Raspberry Pi based Sign to Speech Conversion System for Mute Community

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Abstract. Motion sign based language becomes important roles for mute community for data transmission. Mute people facing very difficult situation to convey information to normal people. We find the solution for dumb community to make their communication simple and smart using micro processor. We proposed a latest sign language system for dumb people; it helps in emergency situation to convey their required information to normal people easily. This proposed system converts their sign signal to voice. In this proposed method we implemented using Raspberry Pi microprocessor to fast conversion of data. In this technique two major roles that sign based data conversion and voice generation system using micro processor. For the implementation of this enhanced sign conversion system we used flex sensors as sign conversion and RPI module for processing and 3.5mm Audio jack for voice enable. This proposes system will be useful to all mute community, physically unable persons as well as older people to share their information in any situation.

Keywords: Raspberry Pi, Speech Conversion, flex sensor, LCD.

1. Introduction

Impaired people are everyone genuinely or simple-minded. A Dumb and old age individuals goes up against such an assortment of issues in the overall population. Impaired in the sense it is the state of weakness what’s more, moreover it suggests the limitations experienced by the impaired individual in relationship with the activities of the health of practically identical age and sex. This paper points to bring down the obstacle in correspondence. It relies upon the need of working up an electronic device that can make a translation of motion based correspondence into discourse in order to make the correspondence between the quiet bunches with by and large populace possible. Movements of the hands are identified by the glove for Dumb individuals and it will be changed over into voice so common people can grasp their look movement in a motion based correspondence is a particular advancement of the hands with a specific shape made out of them and it sends email to concern individual of moronic and visually impaired individuals predefined pictures. In existing framework we utilized MEMS Accelerometer for movement identification of quiet individuals. In the square chart we will have the segment like MEMS accelerometer ADC converter, microcontroller, speaker, Arduino. Accelerometer sensor utilized for identifying the hand movement. Accelerometer actuator acts as position, that point their voltage additionally changed. Accelerometer sensor depends on variable resistance it acts as sensor high and low. This information is straightforwardly given to Arduino. In this existing system accuracy of data transfer system is very less and its complex integration of audio speaker connection and consume huge power. To avoid this we proposed new sign conversion system using raspberry Pi.

2. Literature Survey

In all around the globe about 9.1 billion individuals are hard of hearing and idiotic. In their day by day life they face a lot of issues on their correspondence. It is perceived that in excess of a half of our mind is committed to the understanding of what we see, making the sight the most prevailing sense [1]. In
this paper, motion acknowledgment that assumes a key job. Proposed paper incorporates a brilliant glove that interprets the Braille letter set, which is utilized generally by the proficient hard of hearing visually impaired populace, into text and the other way around, and imparts the message by means of SMS to a distant contact [2]. While it's simple for the Deaf to impart among themselves utilizing hand signs, the overall population regularly finds it hard to follow these motions. Mediators [3] who have aced the methods associated with Sign Language are continuously required in such cases. The speak module, a minimal, open source, programming discourse synthesizer for Raspberry Pi is used which changes over the predefined text to discourse. The produced codes even relate to activities like turning on the fan, lights and so forth. A vibration sensor is associated as a wrist band to the client at whatever point the doorbell rings, the sensor [4] vibrates, which tells the client. The essential point of this paper is to present an issue that will proficiently interpret language signals [5] to each text and reasonableness voice. Regularly daze individuals have an issue in recognizing their current area. So to support them, the Raspberry Pi is associated to the glove has a GPS module which recognizes the scope what’s more, longitude. The location comparing to those qualities are discovered utilizing the decoder’s module of python. Once again the eSpeak module changes over this location into discourse or then again sound yield. Signal acknowledgment [6] is classed into a couple of principle classifications: vision based for the most part and locator based [5]. Silvia Mirri et al. [7] conceived a gadget for the hard of hearing visually impaired clients that can utilize the glove to convey messages to other clients, utilizing the Malossi letters in order. The characters (and phrases) along these lines made, will be sent to the android application and shown or heard through discourse.

3. Proposed System

The proposed sign conversion system is integrated of both hardware and software. This system used four flex sensors, audio speakers and raspberry pi 3 b+ model microprocessor, regulated power supply section for sign conversion system using python programming

![Fig.1.Block diagram](image)

Microprocessor is the integrated of all input and out modules for processes the data every individual sensor finds the respective parameter of data gives to the processor. Flex sensor are provide analog values of the data when it alerts its position. When flex sensors bend then it activate and give output voltage. This output voltage reads by the microprocessor with the help of python scripting language controls the output modules. 3.5mm audio jack used as voice generation circuit for proper sound. We used four flex sensors for 5 parameter alerts through voice. First flex sensor activated displays I need water on LCD monitor and same thing will be voice converted trough speakers. Second flex sensor activated displays I need food massage on LCD monitor and same thing will be voice converted trough speakers. Third flex sensor activated displays I need medicine massage on LCD monitor and same thing will be voice converted trough speakers. Fourth flex sensor activated displays please help for washroom massage on LCD monitor and same thing will be voice converted through speakers.
converted through speakers. All four flex sensors are stacked to glove when all 4 activated displays emergency massage on LCD monitor and same thing will be voice converted through speakers.

This schematic diagram informs that which module of the pins connected to which pins of microprocessor Raspberry pi. The hardware functional modules are explained below.

A. Regulated Power Supply

In this section of RPS we need 5v dc to work RPI processor. This RPS module is getting the required voltages from higher voltages with the help of filters and voltage regulators. 12v alternating current received by 230 v alternating current step-down by transformer, Bridge rectifier used to converts AC voltage to DC voltage. 1000 micro farad Capacitor for filtering the noise and voltage regulator 7805 used to provide 5v DC for operating the RPI processor.

B. Raspberry Pi

Raspberry pi processor used to integrate the all input and output peripherals, process the input data and control the output modules. This processor having 4 USB ports for integrating output modules. 1GB RAM which is high speed process the data. 3.5mm audio socket for output voice, CSI camera
port for interface camera, micro SD card for operating system storage, 1.2GHz speed 64 bit Broadcom processor. This processor having 40 GPIO pins. All input sensors and output modules are interfaced to processor. Python programming used to implement RPI based applications.

![Raspberry Pi](image)

Fig. 4. Raspberry Pi

C. Flex Sensor

Flex sensors is bending position converted to voltage. If the bend of flex sensor is 0 degrees its acts as in active. If the bending of flex increased to 45 degrees it then increases the resistance value. Depends upon the resistance value we alter the status of sensor. All the sensors are integrated to raspberry pi module and these sensors are easy to perform their activities easily.

![Flex Sensor](image)

Fig. 5. Flex Sensor

D. LCD Monitor

A liquid Crystal Display commonly abbreviated as LCD is essentially a display unit built using liquid technology. LCD module is 32 character displays, which is 16x2 models. Having 16 Characters in row. LCD module interfaced to microprocessor with 16 pin configuration. LCD has 16 pins in series. Each pin is programmed to do here: Pins 1 and 16: Power and ground are these. Pin 3: This is used to change the LCD's brightness. Pins 4–6: Used for LCD service. Pins 7–14: Used as line of info. Pins 15–16: Used to control backlight to the LCD.

![16x2 LCD](image)

Fig. 6. 16x2 LCD

E. Audio speakers

3.5 mm audio used for voice output. These speakers have universal pin used to insert for micro
processor. The corresponding flex activated corresponding voice data will be blown out using these speaker modules. The pair of speakers will work with 5v dc voltage which we provide using ush connector from Raspberry pi.

![Audio speakers](image)

Fig.7. Audio speakers

F. Software

In embedded system software module plays important role for any electronic automation. This proposed article we use Python IDE for programming development, debugging and compilation process. Python is effective scripting language for real time applications. Rasberian Operating System is used in Raspberry pi modules.

G. Results and Discussion

This is the output of sign to voice conversion system obtained accurate results and contrusteded in a model way Hardware designed model of sign to voice conversion system which is integrate of all input flex sensors and output LCD, Audio speakers to Raspberry Pi. This proposed system is integrated all input sensors and output modules for easy to motion based sign to voice conversation system. This in us implemented using Raspberry pi 3b+ model for high efficiency in speed and accuracy in output execution.

![Output Hardware setup](image)

Fig.8 Output Hardware setup
Fig. 9 powered on Output Hardware setup

Powered on Hardware designed model of sign to voice conversion system which is integrate of all input flex sensors which is form in a glow to easy operation and output LCD, Audio speakers to Raspberry Pi. All flex sensors are the attached to the five finger glove to easily control the system for older and physically unable persons. If we lightly bend any finger according to that data will be displayed on the output module. We implemented all 4 flex sensors with ADC converter which attached to the RPI processor.

Fig. 10 proposed title displayed on LCD
Figure 10 in the proposed model title is displayed on the output module LCD, sign to speech conversion system. Once the power on then after system it displays title. Figure 11 in the proposed model operation of flex sensor output. One flex sensor activated then it automatically display that I need food and speakers give the same alerting. Figure 12 in the proposed model operation of flex sensor output. One flex sensor activated then it automatically display that I need medicine and speakers give the same alerting. All the outputs are successfully achieved and all sensor modules outputs are displayed in LCD.

4. Conclusion

We implemented and constructed sign to speech conversion system using raspberry pi done successfully in this proposed system we integrated all input modules and output modules to the Raspberry Pi Micro processor. We obtained results accurately. This proposed system proves that this is efficient system than existing one. All input flex sensors integrated and their output is reviewed in LCD module and Audio speakers effectively.

References

[1]. Wolf, C. G. Will individuals use motion orders? IBM Examination Report, (RC 11867), April 7, 1986.
[2]. Sanna K., Juha K., Jani M. furthermore, Johan M (2006), Perception of Hand Gestures for Pervasive Computing Conditions, in the Proceedings of the working meeting on cutting edge visual interfaces, ACM, Italy, p. 480-483.
[3]. WII Nintendo, 2006, http://www.wii.com, Available at http://www.wii.com [Last got to April 21, 2009]. 9. W. K. Edwards and R. E. Grinter, "At home with universal figuring: seven difficulties," introduced at Ubicomp, Atlanta, USA, 2001.
[4]. Malik, S. furthermore, Laszlo, J. (2004). Visual Touchpad: A Twohanded Gestural Input Device. In Proceedings of the ACM Global Conference on Multimodal Interfaces. p. 289
[5]. Rithesh M Nanda1, Harshini H K1, Praveen Kuruvadi1, Ankhit B V1, C Gururaj2,"wireless
Gesture Controlled Framework", 1Student, Dept. of Telecommunication, BMS College of Engineering, Bangalore, India 2Assistant Professor, Dept. of Telecommunication, BMS College of Engineering, Bangalore, India.

[6]. Jia, P. furthermore, Huosheng H. Hu. (2007), "Head signal acknowledgment for sans hands control of a keen wheelchair", Industrial Robot: An International Journal, Emerald, p60-68.

[7]. Juha K., Panu K., Jani M., Sanna K., Giuseppe S., Luca J. furthermore, Sergio D. M. Accelerometer-based signal control for a structure condition, Springer, Finland, 2005.

[8]. Jani M., Juha K., Panu K., and Sanna K. (2004). Empowering quick and easy customization in accelerometer based signal connection, in the Proceedings of the third global gathering on Mobile and universal interactive media. ACM, Finland. P. 25-31

[9].http://www.telegraph.co.uk/news/uknews/1563076/El derly-dependent on Nintendo-Wii- atcare-home.html

[10]. Pooja Dongare1,Omkar Kandal Gaonkar2, Rohan Kanse3, Sarvesh Kukyan4,"Innovative Tool For Deaf, Dumb Furthermore, Blind People", B.E Students K.C. School Of Engineering and Management Studies and Research, Kopri, Thane(E)- 400 603, India.