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Electronic Voice to Deaf & Dumb People Using Flex Sensor

P. Vamsi Praveen[1], K. Satya Prasad[2]

M. Tech Student, Department of E.C.E, University College of Engineering, JNTUK, Kakinada, A.P, India[1]

Professor, Department of E.C.E, University College of Engineering, JNTUK, Kakinada, A.P, India[2]

ABSTRACT: Communications between deaf-mute and a standard person have invariably been a difficult task. The project aims to facilitate individuals by means of a glove based mostly deaf-mute communication interpreter system. The glove is internally equipped with four flex sensors. For every specific gesture, the flex detector produces a proportional amendment in resistance and measures the orientation of hand. The process of those hand gestures is finished in controller. The glove includes 2 modes of operation- coaching mode to learn of each user associate degree an operational mode. The concatenation of letters to create words is additionally drained controller. Additionally, the system conjointly includes a Text to Speech conversion (TTS) block that interprets the matched gestures i.e. text to voice output.

KEYWORDS: Flex detector, ARM7-LPC2148 Analysis Kit, LCD, TTS module, Speaker.

I. INTRODUCTION

As we tend to all grasp that communication plays a really outstanding role in our human lives. At this gift innovative world, there square measure most of individuals World Health Organization (WHO) square measure deaf and dumb ought to have a tiny low dream on communicate as traditional people with others is not a straight forward task. An electronic glove is developed for deaf-mute communication interpreter system that helps out the deaf and dumb individuals to speak with dependability. Here only 1 hand is employed .There is four flex detectors are employed and every square measure fitted with length of every finger of glove. The hand gesture plays a key role. The gestures are decoded by microcontroller. By the every specific gesture (i.e. creating completely different positions of fingers) of the flex sensors, the Indian linguistic communication alphabets/letters square measure to be created off. The concatenation of letters to create words is finished in Controller. Message is shown in alphanumeric display and voice output is produced from speaker.

II. RELATED WORK

From the References [1][10], the work that related to the project such as of gesture recognition that plays a key role. In this one of the method is glove based systems, the data gloves are used which can archive the accurate positions of hand gestures as its positions are directly measured. The Data-Glove based methods use sensor devices for digitizing hand and finger motions into multi-parametric data. The extra sensors make it easy to collect hand configuration and movement. However, the devices are quite expensive and bring much cumbersome experience to the users some of the earlier gesture recognition systems attempted to identify gestures using glove-based devices that would measure the position and joint angles of the hand is studied from references [2][3][6]. However, these devices are very cumbersome and usually have many cables connected to a computer. This has brought forth the motivation of using non-intrusive, vision-based approaches for recognizing gestures Also the sensors used for the detection of the sign language and the gesture recognition in the system that are available in the market are quite costly. In computer recognition of spoken language, speech data is captured using a microphone connected to an ADC, is [11]. Similarly a data-capturing device is also required in order to recognize sign language; in this case measuring the position and movement of the signer's hands. From below mentioned references the project was developed.

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III. SYSTEM PRACTICALITY

As the FLEX detector output is analog form, thus on convert to digital kind there's Analog to Digital converter (ADC). Then ADC's output goes in microcontroller module wherever programming is finished. And therefore the output is shown on alphanumeric display. Because the output of alphanumeric display that is in digital sort of information is reborn to analog sort of signal is thru Digital to Analog converter (DAC). Where the ADC, MICROCONTROLLER, Liquid Crystal Display (LCD),DAC of all square measure built-in of ARM7-LPC2148 analysis kit. The output analog signal of DAC is given as input to the TTS converter block (aPR33A3 module), wherever the text to speech conversion is finished. Because the reborn signal is given to the speaker, there the speaker amplifies the signal and produces output as voice. Then the voices square measure held on in memory that is built-in within the voice module. Finally the message text is shown in alphanumeric display and therefore the message of voice from speaker must be same. As this above practical process of system block diagram shown in below Fig1.

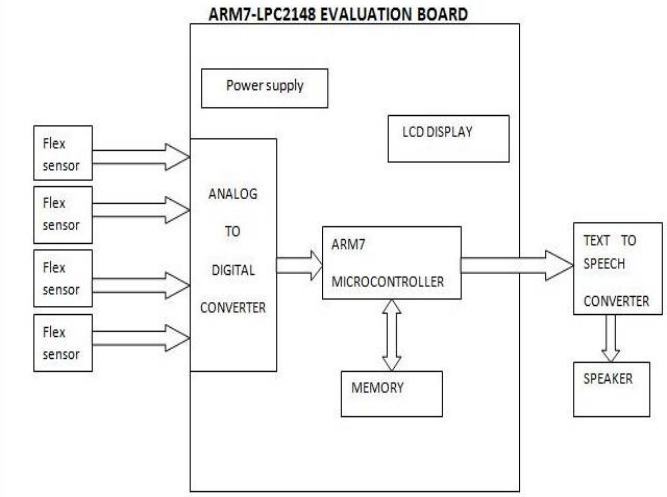

Fig 1: System Block Diagram

IV. FLOW METHOD OF SYSTEM

The flow process of system is shown in below Fig 2.When power on the system, then first of all the non-verbal communication is given to the system through the flex sensors. There the flex detector of Fig 3, which will be operated with +5v as by giving the actual hand gesture, the resistance variance happens in flex detector by that the output analog signal is made. The analog signal is given to the ADC on convert the signal in digital kind. Next the digital signal is given to programmable microcontroller as input. Then the micro controller processes the signal and relates the actual message that is allowed within the code. This code is drop in to the ARM7-LPC2148 analysis kit as through the Universal Asynchronous Receiver/Transmitter (UART) serial communication cable comparable to RS232 cable. The microcontroller output is shown in alphanumeric display of Fig 4, as to Illustrate "Message 1". Thereafter, on get the output as voice from speaker. The output of microcontroller that is in digital kind is given to DAC on convert in to analog signal. Then this signal is given to the TTS-BLOCK (TEXT TO SPEECH CONVERTER) known as voice module and therefore the module produce voice message through speaker of Fig5, as to Illustrate "Message 1".

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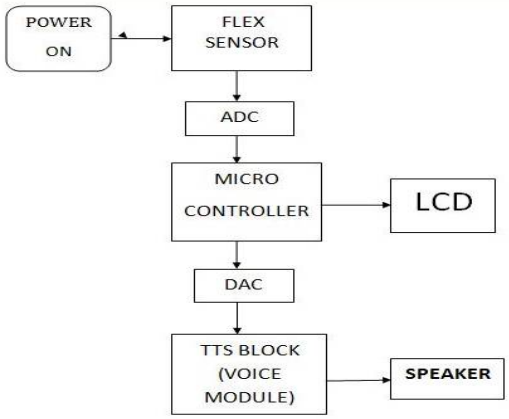

Fig 2: Flow Process of System Practicality

Fig 3: Handglove Equipped With Flex Detector

Fig 4: Message displaying on LCD

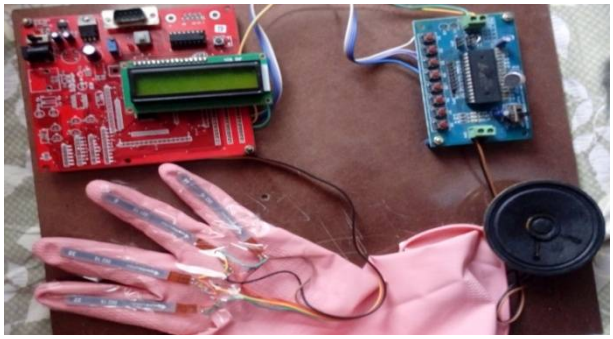

Fig 5: Hardware Kit

V. FLEX DETECTOR

The Flex detector proprietary technology is predicated on resistive carbon parts. As a variable written of resistance, the Flex Sensor achieves nice form-factor on a skinny versatile substrate. When the substrate is bent, the detector produces

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a resistance output correlated to the bend radius-the smaller the radius, the higher the resistance price. Flex sensors square measure analog resistors. They work as of variable analog voltage dividers, within the flex detector square measure carbon resistive parts inside a skinny versatile substrate. A lot of carbon means that less resistance. Once the substrate is bent the detector produces a resistance output relative to the bend radius. With a typical flex sensor of Fig 6, a flex of zero degrees can provide 10K resistance can a flex of ninety can provide 30-40 K ohms. The Bend detector lists resistance of 30-250 K ohms. The Flex detector also called as Flex sensor.

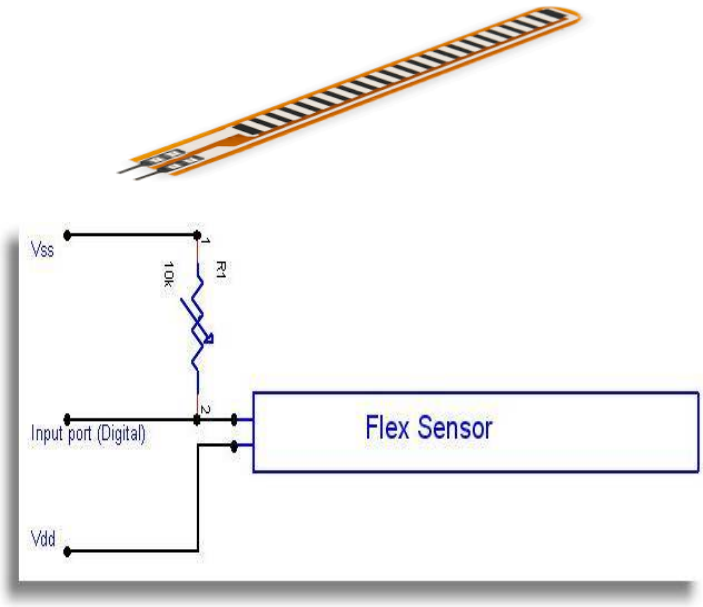

Fig 6: Flex Detector Circuit Diagram

VI. ARM7-LPC2148 ANALYSIS KIT

ARM analysis Kit is planned to smooth the progress of developing and debugging of various assorted styles encompassing of High speed 32-bit Microcontrollers. It integrates on board 2 UARTs provision to attach LCD/GLCD show, LEDs, ADC inputs and Wireless Modules to form a complete versatile test take a look at platform. User can easily engage in development in this platform, or use it as regard to application development.

FEATURES:

- Wireless Module I/F: Bluetooth (SENA-ESD200 | two hundred luminous flux unit 400)
- MEMS Module I/F: MMA7260A
- Show Interface: 2X16 Character alphanumeric display, 128x64 GLCD (Touch Panel Driver)
- Digital Output: four Nos. Point LEDs
- Digital Inputs: four Nos. Digital Input
- On-Board ADC take a look at (Potentiometer)
- On-Chip RTC (Battery-Backup)
- 2 Nos. UART (RS232) | USB a pair of.0 Device (Virtual Port)
- DAC output Termination
- 10-pin FRC Connector (Serial Ethernet)
- a pair Nos. of 20-pin growth Connective
- JTAG Header (Program/Debug) | ISP engineer
- General Purpose Solder space.

BENEFITS:

UCOS-II RTOS Support

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Evaluate Real Time Applications
ISP Programming / JTAG Debugging
Facility to interface external devices
LPC2148:
Devices: LPC2148 (ARM7TDMI-S Core)
Memory: 512K FLASH | 32K+8K SRAM
Clock: 12MHz crystal (On-board).

VII. **LCD**

Innovative{alphanumeric display or LCD} 2x16 A Module provides versatile display functions. Through its straight forward connections, it may be controlled by Innovative BASIC Commander for a good vary of alphanumeric applications. During this module, 2 show lines, each with sixteen characters on every line may be displayed. By exploitation the indicator management command, the position of the character to be displayed on the screen may be arbitrarily modified. During this module, the backlight operate may be accustomed modification the backlight to permit the message to be browse simply.

VIII. **TTS BLOCK (VOICE MODULE)**

This is a brand new and increased eight channel recordable voice module. every channel of Fig 7, stoppage to one minute of recorded voice and/or music with a combined total record time of eight minutes. Recording is fast and simple exploitation the designed - in mike and push to record button. A line-level output jack permits association to external amplifiers, audio instrumentation, and paging systems.

- Eight Channels of Recordable Voice/Music.
- Most record time is eight minutes which can be divided between the quantity of channels needed.
- Recordings are hold on in non-volatile memory.
- Every channel selectable for "+" or "-" triggering.
- Every channel can settle for a fugitive trigger.
- Continuous playback or "One Shot" settings.
- Intrinsic microphone for recording.
- Adjustable speaker volume and current draw.
- Powerful twenty four watt amplifier for Speakers.
- Line Level Output for Amplifiers and Paging Systems.

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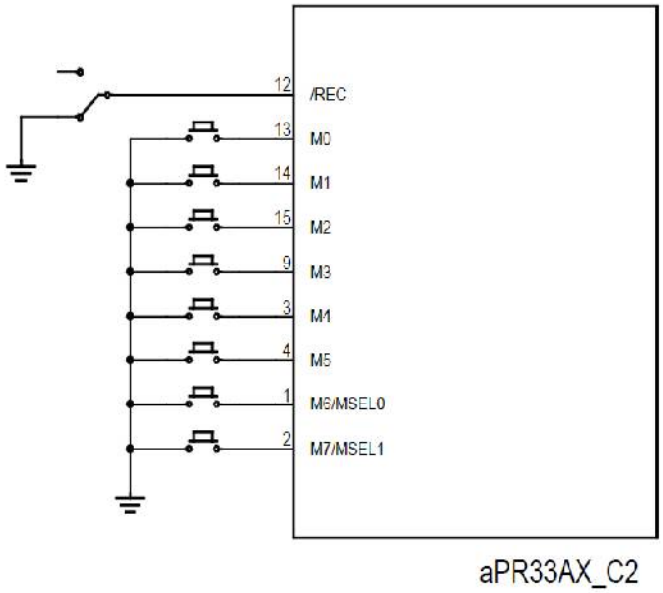

Fig 7 : Voice Module

IX. SPEAKER

This is associate degree analog speaker which merely amplifies the analog magnetism waves into sound waves. So, the aim of speaker is to provide audio output that may be detected by the individual.

X. RESULTS

Here four different gestures are accustomed convey the commands Accuracy of those gestures for specific command is checked by showing command on alphanumeric display for that specific gesture. As any outlined gesture is completed, flex sensor can begin bending. Due to bending, there'll be some changes in resistance value of flex sensors. As let consider the gesture 1 is given by using flex sensor of hand glove as input. Initially the resistance value produced by flex sensor before the gesture 1 is 250 ohms and then after the resistance value produced by flex sensor after the gesture 1 given is 160ohms. According to this variance the words which are assigned to gesture 1 in microcontroller will be displayed in LCD as output. The system results of modification in resistance value, when gestures are given as shown in below Table 1.

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Table 1: System Results

S.No	Gesture	Resistance value before gesture is given	Resistance Value After gesture is given	Command displayed on LCD display
1.	Gesture 1	250 ohms	160 ohms	FLEX 1 ON MESSAGE 1
2.	Gesture 2	250 ohms	160 ohms	FLEX 2 ON MESSAGE 2
3.	Gesture 3	250 ohms	160 ohms	FLEX 3 ON MESSAGE 3
4.	Gesture 4	250 ohms	160 ohms	FLEX 4 ON MESSAGE 4

XI. CONCLUSION

- This project is helpful for deaf and dumb Individuals people who cannot communicate among themselves or with normal person. It's additionally helpful in creating of communication responsibility cherish language translation & effective communication between the deaf/dumb & traditional individuals.
- This project is helpful for further additional help of developing mobile communication for deaf &dumb individuals.

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BIOGRAPHY

K. Satya Prasad, Awarded with 16 Ph. D scholars currently working as Professor of ECE Department with 36 years of teaching experience and 30 years of R&D experience. His Area of interests include signals & systems, DSP, communications and Radar telemetry.

P. Vamsi Praveen, received a B. Tech Degree under the stream of ECE from Kakinada Institute of Engineering and Technology. Currently pursuing the M. Tech in Jawaharlal Nehru Techno -logical University Kakinada under the Department Of Electronics and Communication Engineering.