receive.The transmit pin always transmit data and the receive pin always receives it.sounds easy,But it can be a bit confusing.For example.suppose you have a GPS device that transmits a TTL signal and you want to connect this GPS to your microcontroller UART.This is how you would do it:



Notice how Tx is connected to Rx, and Rx is connected to Tx. If you connect Tx to Tx, stuff will fry and kittens will cry.

If you are the type of person to accidentally plug in your wiring backwards, you may want to add a resistor of say ~2kohm coming out of your UART to each pin. This way if you connect Tx to Tx accidentally, the resistor will absorb all the bad ju-ju (current that will otherwise fry your UART).Tx pin -> connector wire -> resistor -> Rx pin

And remember to make your ground connection common!

3.2BAUD RATE:

Baud is a measurement of transmission speed in asynchronous communication. The computer, any adaptors, and the UART must all agree on a single speed of information - 'bits per second'.

For example, your robot would pass sensor data to your laptop at 38400 bits per second and your laptop would listen for this stream of 1s and 0s expecting a new bit every 1/38400bps = 26us (0.000026 seconds). As long as the robot outputs bits at the pre-determined speed, your laptop can understand it.Remember to always configure all your devices to the same baud rate for communication to work!

3.2ASYNCHRONOUS SERIAL TRANSMISSION

As you should already know, baud rate defines bits sent per second. But baud only has meaning if the two communicating devices have a synchronized clock. For example, what if your microcontroller crystal has a slight deviation of .1 second, meaning it thinks 1 second is actually 1.1 seconds long. This could cause your baud rates to break! One solution would be to have both devices share the same clock source, but that just adds extra wires . . . All of this is handled automatically by the UART, but if you would like to understand more,continue reading.Asynchronous transmission allows data to be transmitted without the sender having to send a clock signal to the receiver. Instead, the sender and receiver must agree on timing parameters in advance and special bits are added to each word which are used to synchronize the sending and receiving units. When a word is given to the UART for Asynchronous transmissions, a bit called the "Start Bit" is added to the beginning of each word that is to be transmitted.

The Start Bit is used to alert the receiver that a word of data is about to be sent, and to force the clock in the receiver into synchronization with the clock in the transmitter. These two clocks must be accurate enough to not have the frequency drift by more than 10% during the transmission of the remaining bits in the word. (This requirement was set in the days of mechanical teleprinters and is easily met by modern electronic equipment.)

When data is being transmitted, the sender does not know when the receiver has 'looked' at the value of the bit - the sender only knows when the clock says to begin transmitting the next bit of the word.

When the entire data word has been sent, the transmitter may add a Parity Bit that the transmitter generates.

The Parity Bit may be used by the receiver to perform simple error checking. Then at least one Stop Bit is sent by the transmitter.

When the receiver has received all of the bits in the data word, it may check for the Parity Bits (both sender and receiver must agree on whether a Parity Bit is to be used), and then the receiver looks for a Stop Bit. If the Stop Bit does not appear when it is supposed to, the UART considers the entire word to be garbled and will report a Framing Error to the host processor when the data word is read. The usual cause of a Framing Error is that the sender and receiver clocks were not running at the same speed, or that the signal was interrupted. Regardless of whether the data was received correctly or not, the UART automatically discards the Start, Parity and Stop bits. If the sender and receiver are configured identically, these bits are not passed to the host.

If another word is ready for transmission, the Start Bit for the new word can be sent as soon as the Stop Bit for the previous word has been sent.

In short, asynchronous data is 'self synchronizing'.

3.4 HALF AND FULL DUPLEX:

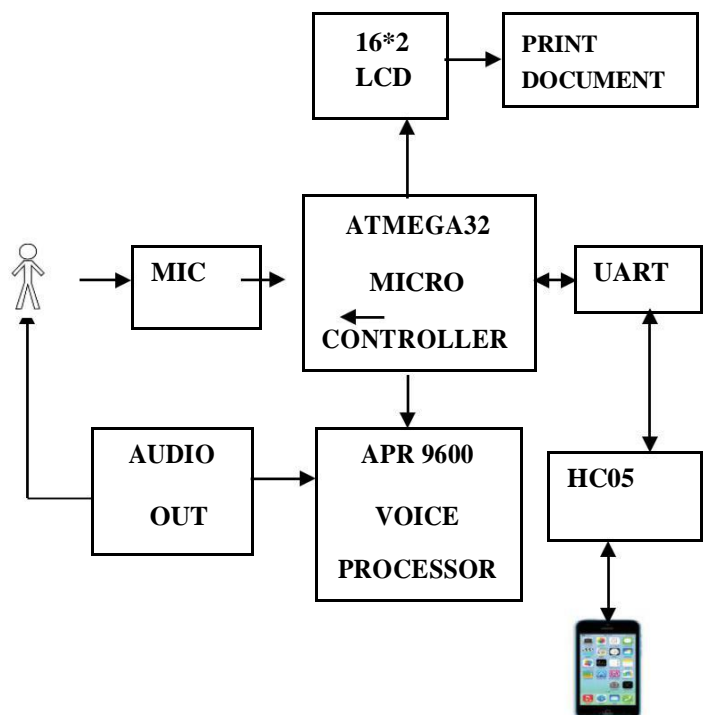
Full Duplex is defined by the ability of a UART to simultaneously send and receive data. Half Duplex is when a device must pause either transmitting or receiving to perform the other. A Half Duplex UART cannot send and receive data simultaneously. While most microcontroller UARTs are Full Duplex, most wireless transceivers are Half Duplex. This is due to the fact that it is difficult to send two different signals at the same time under the same frequency, resulting in data collision.

If your robot is wirelessly transmitting data, in effect it will not be able to receive commands during that transmission, assuming it is using a Half Duplex transmitter.

4. WORKING

Reading questions during examinations are really tough for the blind or visually impaired people due to their limited visibility. We propose to develop an intelligent system which solves all these problems in real time. The proposed applications will read out the questions to the candidates with help of speech synthesis. This application will accept the answers from the candidates through voice commands using speech recognition. The answer is sent to the mobile where the audio gets converted as text and it is compared with predefined key words that are done with the help of ANDROID application. The audio that is converted as text is display in a LCD display. The results are instantly declared through voice. We hope that our system will provide the blind people to effectively tackle their examination related problems in real time.

BASIC ARCHITECTURE



5.SCOPE OF THE PAPER

This paper proposes a system that will create a revolution in a world of education by providing an easier way for visually impaired people to take tests just as normal students do. The system acts as a mediator who converts the responses that are given orally to the system to acceptable and needed format i.e. Text. When user gives response orally speech to text converter is invoked and it converts the response in text to mark the appropriate option of all. Similarly, other essential things like timer and result can also be heard. Both the things can be invoked orally by just remembering few commands. There are different sections in the system.

User can choose any one option through voice command. The whole system works on voice command so that everyone can use the same system using visually impaired people.

6.PROBLEM DEFINITION

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Use of this application shall benefit students with:

- Learning disabilities
- Poor or limited motor skills
- Vision impairments
- Physical disabilities
- Limited English Language

The application will help the students with reading-writing disabilities as well as sensory disabilities(blind or handicapped).

7.CONCLUSION

In this paper we have proposed a system that runs on the latest technology (Android) and makes use of speech technology to totally run the application. System works amazingly with any type of human voice.

Its result is not based on specific voice. The same application can also be used by sighted students or people who don't need voice commands for using the system. It will be a revolutionary change that will benefit visually impaired students, boost their confidence and put them at par with regular students and people.

8.REFERENCES:

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