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A Novel Approach of Sensorized Glove for Paralyzed Person

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ABSTRACT

The master purpose of the paper is to build sensorized glove system, designed to provide a comfortable communication using synthesized speech for the convenience of a paralyzed person. Usually, a paralyzed people with half of their body paralyzed (speechless) communicate with society through their sign language which is difficult to be understood by the majority of people. The intended system is configured to solve this problem. The movement of user's finger of this glove will be changed into synthesizing speech to carry an audible message to receivers. The glove is occupied with the no of flex sensors which are constructed using bend sensitive resistance element. For every particular movement, flex sensor generates a proportional change in resistance of the various element. This mechanism sends a unique set of signal to microcontroller and voice IC which is pre-programmed to give the desired command. Thus, the developed system is used to establish a communication bridge among paralyzed (or speechless) and normal person.

Keywords: *Flex Sensor, Sensorized Glove, Voice IC, Gesture Communication, Paralyzed Person.*

1. INTRODUCTION

According to one survey conducted by Christopher and Dana Reeve Foundation, in today's era, nearly 5.6 million of people are suffering from the problem of paralysis. Such large number of people cannot be neglected. Thus we have proposed one model which has its main mechanism based on gesture communication. This system provides an effective solution to the disabled persons and helps them to establish comfortable communication with the society. This model is very much useful for speechless persons as well.

The heart of this system is glove having several flex sensors attached to it. Such sensorized glove is used for data collection of finger movement and transmission of a generated signal to the microcontroller. Amount of flex sensor can vary according to user requirement. For example - up to five flex sensors can be attached to one glove.

Instead of just displaying output message on LCD this model comprises of voice IC at the output side. Thus there is no necessity for the receiver to check the LCD display time to time.

- The basic aim of this paper is to provide an easy and simple solution to the stated problem.
- To establish an effective communication by translating the gestures into words, using portable model.[1]

2. LITERATURE REVIEW

The first glove base system was developed in 1970's [3]. From that point forward various glove systems have been developed. These system prototypes were generated at Massachusetts Institute of Technology (MIT) and were named as MIT-LED and Digital entry data glove.

Later in 1977 Thomas de Fanti and Daniel Sandin created glove which utilizes light as a source and transmitted through flexible tube attached to each finger. Further in 1983 digital entry data glove is patented by Garry Crimes [6]. In 1987, visual programming language research came with new fiber optic technology [7]. In 1989, Power glove for Nintendo video game was created by matel Toy Company which used resistive ink imprinted on the flexible plastic bend. The super glove was generated by Nissho electronic in 1995 which utilize with 10 to 16 sensors sewn on glove cloth. In 2002, power glove was replaced with super glove [8].

Further, the data glove modified using force sensor, it was found in robotics, bio mechanic device. This sensor has been made up of steel plate base where in general strain measuring gauges are connected. In cyber gloves for aligning the sensors, an Artificial Neural Network (ANN) were used.

3. METHODOLOGY

The designed model is a combination of transmitter and receiver section. The transmitter section includes flex sensor attached to glove which is connected to microcontroller whereas receiving section comprises of voice IC (APR 33A3). The microcontroller used in this model is AtMega328. The purpose of selecting this microcontroller is it provides 32K of flash memory and it has inbuilt ADC. Once the code for finger movement is generated by flex sensor, the data transmission will take place to the microcontroller, where microcontroller will check for a valid code. Upon the reception of valid code, the microcontroller will send further information to voice IC. Voice IC will generate command according to the received information. Thus the output is displayed on LCD as well as the desired command (output) is speak through voice IC. Speaker can be attached to voice IC for increasing the intensity of voice.

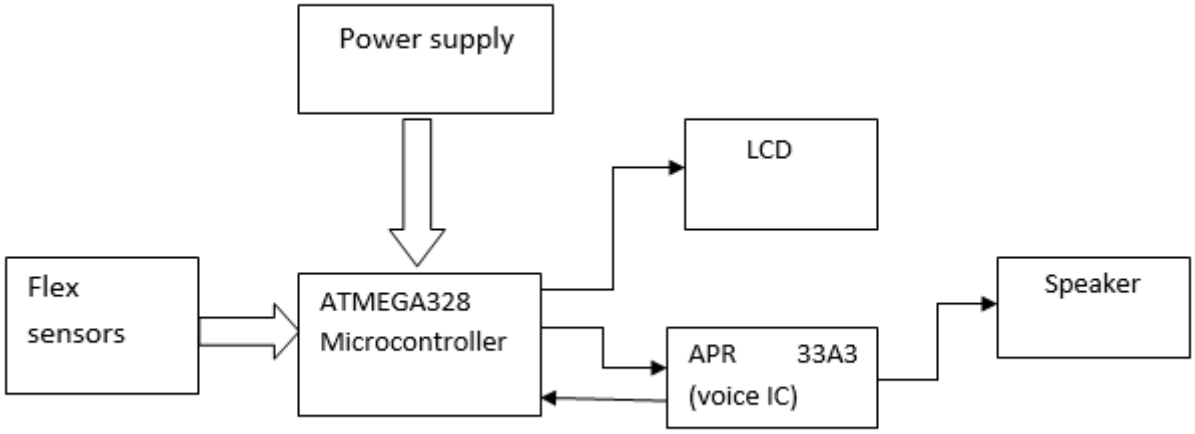


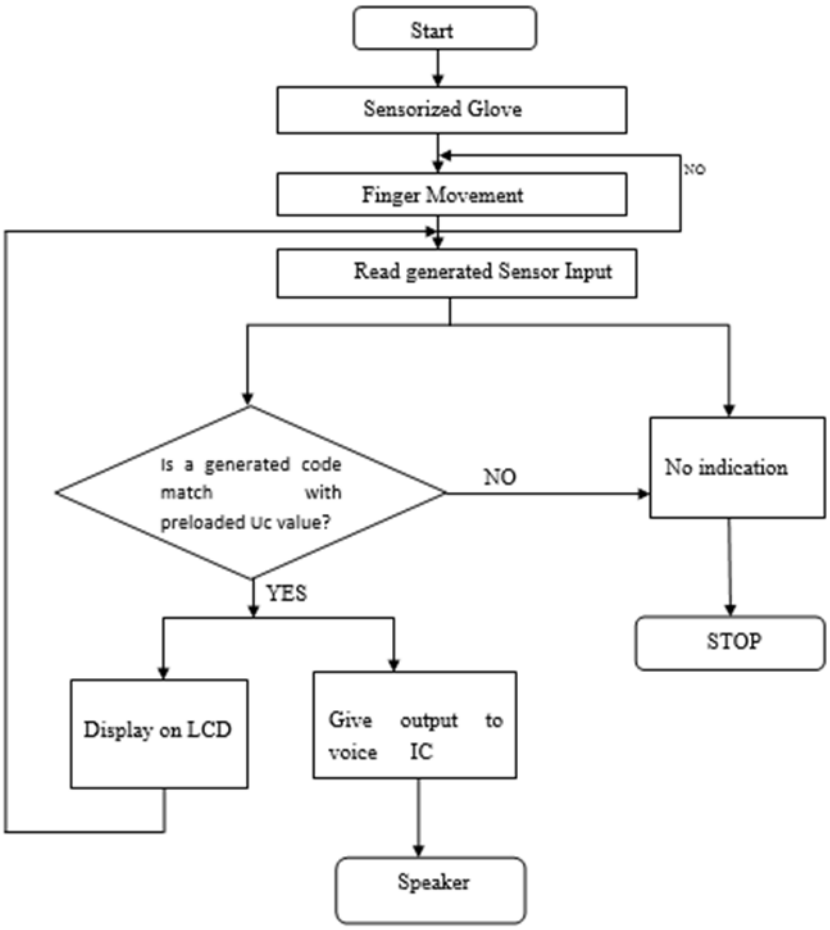
Fig 1: Block diagram of proposed system

FLEX SENSOR

Flex sensor is an electronic device which is constructed using resistive carbon elements [2]. Flex sensor is sometimes also known as bend sensor or flexible potentiometer. The high form factor is achieved by flex sensor on the thin flexible substrate. Flex sensor changes the resistance according to bending position of sensor eg: 10kohm, 14.5kohm, 18.8kohm, 20kohm of resistance can be obtained for a deflection angle of 0^0, 20^0, 40^0, 45^0 etc [1].

Fig 2: Flex Sensor

4. FLOW CHART



5. FUTURE SCOPE

- We can straighten this subject by using the same technology in the automatic car system. Handicap persons are not able to drive a car but the use this technology sensor can help them to drive a car with the help of finger movement.
- Zigbee and GPRS systems can effectively use to increase the range of communication.
- With the help of video camera, live streaming is possible between doctor and patient.
- Gesture recognition based robot can be constructed which can be used in any sector of application.

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