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Implementation of Raspberry Pi Based Inteli Glove for Gesture to Voice Translation with Location Intimation for Deaf and Blind People

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ABSTRACT: Communication plays an important role for human beings. Communication is treated as a life skill. This paper helps in improving the communication with the deaf and dumb using flex sensor technology. A device is developed that can translate different signs including Indian sign language to text as well as voice format. The people who are communicating with deaf and dumb may not understand their signs and expressions. Hence, an approach has been created and modified to hear the gesture based communication. It will be very helpful to them for conveying their thoughts to others.In the proposed system, RF module is used for transmitting and receiving the information and raspberry pi as a processor, GPS module is also used for blind people to identify their location. The entire framework has been executed, customized, cased and tried with great outcomes.

Keywords: *Flex sensors, Raspberry pi processor, RF transmitter, RF receiver, speaker, camera.*

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I. INTRODUCTION

In all around the world about 9.1 billion people are deaf and dumb. In their daily life they face plenty of problems on their communication. It is recognized that more than an half of our brain is devoted to the interpretation of what we see, making the sight the most dominant sense[1]. In this paper, gesture recognition that plays a key role [4]. Proposed paper includes a smart glove that translates the Braille alphabet, which is used almost universally by the literate deaf blind population, into text and vice versa, and communicates the message via SMS to a remote contact [2].

While it's easy for the Deaf to communicate amongst themselves using hand signs, the general public often finds it difficult to follow these gestures. Interpreters [8] who have mastered the techniques involved in Sign Language are always needed in such cases. The eSpeak module, a compact, open source, software speech synthesizer for Raspberry pi is utilized which converts the predefined text to speech. The generated codes even correspond to actions like switching on the fan, lights etc.

A vibration sensor is connected as a wrist band to the user whenever the doorbell rings, the sensor [6] vibrates, which notifies the user. The primary aim of this paper is to introduce an issue that will efficiently translate language gestures [9][10] to every text and sensibility voice. Often blind people have a problem in identifying their current location. So to help them, the RaspberryPi is connected to the glove has a GPS module which detects the latitude and longitude. The address corresponding to those values are found using the geocoders module of python. Once again the eSpeak module converts this address into speech or audio output.

Gesture recognition [7] is classed into a pair of main categories: vision based mostly and detector based [5]. Silvia Mirri et al. [3] devised a device for the deaf-blind users that can use the glove to deliver messages to other users, using the Malossi alphabet. The characters (and phrases) in this way created, will be sent to the android application and displayed or heard through speech.

II. PROPOSED SYSTEM

An electronic glove is developed for communication interpreter system that helps out the deaf and dumb individuals to speak with dependability. There are five flex sensors that are employed and every square measure fitted with length of every finger of glove. The hand gesture plays a vital role in this paper. The gestures are decoded by Raspberry pi. Every specific gesture (i.e, creating various positions of fingers) has a meaning associated with it. So, whenever a gesture is shown, a binary code with 5 digits will be generated. Every 5 digit code is interpreted to a predefined text.

The eSpeak module is an open source software speech analyzer for Raspberry pi. It converts the predefined text to speech. A vibrating sensor is connected as a wrist band to the user because whenever the doorbell rings then the sensor

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vibrates and notifies the user. The main aim of this paper is to introduce an issue that will efficiently translate language gestures to every text and sensibility voice. GPS module is connected to the glove which helps the blind people to identify their location. This GPS module detects the position according to latitude and longitude.

To convert sign language to speech user needs to wear the gloves which consist of the flex sensors. For making hand gesture user fingers are either folded or may not be folded. When fingers are folded the values of resistance of flex sensor changes. Those values are stored in the memory. When user shows the particular gesture the processor search from the memory and turns into speech and text form.

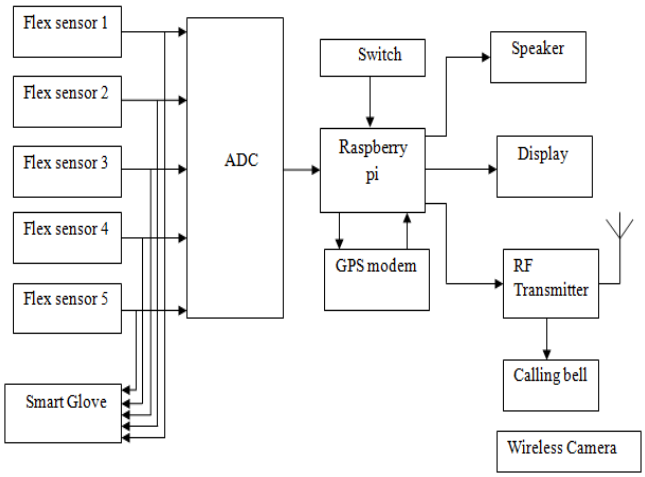

FIG 1. TRANSMITTER MODULE

Serial ADC is a communication channel between Raspberry pi and flex sensors. The smart glove can be wear to our hand depends on the gesture it will gives the information to the Raspberry pi. Based on the gesture output will display or voice from speaker or calling bell is activated.
The flex sensor produces the digital patterns. Depends on the digital pattern we are getting message or information through Raspberry pi as which the dumb and deaf person intentional view. If the digital pattern of flex sensor1 is 0, flex sensor 2 is 0, flex sensor 3 is 0, flex sensor 4 is 0 and flex sensor 5 is 1 then the indication sent is “good morning” which is shown in table 1. Similarly, if digital pattern is 00010, then the indication is “good night”. If digital pattern is 01111, then the indication is “I am fine”. By using these 5 flex sensors, we are getting 30 digital patterns with 30 messages are done in our project by using Raspberry pi.

If deaf and dumb person want to speak by using flex sensors indication, the output of the speaker will give the predefined voice message to the communicating person. In some cases, the message is displayed on the screen.

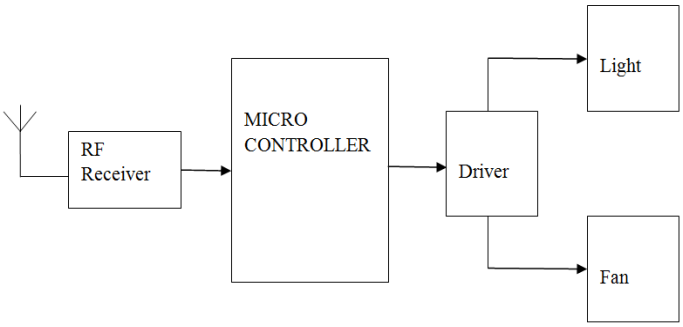

FIG 2. RECEIVER MODULE

The RF transmitter took the information from Raspberry pi, according to the flex sensor position then it gives the information to the RF receiver through wireless. The RF receiver gives the information to micro controller. The driver is controlled by the micro controller and operates the light and fan. The above RF block is used to operate the home devices by using wireless depends on the flex sensor indication.

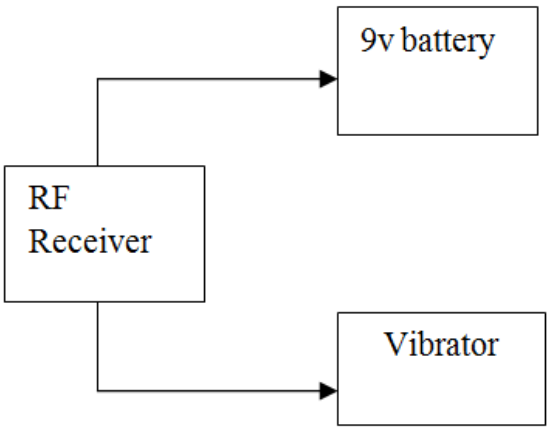

FIG 3. HAND BAND

The hand band is connected to the Deaf and dumb person. When the RF receiver receives the information wirelessly then automatically alerts the person through vibrator.

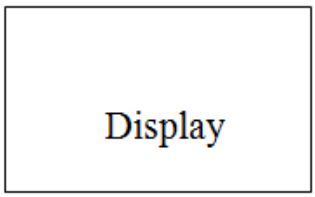

FIG 4. WIRELESS MONITORING

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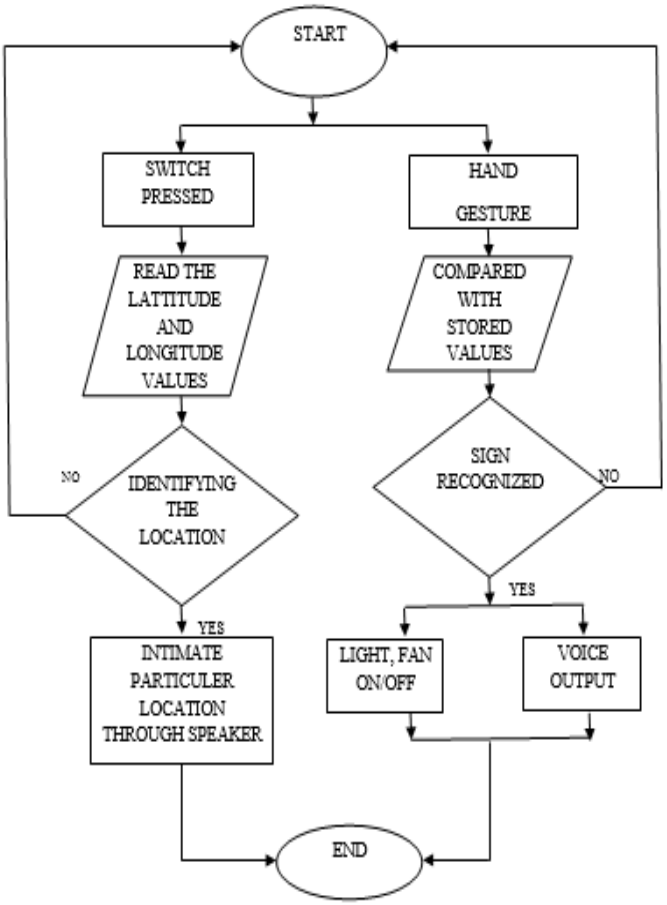

FIG 5. FLOW CHART

Initially, switch is pressed then read the values of latitude and longitude. If the values are generated then particular location is intimated through the speaker. If not the process is repeated. The concern person wear electronic glove and give the gestures. These hand gestures are compared with the stored values then sign recognition is done. If sign is recognized then it will gives the voice output as well as automatically light and fan are turn on/off.

TABLE 1
DIGITAL PATTERNS FOR GIVING INDICATION TO THE DEAF AND DUMB PERSON

S.no	Digital pattern	character
1	00001	Good morning
2	00010	Bulb on/off
3	00011	Good night
4	00100	Fan on/off
5	00101	It's time to take my meals
6	00110	Can I have tea
7	00111	Can I take today's news paper
8	01000	Can I get some water to drink
9	01001	Can I have coffee
10	01010	How are you
11	01011	I am fine
12	01100	Who are you
13	01101	Where are you going
14	01110	My native place is Guntur
15	01111	All the best
16	10000	Thank you very much
17	10001	Can I have Tiffin
18	10010	My mother name is
19	10011	My father name is
20	10100	Nice to meet you
21	10101	I am Indian
22	10110	I need to go to the rest room
23	10111	Sorry
24	11000	Hallow
25	11001	How do you do
26	11010	Good afternoon
27	11011	Good evening
28	11100	I am very happy
29	11101	I am alright
30	11110	Don't worry be happy
31	11111	Jai hind

III. RESULTS

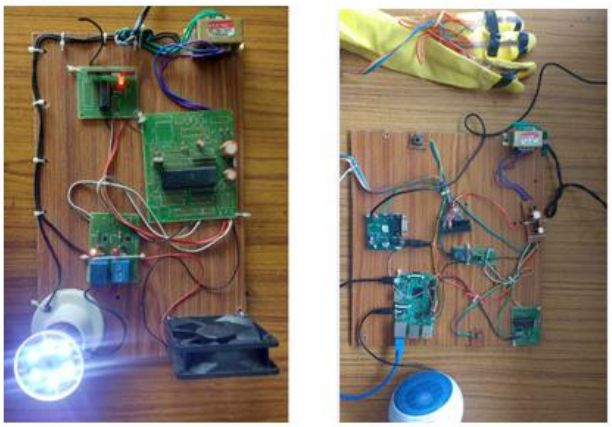

FIG 6. HARDWARE IMPLEMENTATION

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FIG 7:GESTURE 4 FOR FAN ON/OFF

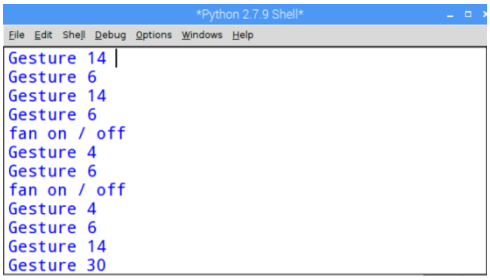

FIG 8: GESTURE 4 OUTPUT

FIG 9: GESTURE 2 FOR BULB ON/OFF

FIG 10: GESTURE 2 OUTPUT

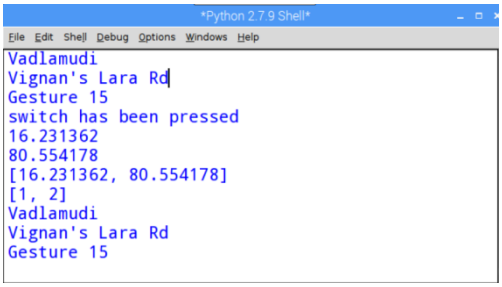

FIG 11: LOCATION IDENTIFICATION OF A BLIND PERSON

IV. CONCLUSION

This paper is helpful for deaf and dumb people who cannot communicate with normal persons. The important key factor in this project is to facilitate these people and to fix them more confident to manage their sites by themselves. The primary advantage is that the device can be taken away easily and is of about less weight.

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