

Raspberry Pi Based Gesture Vocalizer for Dumb People Using OpenCV Python

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ABSTRACT

Today the main problem faced by the deaf and dumb folks is the communication share, to deliver their thought with other deaf and dumb people and with other normal people. There have been several advancements in technology and a lot of research has been done to help the people who are deaf and dumb. Aiding the cause, Deep learning, and computer vision can be used too to make an impact on this cause. This can be very helpful for the deaf and dumb people in communicating with others as knowing sign language is not something that is common to all, moreover, this can be extended to creating automatic editors, where the person can easily write by just their hand gestures. This system will assist those folks by providing an intermediate to communicate. It is implemented using Open cv python concept-based gesture recognition. When the dumb people use gesture through fingers this system will convert into voice to communicate with other people. The raspberry pi 3B model is used and to play the audio file using python.

Keywords: Gesture vocalizer, OpenCV, Raspberry pi.

1. INTRODUCTION

Humans possess the voice capability for interaction and communication among each other. Unfortunately, not everybody has the capability of speaking and hearing. Sign language used among the community of people who cannot speak or hear as the means of communication. Sign language is a gesture representation that involves simultaneously combining hand shapes, orientation and movement of the hands, arms or body, and facial expressions to express fluently with a speaker's thoughts. The people who cannot speak makes use of the sign languages to communicate with other fellow vocally impaired person and even with other normal people who knows the meanings of sign languages or an interpreter is needed to translate the meanings of sign languages to other people who can speak and do not know the meanings of sign languages. However, it is not always possible for an individual to be around all the time to interpret the sign languages

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 individual 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.

Sign-language has become a most common method of communicating to those people who cannot speak. It is a language that uses the hand motions to express alphabets and words. People who are using the sign language were recorded just in China alone . It exceeds up to 80 million in total and especially those people will always have a problem of communicating with each others who can't able to understand the sign language. Vision method has become the popular method used for sign recognition in the past decades. It is a system which uses a camera to sense the information that has been obtained through finger motions. It is the most commonly used visual-based method. It has been a tremendous effort and has been gone into the development of vision-based sign recognition systems through worldwide. Vision-based gesture recognition systems can be divided into direct and indirect methods. In earlier days for recognizing hand motion, vision based technique is used. But in this method the environmental effect in the recognized image is high. And another disadvantage is they have to show their hands to in front of the camera. Here flex sensor is used for detecting the hand motion and convert it into voice using microcontroller (raspberry pi). This is a very easy and accurate method compared to using camera as a recognizing component. This is easily portable set up. In the block diagram we will be having the component like flex sensor, ADC converter ADC0804, microcontroller such as PIC, Arduino and speaker. Here the flex sensor used for detecting the hand motion. Flex sensor is also called as bending sensor, based upon the bending of sensor their resistance of the sensor get varied. Then their voltage also varied, according to the voltage value the command will be provided. So this flex sensor is exactly act as a variable resistor. Flex sensor is analog in nature. This input is directly given to Arduino. Because an Arduino has inbuilt analog to digital converter. This will convert the analog sensor input into digital input to Arduino. But in the case of raspberry pi we have to use ADC IC externally. Example ADC0804.

Sign language is a natural way of communication between normal and dumb people. Sign language is mostly dependent on hand gesture recognition. It is sometimes not easy for normal people to recognize the signs properly and understand what they want to say. So the intension of the gloves is to make the life style of the dumb and deaf people easy. The gloves translates the hand gestures to text and further speech so that the normal people can read the recognized gesture and hear to the voice and understand what that person wants to tell, which will make the communication more efficient. The system consists of both physical and non-physical communication. Sign language differ from country to country it is not universally same. America developed American Sign Language (ASL); British developed British Sign Language and so on. Most of the countries follow the American Sign Language and our system is also based on the same. The gloves convert the specific gestures to text then to speech using Arduino as heart of the system. The flex sensors are used in the system which is attached onto the gloves which convert the gesture into resistance which is further converted to the text through Arduino nano. The flex sensors come from flexible sensors family, which are flexible enough. Along with flex sensors accelerometer and contact sensors are also used for accurate output. The accelerometer is used to monitor the motion of the hand and to monitor the contact between the fingers the contact sensors are used. The selection of the sensors is based on the sings the language is consisting. Some sings are dependent on the movement of palm so to monitor that accelerometer is

used while some signs are dependent on the contact of the fingers so to get the specific output if that signs contact sensors are used. The output of the sensors is processed on Arduino nano to get text as an output displayed on LCD. Further that text is sent via Bluetooth module to mobile phones/computers. Further that data is converted to speech via text to speech conversion software. There is no such commercial system available in the market to convert sign language into speech. However research is being made to convert sign to speech and make it portable, efficient and highly accurate.

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 speak 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.

In the past, many techniques have been used to convert the hand gesture to text. However, they were limited in terms of their functionalities. Many techniques required gloves with sensors which not only made the application more complex but also expensive. In the other version, the system was limited to a particular background without any noise or disturbance. There were some projects which were heavily dependent on heavy GPUs making it difficult for common man to use the system. Additionally, there were some systems for detections which required the object to be of a particular skin colour. Although, there have been various techniques for converting the hand gesture to text but a very few focus on converting the gesture to both text and speech with that too with limited properties.

About nine billion people at intervals the planet unit of measurement dumb. The communication between a dumb and hearing person poses to be an important disadvantage compared to communication between blind and ancient visual people. This creates an extremely little house for them with communication being associate degree elementary aspect of human life [8]. The blind people can speak freely by implies that of ancient language whereas the dumb have their own manual-visual language referred to as language. Language is also a non-verbal form of intercourse that's found

among deaf communities at intervals the planet. The languages haven't got a typical origin and thence hard to interpret. A Dumb communication interpreter is also a tool that interprets the hand gestures to sensibility speech. A gesture in associate degree extremely language is also a certain movement of the hands with a particular kind created out of them. Facial expressions collectively count toward the gesture, at constant time. A posture on the other hand is also a static variety of the hand to purpose an emblem. Gesture recognition is classed into a pair of main categories: vision based mostly} and detector based [9]. The disadvantage of vision based totally techniques includes advanced algorithms for process. Another challenge in image and video method includes varied lighting conditions, backgrounds and field of scan constraints and occlusion. The detector based totally technique provides larger quality. The primary aim of this paper is to introduce an issue that will efficiently translate language [10] gestures to every text and sensibility voice. The interpreter makes use of a glove based totally technique comprising of flex detector, instrument sensors. For each hand gesture created, a symptom is formed by the sensors appreciate the hand sign the controller matches the gesture with pre-stored inputs. The device not exclusively interprets alphabets but cans even sort words exploitation created gestures. A training mode is gettable on the device therefore it fits every user and accuracy is inflated. The device will even be able to translate larger gestures that require single hand movement. Gesture recognition implies a method by that knowledge is collected from parts of the physical body (usually the hand) and processed to work out attributes like hand form, direction and speed of gesture being performed. There are presently 2 sorts of answer. Device based mostly techniques involve some variety of guide like a glove or glove like framework fitted with position trackers and flex sensors to live the condition and position of the hand. Visual based mostly techniques use camera chase technologies, whereby usually the user wears a glove with specific colors or markers indicating individual parts of the hands, specially the fingers. The cameras record the everchanging image and position of the hand because the user signs and also the pictures are then processed to retrieve the hand form, position and orientation.

Thomas Pryor and Navid Azodi are UG students who made the Gloves that translate sign language into text and speech known as sign aloud. They had won Lemelson-MIT student price for this project. Which inspired me to make a system of my own which can be used for public welfare [11].The 1st Hand Talk glove was designed by Ryan Patterson in the year 2001. This model had limitations that a computer or a laptop was always required for its functioning which made it less portable. n 1620, Juan Pablo Bonet published R, education of letters and art for teaching mute people to speak which is considered as the first modern treatise of sign language phonetics, setting out a method of oral education for deaf people and a manual alphabet [12]. Interactive Accelerometric Glove For Hearing Impaired: Kuldeep Singh Rajput, Shashank Deshpande, UmaMudenagudi: The main aim is to set an interface between the Hearing Impaired people and normal person to improve the communication efficiency so that they can communicate handily with others.[13] Hand Gesture Recognition System :Swapnil D. Badgujar, GourabTalukdar ,Omkar Gondhalekar, Feb. 2014. Implemented by real time gesture recognition a user can control a computer by doing a decided gesture in front of a video camera which is linked to the computer. [14]

3. EXISTING SYSTEM

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.

4. PROPOSED SYSTEM

The proposed sign conversion system is integrated of both hardware and software. This system used open cv based finger gesture sign, audio speakers and Raspberry Pi 4 model microprocessor, regulated power supply section for sign conversion system using python programming

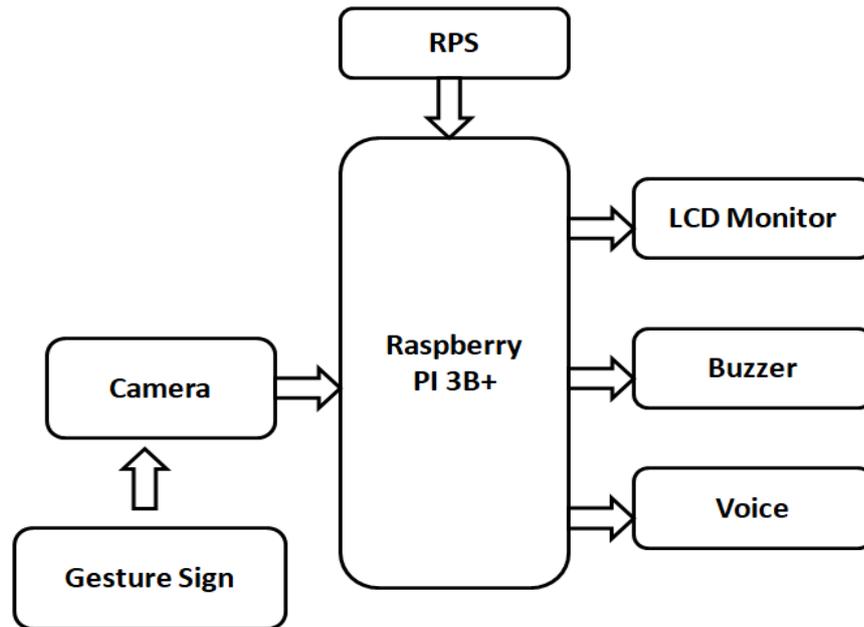


Figure 1. Block diagram of proposed system

Working

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. By using us camera we are showing the gestures the raspberry pi processor recognizes the gesture and provide the sufficient voice through audio speakers. 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 gesture signs for 4 parameter alerts through voice. When you show B symbol activated displays, I need water on LCD monitor and same thing will be voice converted trough speakers. When you show Y displays, I need food massage on LCD monitor and same thing will be voice converted trough speakers. When you show C symbol activated displays, I need medicine massage on LCD monitor and same thing will be voice converted trough speakers. When you show L symbol activated displays, please help for washroom massage on LCD monitor and same thing will be voice converted trough speakers.

Advantages

1. auto alerting system
2. wireless data access through IOT
3. Efficient and low-cost design.

4. Sign to voice conversion system
5. Low power consumption.

Applications

1. Hospitals
2. Home

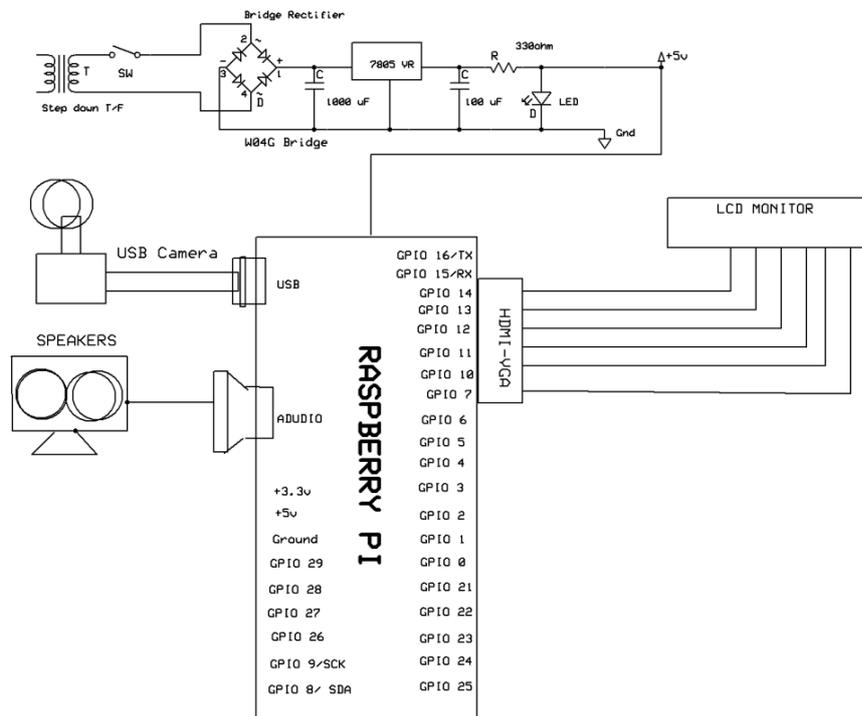


Figure 2. schematic diagram of proposed system

5. RESULT



Figure 3. Opening of the kit.

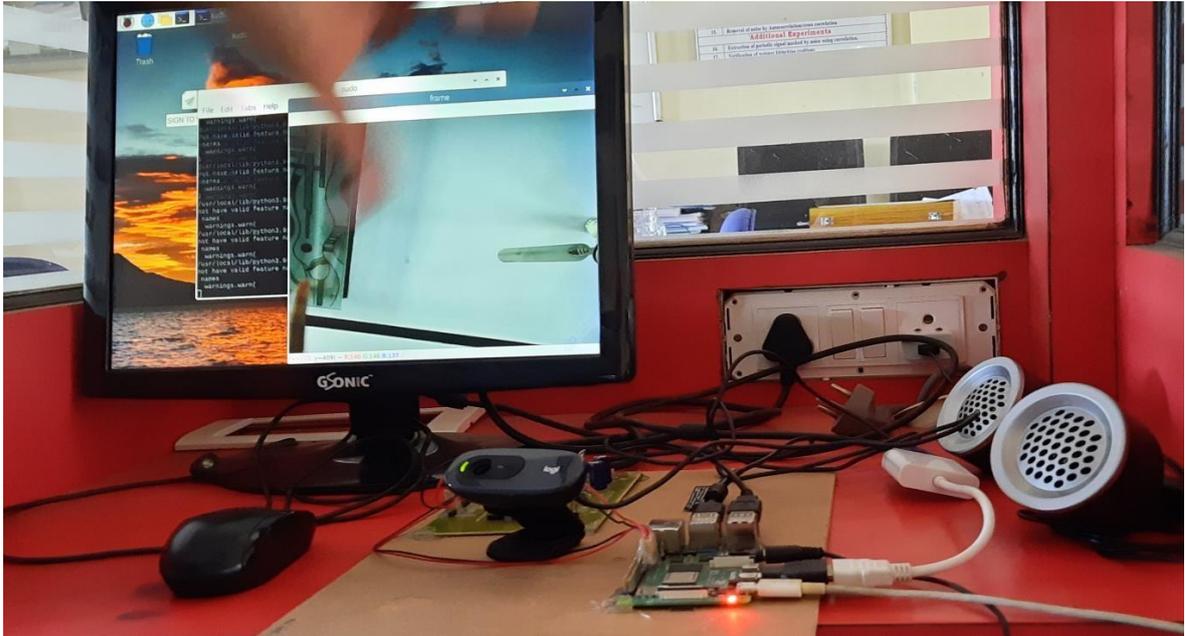


Figure 4. after execution of the code

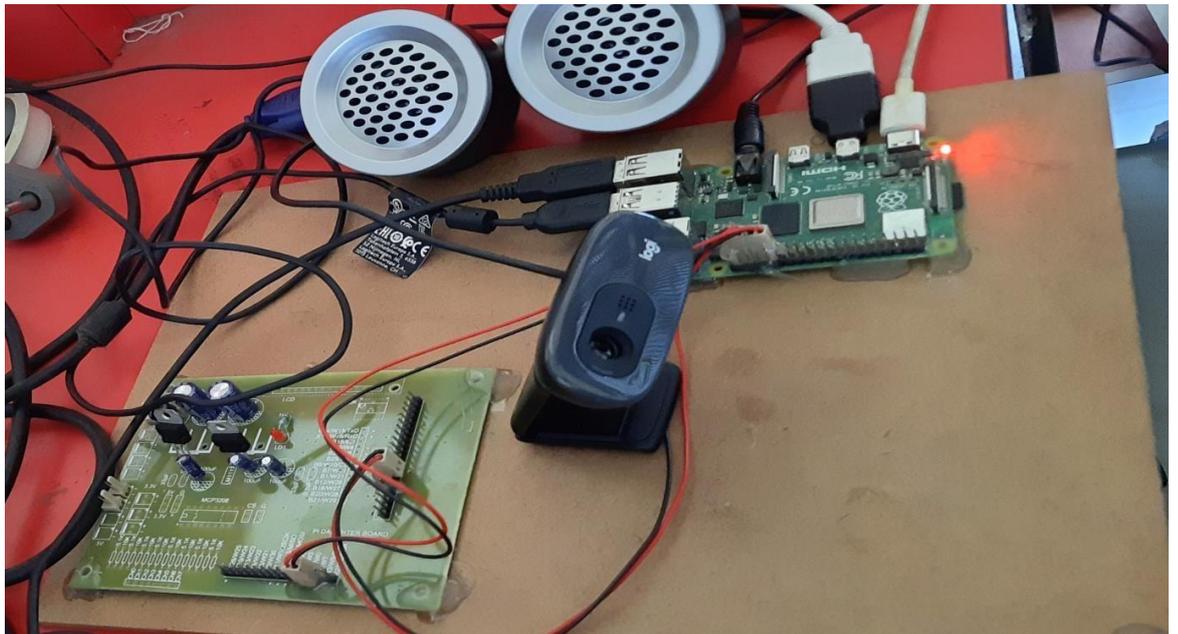


Figure 5. The overview kit of the project

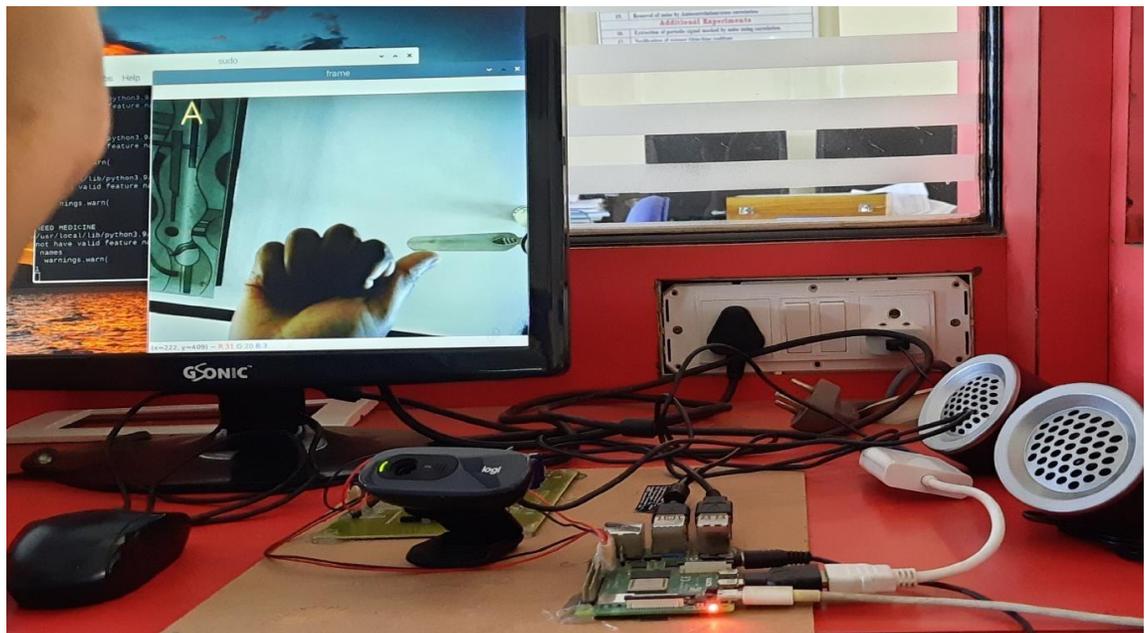


Figure 6. The symbol of A

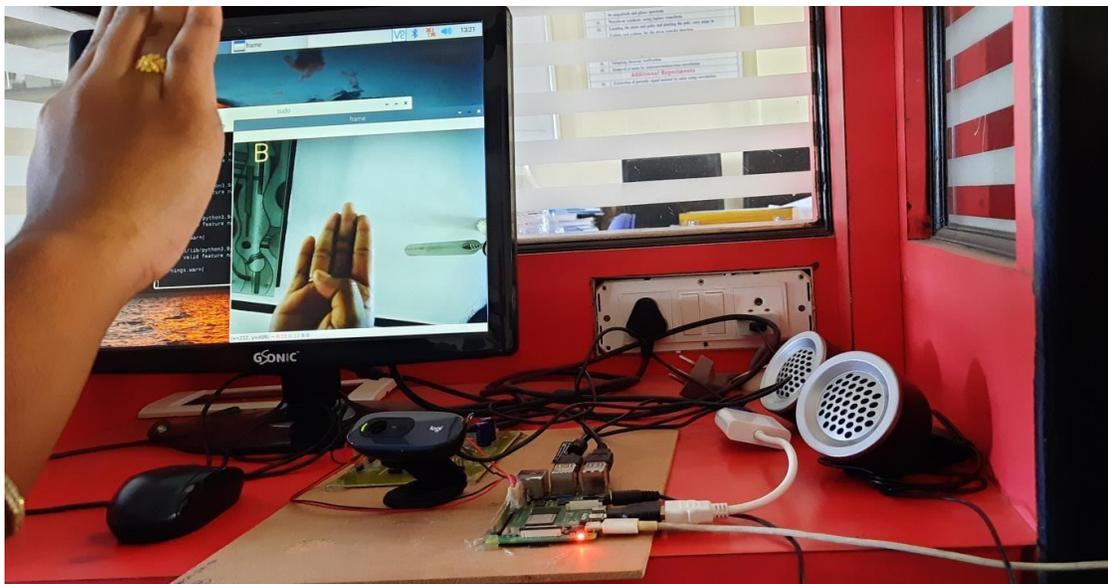


Figure 7. The symbol of B

6. 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 Microprocessor. We obtained results accurately. This proposed system proves that this is efficient system than existing one. Open cv based gesture to voice conversation and their output is reviewed in LCD module and Audio speakers effectively.

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