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Department of Electronics & Communication Engineering

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Annexure I

1. Project Title: Gesture Based Vocalizer for Deaf and Dumb Community

TABLE OF CONTENTS

1. Abstract & Objective

1.1 Abstract

The aim of the **"GESTURE BASED VOCALIZER FOR DEAF AND DUMB COMMUNITY"** is to provide communication among the dumb and deaf people and also with the normal people. Gesture Vocalizer is basically a data glove and microcontroller based system. In general, the communication among the dumb people and also their communication with the normal people mainly depend on gestures. So we can produce human recognizable voice with the help of this project.

Many scientists are working in the field of gesture recognition. This project differs from the previous one in some aspects such as providing display in the system for deaf people communication and here we are not using tilt sensors, bend sensors and accelerometers so that we can reduce the complexity and the cost.

The main component in this project is data glove and this data glove is equipped with the FLEX SENSORS which produces voltage signals when gestures made by the hand. These generated signals are given to the microcontroller through driver circuit and it processes the data and transfers the corresponding data to system. Whenever the corresponding data is matched with messages stored in microcontroller data base, the message will be displayed on the LCD screen and simultaneously the text message is converted to audio commands through help of text to speech module.

From the past years the major problem for the dumb people is to communicate with others. So we can reduce this problem with the help of this project. This project helpful for dumb-deaf people interaction using LCD display and voice commands and makes interaction for dumb people easier.

1.2 Motivation

This project is mainly useful for the deaf & dumb people to communicate among themselves and also with the normal people. This is also useful for the dumb people to communicate with the blind persons (i.e., blind people cannot see the gestures made by the dumb people) so, by using this project we can produce voice for their gestures. Other applications of this project are in secrete communication and in areas where the voice announcement is required with less human effort like Railway announcements etc.

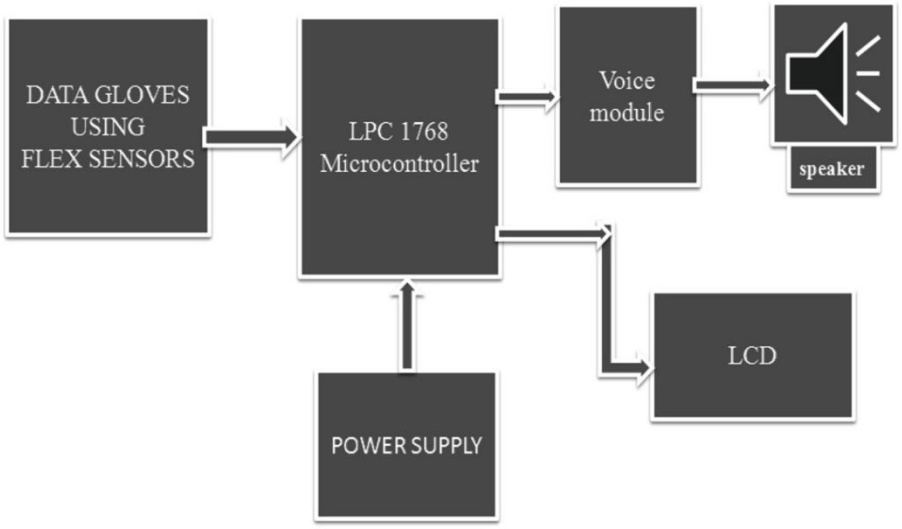
1.3 Objective

The main aim of our project is to provide an easy and better communication among the dumb people and also with normal people using data gloves and microcontroller technology to make their conversation more understandable

2. Block Diagram & Technical Specifications

2.1 Block Diagram and Working:

2.1.1. Block Diagram:



2.1.2. Working:

The block diagram can be divided into modules .the first module is taken as data gloves connected to microcontroller and battery .Data glove is made up of flex sensors. Flex sensors are resistance based and their resistance varies according to their bending. In straight position the resistance of this sensor is low. The resistance increases when the sensor bend .these Flex Sensor patented technology is based on resistive carbon elements. As a variable printed resistor, the Flex Sensor achieves great form-factor on a thin flexible substrate. When the substrate is bent, the sensor produces a resistance output correlated to the bend radius—the smaller the radius, the higher the resistance value, and a flex sensor and force sensors give raw values. Based on these values there is a threshold value. These sensors give analog inputs to microcontroller. Initially all the flex sensors are in short circuit condition i.e. the raw value is above the threshold value acts as binary input ‘one’ and when it bents the resistance of the flex sensor increases and the raw value will decreases and this is below the threshold value take input as binary ‘zero’. Data glove contain 5 sensors. So, there is possibility for generating 32 messages corresponding to the

signals of flex sensors. The microcontroller lpc1768 is the heart of the above system gesture based Vocalizer for deaf and dumb community. .

2.2 Technical Specifications:

2.2.1 LPC 1768 microcontroller:

The Mbed LPC 1768 microcontroller incorporates a 3-stage pipeline and uses Harvard architecture with separate local instruction and data buses as well as a third bus for peripherals. The ARMCortex-M3 CPU also includes an internal prefetch unit that supports speculative branches. The peripheral complement of the LPC1768 includes up to 512 kB of flash memory, up to64 kB of data memory, Ethernet MAC, a USB interface that can be configured as either Host, Device, or OTG, 8 channel general purpose DMA controller, 4 UARTs, 2 CAN channels, 2 SSP controllers, SPI interface, 3 I2C interfaces, 2-input plus 2-output I2Sinterface, 8 channel 12-bit ADC, 10-bit DAC, motor control PWM, Quadrature Encoder interface, 4 general purpose timers, 6-output general purpose PWM, ultra-low power RTCwith separate battery supply, and up to 70 general purpose I/O pins.

4.3 FEATURES

- ARM Cortex-M3 processor, running at frequencies of up to 120 MHz on high speed versions (LPC1769 and LPC1759), up to 100 MHz on other versions. A Memory Protection Unit (MPU) supporting eight regions is included.
- ARM Cortex-M3 built-in Nested Vectored Interrupt Controller (NVIC).
- Up to 512 KB on-chip flash program memory with In-System Programming (ISP) and In-Application Programming (IAP) capabilities. The combination of an enhanced flash Memory accelerator and location of the flash memory on the CPU local code/data bus provides high code performance from flash.
- Up to 64 KB on-chip SRAM includes:
    - Up to 32 KB of SRAM on the CPU with local code/data bus for high-performance
- CPU access.
    - Up to two 16 KB SRAM blocks with separate access paths for higher throughput.
- These SRAM blocks may be used for Ethernet, USB, and DMA memory, as well as for general purpose instruction and data storage.

- Eight channel General Purpose DMA controller (GPDMA) on the AHB multilayer Matrix that can be used with the SSP, I2S, UART, the Analog-to-Digital and Digital-to-Analog converter peripherals, timer match signals, GPIO, and for Memory-to-memory transfers.
- Multilayer AHB matrix interconnects provides a separate bus for each AHB master.
- AHB masters include the CPU, General Purpose DMA controller, Ethernet MAC, and the USB interface. This interconnect provides communication with no arbitration delays unless two masters attempt to access the same slave at the same time.
- Split APB bus allows for higher throughput with fewer stalls between the CPU and DMA.
- A single level of write buffering allows the CPU to continue without waiting for Completion of APB writes if the APB was not already busy.

2.2.2 FLEX SENSOR:

MECHANICAL SPECIFICATIONS

-Life Cycle: >1 million
-Height: 0.43mm (0.017")
-Temperature Range: -35°C to +80°C

ELECTRICAL SPECIFICATIONS

-Flat Resistance: 25K Ohms
-Resistance Tolerance: ±30%
-Bend Resistance Range: 45K to 125K Ohms (depending on bend radius)
-Power Rating : 0.50 Watts continuous. 1 Watt Peak

2.2.3 Liquid Crystal Display (LCD):

Most of the LCD modules conform to a standard interface specification. A 14pin access is provided having eight data lines, three control lines and three power lines. The connections are laid out in one of the two common configurations, either two rows of seven pins, or a single row of 14 pins. The 16 *2 LCD Pin diagram is shown in below Figure bellow

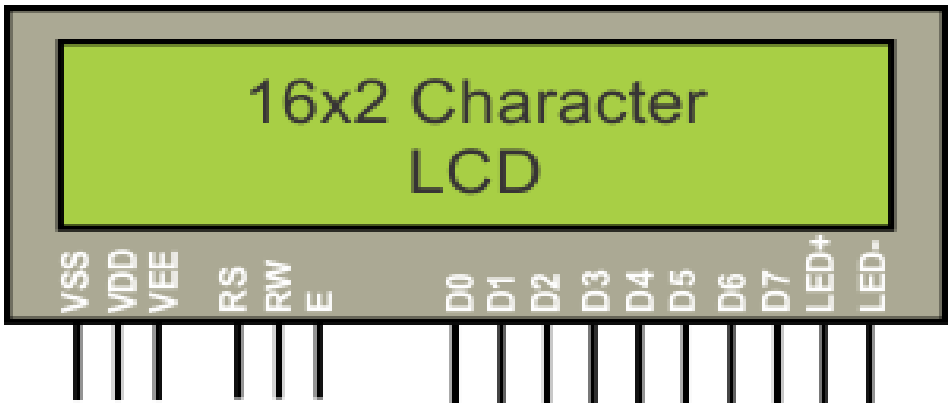


Figure: Pin Diagram of LCD

2.2.4 TEXT TO SPEECH MODULE:

Name	Typical	Unit
Working Voltage	5	V DC Regulated
Current Consumption	100Ma	Peak(20mA Avg)
UART Level	3-5V	Can work directly with 3V or 5V MCU pins
UART baud rate (8 bit data, no parity, 1 stop bit)	9600	bps default. Adjustable.

3 Results and Analysis

3. 1Results & Analysis

Based on the gestures the regarding messages will be displayed on LCD screen and the audio messages will be heard such that is useful for the deaf, dumb people to communicate with the normal people. These are the snap shots of this project, the Figure bellow shows the image of this project which is included with the data glove and the corresponding message and voice generated. 6.3 showing whole project that displaying text message on LCD panel regarding to the gesture and text to speech module showing red led glowing that indicates the output generating from it and figure and power supply given through usb cable to the processor that used by the project.

Figure: Showing message on LCD panel regarding to the gesture

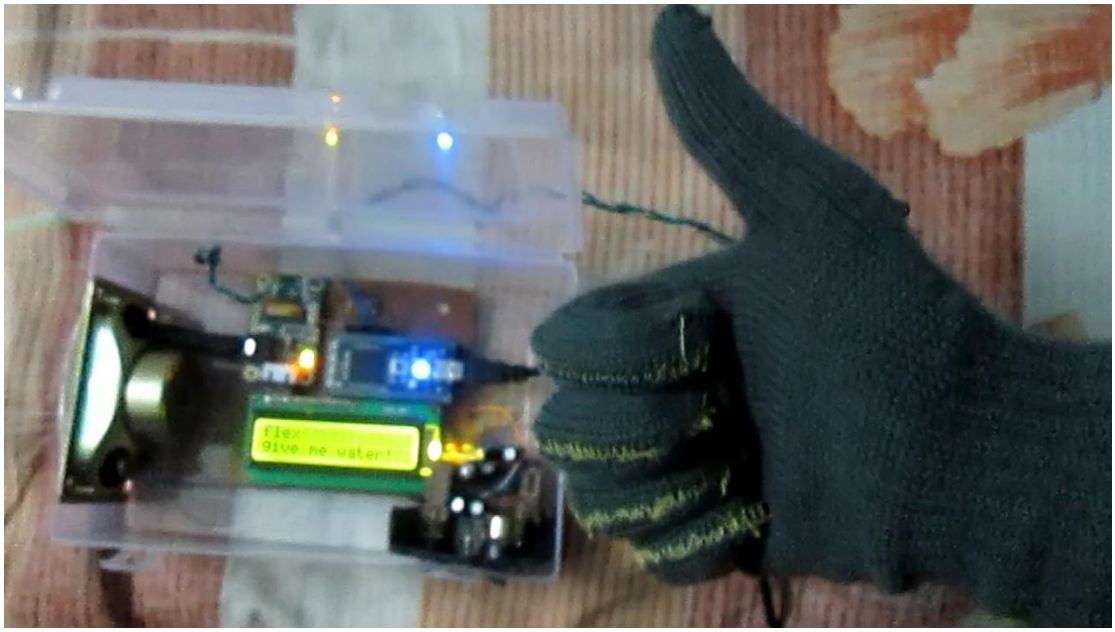


Figure: Voice messages generated regarding to the corresponding gestures

3.2 Conclusion:

Hence the gesture based vocalizer for speech and hearing impaired people have been made successful to interpret their expression of words. Hence the gesture for each word was acquired with the help of the flex sensors and data gloves. The corresponding distinct voltages of sensors were fed serially to the control unit. The data on processing by the microcontroller and voice module would generate the consonant words which can be heard by normal people with the help of the speaker. Thus, the communication gap between normal and speech and hearing impaired people is reduced. Hence this project provides an elucidation for all the obstacles faced by all speech impaired people, as from this they will be satisfied, motivated and gain self confidence that their feelings will also be understood by other people.