**HAND GESTURE TO VOICE TRANSLATOR FOR MUTE PEOPLE USING MSP430**

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ABSTRACT

Bio medical engineering is the application of engineering principles and design concepts to medicine and biology for health care purposes. Similarly in our project engineering concepts are used to produce a device that helps mute people to communicate with the public effectively. Generally mute people use sign language to communicate with others. People who aren’t familiar with sign language have difficulties in communicating with mute people. Hence, devices were designed in which every letter in the word is expressed in sign and the text is displayed in liquid crystal device (LCD). In this system the illiterate and the visually challenged people still find difficult in communicating with mute people.Therefore in our project the hand gestures are detected using flex sensors and micro electro mechanical system (MEMS), the analog values from these sensors are converted into digital codes by 10 bit analog digital converter (ADC). In multi signal processor (MSP430). These codes are transmitted to voice unit through zigbee. The voice unit have voice integrated circuit APR9600 which works in two modes record and playback mode. In record mode hand gesture is made and voice/word of one’s choice is recorded. Then in the playback mode when a hand gesture is made the corresponding recorded voice is played. The system is entirely controlled by two multi signal processor (MSP430) where one is present in detection and other is in voice unit.

KEYWORD:Biomedical,flex sensors,MEMS,zigbee.APR9600.

1.INTRODUCTION :

In general, embedded system is a combination of both hardware and software used to achieve a unified single task/performance. Importantly it monitors, responds to/or control an external environment that is well connected to a system through sensors, actuators and other interfaces and it meets timing and other constraints imposed on it by the environment. However, embedded systems require a processor that is an important unit and mostly like an heart. The processing core in the embedded system is either a microcontroller or digital signal processors (DSP). In the modern society, there is a consistent increase in the number of people who suffer from various illness that includes metabolic and life style related diseases, though most of the infectious diseases are under control and cured. This condition always looks for better diagnostic tools, expedited information transfer technologies, accurate prognostic devices, importantly patient management system and other alternative medicine strategies. Recently, embedded system technologies have occupied an important area in the biomedical application in diagnosis, prognosis, patient management and telemedicine that broadly includes the diseases of various kinds such as infectious, metabolic and lifestyle related disease in human beings. It is capable of converting the hand gesture into codes that are understandable by computer. However these codes are routed to particular letter and then they are displayed in LCD monitor for human to understand. Each letter is displayed in LCD one by one, and so it takes time to understand as a word and then to respond back. Number of codes can be generated is lesser as it does not use a MEMS based Accelerometer. In Our proposed system, pre recorded is played for each hand gesture and we use MEMS for accurate gesture recognition

2.RELATED WORK

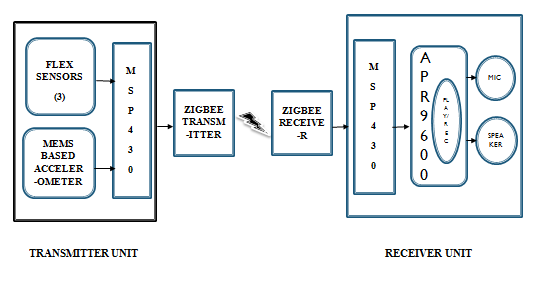
Our project is developed based on the ideas drawn from the following papers.

In reference [1], the sign language is converted into voice using the concepts of neural networks, hidden Markov models, natural language processing, linguistics and parallel computing which makes this system complicated. In reference [2], voice encryption is done using JADE algorithm. Thus, the output produced in the form of computer generated voice which makes the user uncomfortable. In reference [3], in order to communicate a single word in the form of voice, each letter in that word has to be expressed in gesture which makes the communication inefficient and time consuming. In reference [4], only flex sensors are used to detect the hand gesture. Hence, large number of signs cannot be expressed which limits the communication level. In reference [5], the hand gesture has to be done for every alphabet which is converted into its corresponding ASCII code and it is displayed in the form of letter using LCD. Since, the output is in the form of text the illiterate and the physically challenged people find it difficult to communicate with the mute people. In reference [6], the sign language is converted into text and it can be displayed only in devices which supports Bluetooth. It makes the communication difficult if the Bluetooth supporting devices are not available.

3 PROPOSED SYSTEM

Since the output of the existing system is in text form illiterate people find it difficult to understand. Hence in the proposed system, the digital value generated by ADC is mapped to recorded voice. Therefore when mute peoples show their gesture, the pre recorded voice is played. Using this system, the communication between the mute people and others is made easy. This chapter consists of the hardware and software requirements, which is used in the block diagram. Flow of operation is shown for the betterment of understanding.

PROPOSED SYSTEM BLOCK DIAGRAM

 The block diagram consists of two major units – Detection unit and Voice unit. The signals from detection unit are transmitted to the voice unit using ZIGBEE Protocol. The three signals from Flex sensors and two signals from accelerometer are detected using MSP430 controller. Using ADC, those analog signals are converted to digital signals and are transmitted to the voice unit using Zigbee module. The voice unit which contains APR9600 IC receives those digital signals and plays back its corresponding recorded audio using the speaker.

4 HARDWARE EXPLANATION

The flex sensor patented technology is based on resistive carbon elements. They require a 5volt input and output between 0 and 5 volt, the resistivity varying with the sensor’s degree of bend and the voltage output changing accordingly. It will only change resistance in 1 direction. An unflexed sensor has a resistance of about 10,000 ohms. As the flex sensor is bent, the resistance increases to 30-40 kilo ohms at 90 degrees.

The MMA7361L is a low power, low profile capacitive micro machined accelerometer featuring signal conditioning, a 1-pole low pass filter, temperature compensation, self test. It provides low voltage operation ranging from 2.2v to 3.6v. It has a robust design and high shock survivability. It a low cost device.

The MSP430 MCU is designed specifically for ultra-low-power applications. Its flexible clocking system, multiple low-power modes, instant wakeup and intelligent autonomous peripherals enable true ultra-low-power optimization, dramatically extending battery life. MSP430 MCUs are highly integrated and offer a wide range of high performance analog and digital peripherals

Zigbee is used for wireless communication. It acts as a transceiver between the detection and voice unit.

In voice unit IC APR9600 is used it is a voice recording and playback single chip IC. This IC is capable of recording for 60 seconds. It works of two modes auto rewind and record.

The flex and MEMS based accelerometer sensors that are attached to the hand glove senses the hand gesture the analog voltage produced by these sensors are monitored by controller. These analog values are converted into digital values by ADC and transmitted through zigbee module to the receiver unit which has voice IC APR9600. It is capable of recording and playing back of 5 voices. The system works in two modes recoding and play back mode. In the record mode hand gesture is made and the corresponding voice is recorded which purely dependent on one’s choice. Then the system is set to play back mode where hand gesture is recognized and the corresponding voice is played.

5 SOFTWARE EXPLANATION :

Energia is an open-source electronics prototyping platform started by Robert Wessels in January of 2012 with the goal to bring the Wiring and Arduino framework to the Texas Instruments MSP430 based LaunchPad. The Energia IDE is cross platform and supported onMac OS, Windows, and Linux. Energia uses the mspgcc compiler by Peter Bigot and is based on the Wiring and Arduino framework. Energia includes an integrated development environment (IDE) that is based on Processing. The foundation of Energia and Arduino is the Wiring framework that is developed by Hernando Barragan. The framework is thoughtfully created with designers and artists in mind to encourage a community where both beginners and experts from around the world share ideas, knowledge and their collective experience. The Energia team adopts the philosophy of learning by doing and strives to make it easy to work directly with the hardware. Professional engineers, entrepreneurs, makers, and students can all benefit from the ease of use Energia brings to the microcontroller. Energia started out to bring the Wiring and Arduino framework to the Texas Instruments MSP430 LaunchPad. Texas Instruments offers a MSP430, TM4C, C2000, andCC3200 LaunchPad. The LaunchPad is a lowcost microcontroller board that is made by Texas Instruments. The latest release of Energia supports the majority of the LaunchPad product offerings.

ALGORITHM OF THE PROPOSED SYSTEM

Step 1: The analog channels and the variables for assignment are defined,

Step 2: the sensor values are mapped within the range.

Step 3: the sensor values are converted into digital values.

Step 4: the values are transmitted over zigbee transmitter.

Step 5: the transmitter values are received.

Step 6: the values are compared to obtain a

Particular voice.

CONCLUSION

In our proposed system, Flex sensors and MEMS are used for accurate hand gesture recognition. The analog signals from these sensors are converted into digital using msp430 and they are transmitted using zigbee to the voice unit apr9600.Further enhancements that can be done in this system are, by using additional sensors like contact sensors the combinations can be increased and many sign can be stored. Zigbee is short range communication device this system is made efficient by enabling long range communications.

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