Gesture to Text Conversion with Obstacle Detection

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Abstract

Communication is fundamental human right. Sign language is the normal way of communication for deaf and dumb people among themselves and with normal people. Still there exists a large communication gap between normal people and disabled people since normal people often find it difficult to interpret the sign language. To minimize this gap we propose a new methodology which converts sign language to text. It mainly consists of the flex sensors to capture the hand gestures and the recognized character is to a smartphone. This way disabled people are able to communicate with the normal people and vice versa.
Keyword- Gesture –Text Conversion, Power Consumption, Simplicity

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I. INTRODUCTION

In recent years the numbers of people who suffer from speech and hearing impairments are increasing [2]. A deaf, dumb or blind person always uses gestures while communicating with the peers. Gesture communication usually employs hand gestures, orientation of fingers and facial expressions. [1]There are mainly two universally accepted sign languages: American Sign Language and Indian sign language [4]. Most commonly American sign languages are used which are difficult for the normal people to interpret [4]. Hence communication gap takes place between normal section of society and disabled people.

Vision is one of the most important human senses. [3]It plays an important role in human perceptions about the surrounding environments. One of the important problems blind people face is detection of obstacle while walking.

To overcome this we have included an obstacle detection using an ultrasonic sensor. This work is designed with an aim to help deaf, dumb or blind people and combination of deaf and dumb, blind and dumb people with better communication with rest of the world. This system converts gestures to text output. Flex sensor plays the role of capturing the gestures shown by the disabled. The disabled can wear the glove. Flex sensor placed on the hand glove captures the bend when the fingers gestures are shown. Output of the flex sensors are the voltages that may vary according to the gestures. Arduino recognize these signals and send it in to the smartphone. Smartphone with the help of an application displays the text conveyed by the gesture. Ultrasonic sensors are used to detect the obstacle in the path. Normal person is able to communicate back as well by giving a speech input to the smartphone. Smartphone displays the text conveyed by the speech as well as the corresponding animated gesture is shown in the screen.

II. IMPLEMENTATION

A. Hardware Implementation

It consists of an Arduino UNO, flex sensor, MPU 6050 module, ultrasonic sensor. The disabled person can wear the glove and the gestures shown by him/her is sensed using the flex sensor. The raw data from flex sensor, MPU 6050 and ultrasonic sensor is given to Arduino UNO which is send to the smartphone via a Bluetooth module. The smartphone displays the text conveyed by the gestures. Moreover a normal person is able to communicate back by giving a speech input which will be displayed in the screen of the smart phone and a corresponding animated gesture will be shown in the screen.

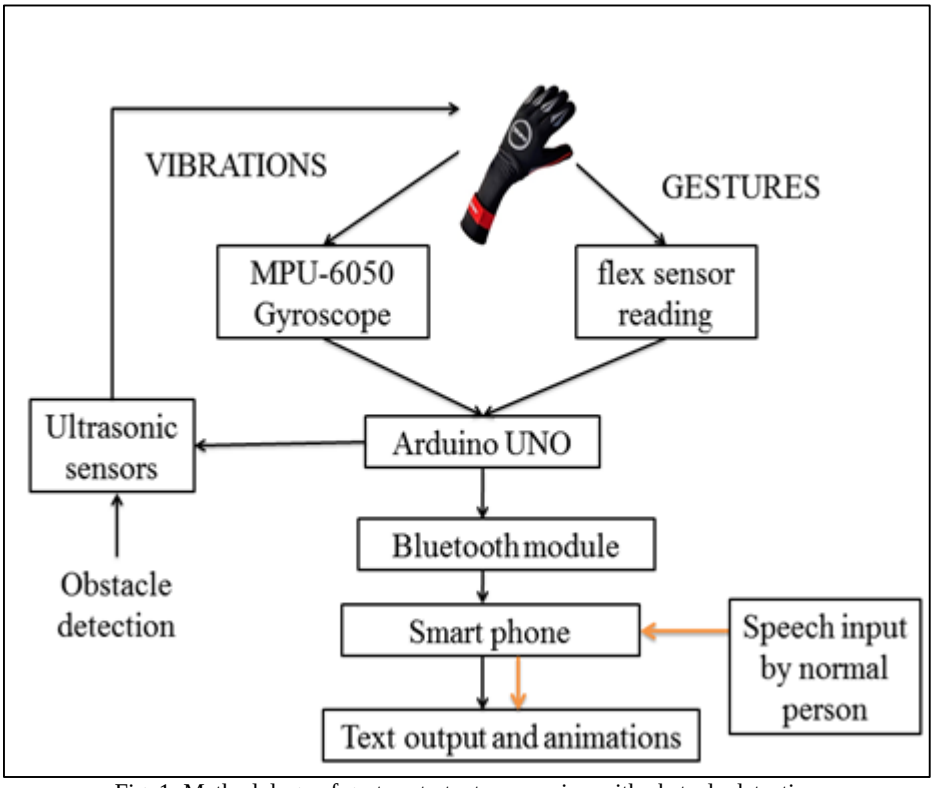

Fig. 1: Methodology of gesture to text conversion with obstacle detection

Methodology of gesture to text conversion with obstacle detection is shown in Fig. 1.
An ultrasonic transducer is also employed for obstacle detection for guiding the blind. Below we explain individual hardware components and their functions:

1) Sensors: We use flex sensor for measuring the bend corresponding to gestures. The sensors output gives change in resistance when bent. These sensors are placed in a resistive divider configuration which converts the resistance change to a voltage change. We are using two sensors on the thumb and index finger. In addition we use an ultrasonic transducer for obstacle detection for guiding the blind.
2) Microcontroller: We use Arduino UNO .It is interfaced with Bluetooth module, MPU-6050, ultrasonic sensor, flex sensor.
3) Bluetooth module: HC05 is used as transmitting module. It is used for transmitting the data from Arduino UNO to smartphone.
4) MPU-6050- It is a Triple axis accelerometer and gyroscope used for detection of rotational and translational movements of hand when the gesture is shown.
5) Smartphone: Any android smartphone can be used.

B. Software Implementation

1) Arduino IDE: For programming Arduino Boards Arduino IDE software is mainly used.
2) Android studio: For developing the application Android Studio is used.

Fig. 2: Reading raw values from flex sensor

III. RESULT

Our proposed system is to reduce the communication gap between deaf, dumb or blind people and the combinations of deaf and dumb and blind and dumb people with normal people. A glove plays the major role in the work. When flex sensors attached to the glove captures the gestures it converts the gestures to text. The text output is received in a smartphone. A normal person is able to communicate back by giving a speech input to the smartphone which is displayed as text in the screen and a corresponding animated gesture is also shown. Ultrasonic sensor is used for obstacle detection. If any obstacle is detected within a range of 30 cm, the vibration motor fixed on the glove vibrates.

IV. CONCLUSION & FUTURE WORKS

This paper describes the design and working of a system which is useful for deaf, dumb or blind people, the combinations of deaf and dumb and blind and dumb people with normal people. [2] The main problem is that, deaf and dumb people use their standard sign language which is difficult to interpret by common people. As technology improvises and electronics shrinks the proposed project can be improvised more. The proposed system cannot be used with a person being both deaf and blind. So such a system can be introduced with improvising technologies. The more number of gestures can be read by employing flex sensors in all fingers. Programming can be improved for variety of gestures.

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