Sign Language to speech conversion device

Miss.Shivani Kute [1]
PG Student, Dept. of E&Tc, SPCOE, Otur (Junnar), Maharashtra, India.

Prof. M.G.Chinchole [2]
Principal, Dept. of E&Tc,
SPCOE, Otur (Junnar),Maharashtra, India.

Prof.R.S Bansode[3]
PG Co-ordinator, Dept. of E&Tc, SPCOE, Otur (Junnar), Maharashtra, India.

Abstract

Human being interact one another to convey their concepts, thoughts, and skill to the individuals around them. But, there's some deaf mute individuals within the world. In this paper, the concept is proposed smart glove system which might be convert sign language to speech output. The glove can facilitate in producing artificial speech that produces daily communication for speech impaired person. Compared to different gestures of body like hand, face and head; hand gesture plays a crucial role, as a result of it express as presently as reaction of individual. This paper shows flex sensor primarily fixed on hand glove used as gesture recognition module. This is developed to acknowledge English alphabet and few words and then synthesize then into speech using speakers. This is essentially, smart glove and microcontroller primarily based system. Flex detector sense finger movement and this information is fed to microcontroller based system to coverts it into some human recognizable voice.

Keywords— *STM32 controller, Sign Lang to speech, SD card, Speakers, flex sensors*

I. INTRODUCTION

The development of the foremost popular devices for hand movement acquisition, glove primarily based systems started concerning 30 years ago continues to interact a growing numbers of researches. Communication suggests that exchange of data, it becomes effective if all using same media or language for conveyance of title info. Generally, mute individuals uses sign language for communication during which gestures are accustomed convey which means rather than sound. Signs are accustomed communicate words and sentences to audience. During this system, flex sensing element plays a very important role. Flex sensing element are sensing element during which resistance dynamical in step with degree of bending. The Hand speak Glove may be a traditional, artifact driving glove fitted with flex sensor on the length of every finger and also the thumb. The microcontroller and sensing element primarily based information glove facilitate to lower communication gap between deaf dumb and traditional person. This paper contains the map to develop a gesture vocalizer.

AN embedded system may be a combination of software system and hardware to perform a passionate task. a number of the most devices utilized in embedded merchandise are silicon chip and Microcontroller. Microprocessors are usually stated as general purpose processor as they merely settle for the inputs, method it and offers the output. In distinction, a microcontroller not and dump solely accepts the info as inputs however additionally manipulate it , interfaces the info with varied devices , management the info and at last provides the result. The “Speaking Microcontroller for deaf individuals” using STM microcontroller is AN exclusive project that is employed to assist the deaf and dumb people to announce their demand exploitation SD card module.

One of the various areas during which embedded system show nice promise is helpful technologies that address the special want of these with impairment. this technique gift Hand speak, a “Smart Glove”, worn by an individual, that acknowledge basic hand gestures and convert them into electrical signal exploitation motion sensors and when process of the signal show on the pc monitor within the style of text. During this system the Flex sensing element is employed as a motion sensing element. This technique uses the remembering Board as a microcontroller that is AN advance version of the microcontroller that makes this technique terribly compact and simply moveable.

In general, deaf have issue in human activity with others United Nations agency don’t perceive language. Even people who do speak aloud generally have a “deaf voice” of that they're self-conscious which will build them reticent. The Hand speak glove may be a traditional, artifact driving glove fitted with flex sensors on the length of every finger and also the thumb. The sensors output a stream of information that varies with degree of bend. The output from the sensing element is analog values it's regenerate to digital and processed by exploitation microcontroller and so it'll be transmitted through wireless communication (RF), then it'll be received within the Receiver section and processed exploitation responds within the voice exploitation speaker. During this project Flex sensing element plays the main role, Flex sensing elements square measure sensors that modification in resistance betting on the quantity of bend on the sensor. They convert t h e modification

in bend to electrical phenomenon - the lot of the bend, the lot of the resistance price. They're sometimes within the style of a skinny strip from 1"-5" long that modify in resistance from some ten to 50 kilogram ohms. They're usually utilized in gloves to sense finger movement. Flex sensors square measure analog resistors. They work as variable analog voltage dividers. Within the flex sensing element square measure carbon resistive parts at intervals a skinny versatile substrate. a lot of carbon suggests that less resistance. Once the substrate is bent the sensing element produces a resistance output relative to the bend radius. With a typical flex sensing element, a flex of zero degrees can offer 10K resistance with a flex of 90degrees can offer 30-40 K ohms. The Bend sensing element lists resistance of 30-250 K ohms. During this system we have a tendency to use frequency Signal to transmit the signal from transmitters to Receptors, during this project we've used microcontroller, a speech IC and additionally a speaker to supply the output.

This paper accentuates the development done over the years to extend efficiency and accuracy. In an exceedingly slim spectrum it acts as a language interpreter and provides a convenient approach for communication and provides a simplified approach for communication between deaf and dumb community and traditional individuals. In figure one, we've shown the sample for general language.

II. LITERATURE SURVEY

S Yarisha Heera and al.[1] The signal acknowledgment framework changes over Indian signing to discourse with the help of assortment of devices like flex sensor, gyrator and measuring system to effectively decide the position and introduction of the hand motion. Sensors ar consolidated on a glove to tell apart the signals and alter over it to discourse with the help of a Bluetooth module associated an golem sensible Phone. The gloves can facilitate in delivering factory-made discourse.

Aarthi M, Vijayalakshmi P and al. [2] A framework which will distinguish static hand indications of letters so as in yankee signing (ASL). Flex sensor-based signal acknowledgment module is created to understand English letter sets and few words and a Text-to- Speech synthesizer in light-weight of HMM is worked to alter over the examination content It needs less segments, a number of that ar flex device, Arduino and measuring system and consequently its value is low contrasted with vision-based motion acknowledgment framework. Within the initial place the framework can amendment over the signal (gesture) to the examination content and at that time the discourse is mixed for the relating content by utilizing the text-to-speech synthesizer. The framework devours low power and it's versatile. The device glove define aboard the fabric device helps in decreasing the uncertainty in signals and shows increased exactitude.

Kusurnika Krori Dutta and al. [3] with the employment of image process and AI, various algorithms and techniques are created. Every gesture based mostly communication acknowledgment framework learns and acknowledges the signs and dynamical over them into needed pattern. Double handed Indian signing is caught as a progression of images and it's computed with the help of MATLAB and at that time it's modified over to speech and text.

A. Ferrone; F. Maita and al [4] A supple sensible wristband that has strain gage sensors and readout physics embedded thereon ar accustomed establish the hand movements. These dynamic devices, that ar extremely reasonable, ar entrenched on this sensible articulatio radiocarpea band doesn't need a direct contact with the skin, so enhancing the solace on the hand.

Andrea Ferrone and al. [5] A wearable framework has been designed supported breathable material and FSS. varied machine learning algorithms were accustomed validate the framework. It eliminates the total idea of direct contact of the skin with the sensors planted on the wristband there by boosting the solace.

Xiang subgenus Chen and al.[6] EMG signal based mostly hand gesture identification has been enforced exploitation 2 sensors. The results of movements of articulatio radiocarpea and fingers that ar accurately recognized by experimentation will be administered by inserting the sensors on the forearm. This setup is well matched to acknowledge one finger movement. The measuring of muscle activity contains adequate info required to acknowledge articulatio radiocarpea and finger movements.

Geetha M, Rohit Menon and al. [7] Associate unassertive Gesture articulatio radiocarpea is intended that permits the employmentr to speak with the wearable computers with the use of Gesture based mostly injection. Hand and forearm movements' ar known by this band. All of the sensors ar planted into the wristband not like the info Gloves or alternative devices. It permits abrupt changes and supports hands-free operations. It will be utilized in varied social settings because it is unassertive.

Sunitha K. A and al. [8] this paper aims to hide the assorted prevailing strategies of deaf-mute communication interpreter system. The 2 broad classification of the communication methodologies employed by the deaf –mute individual's ar - wearable Communication Device and on-line Learning System. Below wearable communication technique, there ar Glove based mostly system, input device technique and Handicap Touch-screen. All the higher than mentioned 3 sub-divided strategies create use of varied sensors, measuring system, an appropriate micro-controller, a text to speech conversion

module, a input device and a touch-screen. The requirement for associate external device to interpret the message between a deaf –mute and non-deaf-mute individuals will be overcome by the second technique i.e on-line learning system. The web Learning System has totally different strategies. The 5 divided strategies are- SLIM module, TESSA, Wi-See Technology, SWI_PELE System and Web-Sign Technology.

III. METHODOLOGY

Figure 1 shows the Block diagram of the proposed system using stm32 controller.

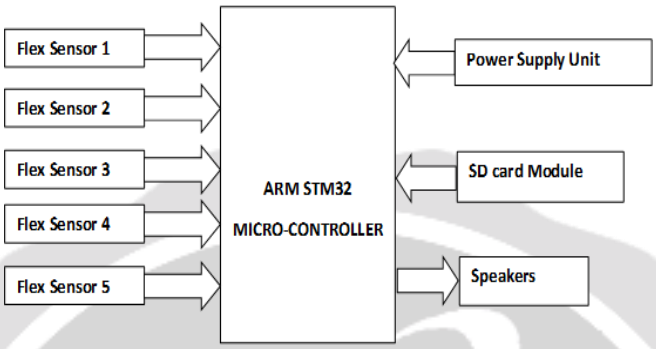


Figure 1. Block diagram of system

Fig 1 shows the proposed system. The system mainly composed of several modules including the flex sensor, stm32 Microcontroller, sd card module and speaker. The first module flex sensor plays important role in this project. Flex sensor are sensor that change in resistance depending on the amount of bend on sensor. They convert the change in electrical resistance, the more bend more is resistance value. Inside flex sensor are carbon resistive element within thin substrate. The output of flex sensor is analog value, it is converted to digital and processed by microcontroller. Also, we used a speech IC and speaker to produce the voice output. This system work on 5V supply.

The data glove is implemented to capture the hand gesture of user. Talk glove is normal, cloth driving glove is fitted with flex sensors along the length of each finger and the thumb. The sensor output of data that varies with degree of bend. Following figure shows the proposed system architecture of sensor based recognition.

A. *Flex Sensor*

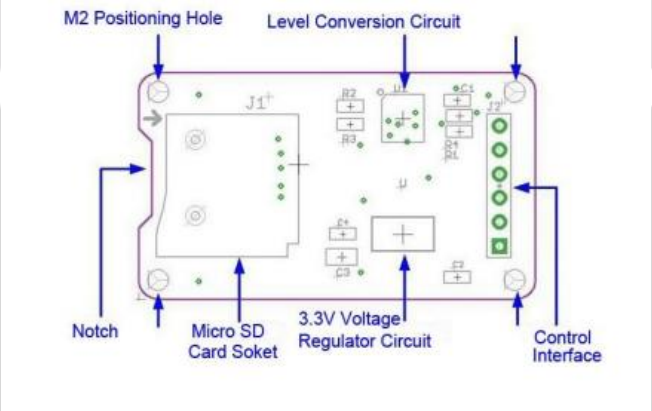
Flex Sensor is an important component used in this system. The resistance of flex sensors changes depending on the amount of bending. Depending on the resistance values we get the analog output. This analog output is fed to the microcontroller for further calculations.

These sensors work best (and last the longest) if they are bent across a large radius, not kinked. Remember that the active area is between the black squares. The pin-end of the sensor is susceptible to kinking and eventual failure. It is safe to secure this area so that it doesn't flex along with the rest of the sensor

B. SD card module

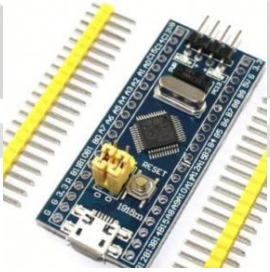
• The module (MicroSD Card Adapter) is a Micro SD card reader module for reading and writing through the file system and the SPI interface driver, SCM system can be completed within a file MicroSD card.

SD Cards work only at 3.3V. This module and Card is used to store sound files i.e. .wav file and language library.



C. STM32 controller

In this system stm32 is a simple microcontroller board and provides an environment for open source development that will allow you to make computers that drive both functional and creative projects alike. This microcontroller merge the values from all the flex sensors and according this input data to audio file will be played.



IV. CONCLUSION AND FUTURE WORK

In this paper, the task plans to reduce the correspondence hole between hurd of hearing or quiet group and normal people. This framework can enhance hard of hearing individual's manner of life. Indeed, even it'll be helpful for the correspondence between the herd of hearing individual and also the idiotic individual. General System is fortunate and practiced because of the employment of Arm microcontroller and Speaker. With this task gesture primarily based communication will be dead to convey, the target individual. The framework has some most well-liked stand over past framework: Translation of discourse to content done effortlessly while not compressing catch. Hard of hearing individual needn't hassle with pen or paper for instructive their discourse, this framework offers nice exactitude. In future it's going to be possible to convert individual character rather than changing complete sentence.

REFERENCES

[1] S Yarisha Heera, Madhuri K Murthy, Sravanti V S, "Talking hands — An Indian sign language to speech translating gloves", IEEE, International Conference on Innovative Mechanisms for Industry Applications (ICIMIA 2017)
[2] Aarthi M, Vijayalakshmi P, "Sign language to speech conversion",IEEE, 2016 fifth international conference on recent trends in information technology
[3] Kusurnika Krori Dutta, Satheesh Kumar Raju K, Anil Kumar G S, Sunny Arokia Swarny B, "Double handed Indian Sign Language to speech and text", IEEE, 2015 Third International Conference on Image Information Processing.
[4] A. Ferrone; F. Maita; L. Maiolo; M. Arquilla; A. Castiello; A. Pecora; X. Jiang; C. Menon; A. Ferrone; L. Colace, "Wearable band for hand gesture recognition based on strain sensors", IEEE, 2016 6th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob).
[5] Andrea Ferrone; X. Jiang; L. Maiolo; A. Pecora; L. Colace; Carlo Menon ,"A fabric-based wearable band for hand gesture recognition based on filament strain sensors: A preliminary investigation", IEEE, 2016 IEEE Healthcare Innovation Point-Of-Care Technologies Conference (HI-POCT).
[6] Xiang Chen; Xu Zhang; Zhang-Yan Zhao; Ji-Hai Yang; Vuokko Lantz; Kong-Qiao Wang, "Multiple Hand Gesture Recognition Based on Surface EMG Signal", IEEE, 2007 1st International Conference on Bioinformatics and Biomedical Engineering.
[7] Geetha M, Rohit Menon, Suranya Jayan, Raju James, Janardhan G.V.V , "Gesture Recognition for American Sign Language with Polygon Approximation", IEEE, 2011 IEEE International Conference on Technology for Education.
[8] Abhijith Bhaskaran K, Anoop G Nair, Deepak Ram K, Krishnan Ananthanarayanan, H R Nandi Vardhan, "Smart Gloves for Hand Gesture Recognition", IEEE, 2016 International Conference on Robotics and Automation for Humanitarian Applications (RAHA)
[9] Jun Rekimoto, "Gesturewrist and Gesturepad: Unobtrusive Wearable Interaction Devices", Sony Computer Science Laboratories, Inc