

## DESIGN AND DEVELOPMENT OF SMART SPECTACLE FOR DEAF PEOPLE USING IOT

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### ABSTRACT

In nowadays there are lots of physically challenge (deaf) people's faces lots of problems while communicating. There are too many technologies used in today's world. To overcome the limitations Found in current technologies those are used for deaf peoples. Our project aim is to design and development of smart spectacle for physically challenge people using IOT. We are use raspberry-pi based speech to text converter and display it on glass. Peoples with hearing loss problem, often use low quality analog hearing aids, and some other wearable devices. But that is only for some percent of deaf peoples. There is no device is designed for totally deaf peoples. So we are going to design smart spectacle for such a peoples, for better communications between deaf peoples and normal peoples. In our project we are also provide some extra features that feature increases its quality and makes our project strong.

**Keywords:** IOT; Speech To Text Converter; Raspberry-Pi; Smart Glass; RTOS.

### I. INTRODUCTION

World is hardly live without communication that's means it is very important to us, the communication among the deaf and dumb people is carried out by text and visual expression. There are various technologies used in today's world for deaf people's like gestures, bone conduction, sign expression etc.

**For this project we are using technology such as:**

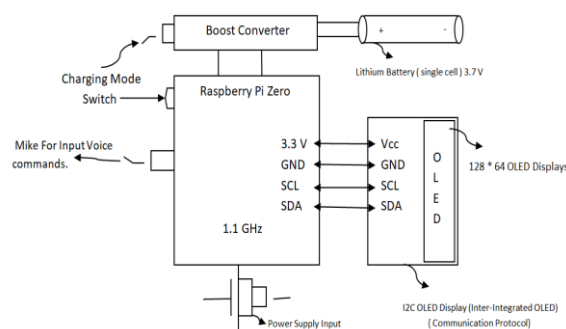
- 1) Automatic speech recognition text convertor by using Raspberry -Pi
- 2) Real time operating system.
- 3) Transparent Display

### II. RELATED WORK

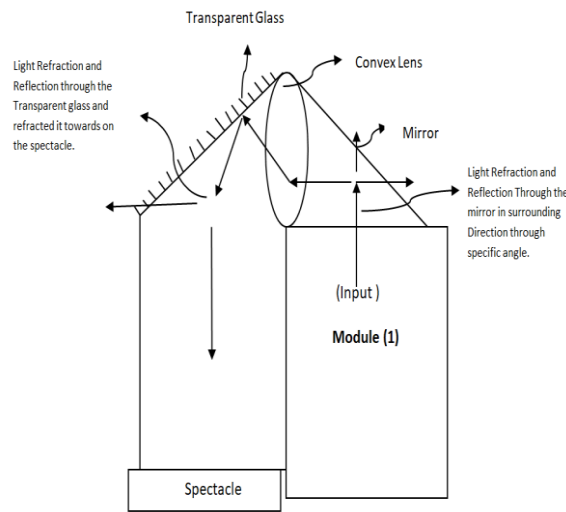
In the today's world there are various technologies is developed for hearing loss persons. But this technologies is not sufficient for deaf persons who has 100% hearing loss from the birth, To overcome this problem we have to design a spectacle that help to the deaf person to communicate with other person by converting the voice commands in the form of text on the spectacle. This project is providing better understanding to conversation between deaf peoples with normal peoples. Provide a real time display on the spectacle as speech to text conversation. Some technologies like bone conduction and gestures techniques for hearing loss persons are exists ,but for totally deaf persons very few technologies is developed ,but we have to developed this kind of spectacle for deaf persons. These tools and Technologies are help to the deaf persons for living better ,while communicating with other persons for better performance.

### III. SYSTEM ARCHITECTURE

Module 1:-



Module 2:-



**Working**

In the Module1 where we used main hardware as raspberry pi zero, with the raspberry pi we connected the charging module and boost converter for starting the process. Where we connected we connected the alternate power supply as lithium battery. Raspberry pi has their own operating system we just connecting with computer and with the help of Wi-Fi connectivity we connected it with Computer and simple used the speech to text converting python code. For displaying the speech to text we used OLED display with I2C OLED. And for recognizing the voice we used USB mike. Where voice recognized and converting it into text and well displayed on LCD ,and user can easily read it. In the module 2 we used spectacle and to be using the refraction and reflection process we transfer the light of incident from LCD to the glass and spectacle, we used convex lens and magnifying mirror and transfer this text incident display to the spectacle and user easily read it.

**IV. HARDWARE AND SOFTWARE REQUIRED**

**1. Raspberry-Pi Zero**



**Fig: Raspberry-Pi Zero**

Raspberry-Pi Zero can be setup to be run like a standard desktop computer, it has their Raspberry-pi operating system to for to connecting with components.

Its are main component of this project.

Its also know as single board computer.

It has 1-GHZ, Broadcom BCM2835 CPU.

512 MB RAM

Micro USB , Mini HDMI Ports, Data Port, Mike Port.

40 GPIO Pins, Portable Device.

**2.I2C OLED Display**



Inter-Intergraded Circuit OLED Display , used for Displaying the text which are input in it.It is basic communication protocol between raspberry pi and display. OLED display module has 128 × 64 resolution display and is best for development boards compatible with raspberry-pi zero.

With a supply voltage of 3.3V to 5.It has 4 connecting Port pins as GND, VCC, SCL, and SDA.SCL- Serial Clock SDA-Serial Data.

**3. USB Mike**



USB mike, which are usable for connecting with raspberry-pi zero and recording the voice through in the module.

This USB Mike connected with Raspberry-pi Zero.

It has operating voltage 4.5V.

**4. Lithium Batter**

Lithium 3.7 Volt Single cell Battery for Power supply to the module.



**5. Charging Module**



Li-ion Lithium battery charging module charging board charger. Charging Module used for alternate power supply for longer period to the main module. Maximum charge current as 1200 mA.

**6. Convex Lens:-** Convex Lens is used for refracting and reflecting the light on the spectacle. These are the lens that converges ray of light that convey parallel to its principle axis.

**7. Transparent glass:-** This is used for reflecting the incident light from convex lens to spectacle. Consequently, Photons of incident light travel through glass instead of being reflected towards the spectacle.

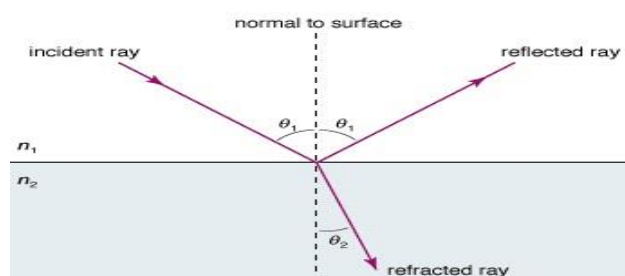
**8. Spectacle :-**

Spectacle are used for displaying incident light (text) from convex lens to transparent glass and then reflected it on the glass



**V. PROCESS DESCRIPTIONS**

The whole process of the modules are based on light refraction and reflection towards the LCD or transparent glass.



Reflection is the bouncing back of light when it strikes the smooth surface.

Refraction is the bending of light when it travels from one medium to another.

### Reflection

Reflection is the abrupt change in the direction of propagation of a wave that strikes the boundary between two different media. At least some part of the incoming wave remains in the same medium. Assume the incoming light ray makes an angle  $\theta_i$  with the normal of a plane tangent to the boundary. Then the reflected ray makes an angle  $\theta_r$  with this normal and lies in the same plane as the incident ray and the normal.

**Law of reflection:**  $\theta_i = \theta_r$

Specular reflection occurs at smooth, plane boundaries. Then the plane tangent to the boundary is the boundary itself. Reflection at rough, irregular boundaries is diffuse reflection. The smooth surface of a mirror reflects light specularly, while the rough surface of a wall reflects light diffusely.

### Refraction

Refraction is the change in direction of propagation of a wave when the wave passes from one medium into another, and changes its speed. Light waves are refracted when crossing the boundary from one transparent medium into another because the speed of light is different in different media. The reflectivity or reflectance of a surface material is the fraction of energy of the oncoming wave that is reflected by it.

## VI. CONCLUSION

The developed System will transcribe speech. i.e spoken words or conversation into text and this text will be displayed on the LCD or glass. Raspberry-pi used for to speech to text conversation by using efficient algorithm. The voice is recognized through the mike which are connected to the device. It can be used both in the official places and domestic places. People operating this device in both these places as were they need to communicating with others. This will help the physically challenge (deaf) peoples for communicating better and efficiently.

### FUTURE WORK

Efficient communication is important for living in the society. Every successful person known by their speech. Speech to text conversation on the display were we can provide a Bluetooth connectivity to connecting the Smartphone, for the future purposed we also take storage as using the cloud computing. Storage is for saving the documents and video screen recording are stored for future purpose. this are the future scope to continuing the better performance of these project.

## VII. REFERENCE

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