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Gesture Based Patient Need Alerting Smart Glove

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ABSTRACT: Even after the advent of voice assistants, virtual assistants and other new technologies, many still struggle to use them effectively and practically. Our project is mainly applicable to old people, physically challenged, and bedridden people. Our project application areas are hospitals and old age homes. During emergency situations where the user is not able to access his/her mobile phone, our prototype can handle such situations effectively by detecting the user's hand gestures and sending alerts to caretakers and hospitals. Our model also has a medical alert system. According to the prior initialization of the time for the medicines to be taken, this prototype alerts the user at that exact time. The alarm message appears on the LCD and by an audible signal. This glove is equipped with an integrated temperature sensor, Flex sensors and pulse sensors that give continuous readings of the user's health parameters and are displayed on the LCD placed in the glove. The main feature of the glove is to communicate the needs of the user, which can be accomplished by a flex sensor.

KEYWORDS: Hand gestures, Emergency Alert System, Medicine Alerts, Temperature, Heartbeat.

I. INTRODUCTION

There are an enormous number of people around the world who are dying because of delayed access to health care. There are many cases where people died only due to late access to medication or delay in reaching the hospital. Thus, ongoing monitoring of health outcomes is important not only for patients in hospitals, but also for those suffering from long term health complications and who are taking health care at home caretakers.

The second problem is that, despite the emergence of many new technologies in the medical field, few people know how to use these technologies. People who are deaf, dumb, paralysed, affected, and taken care of by caretakers need to have a system with which they can effectively communicate with caretakers or doctors.

As a solution to the above-mentioned problems, proposed system is designed a glove that can continuously monitor patient health parameters, store the data in the cloud, and display them in the mobile app.

The second characteristic of this glove is to help the user communicate effectively with the guardian or physician using the gestures of the user's hand.

II. RELATED WORK

The work consists of multiple hardware components linked together. The data acquisition block is made up of a skin temperature sensor, a GSR sensor, a pulse sensor, and a data logging unit. No use of Flex sensors. There are only other monitoring features in these gloves and smart reflex tracking and alerting[1]. The proposed system aims to introduce a new system for continuous finger recognition using flexible sensors. This module had Lilypad Arduino, Flex sensors, Bluetooth, and Batteries to power up the glove. Experimental results reveal that the wireless smart glove can effectively capture the finger movements. The new labelling system for GRU-based sign recognition operations is also beneficial in mitigating the interference introduced by transitions between successive actions [2]. Proposed paper is a smart glove-based fitness tracking system that can detect athletes' activities in any indoor fitness facility, with no need of attaching multiple sensors on the athlete's body[3]. The proposed system is based on a device which uses flex sensor, touch sensor and accelerometer for detecting hand gesture. Consequently, all fingers except the thumb have two sensors of flexibility and can bend to two different degrees[4]. In paper The algorithms

used for recognition of gestures use an IoT based smart wearable gadget capable of performing various tasks like temperature monitoring, Ambient light detection and gesture control has been proposed[5]. software In the work system which supports the two-way communication between the disabled and normal person. The system is made up of two modules i.e. gloves with flexibility sensor for converting gestures to speech and Android app to convert speech to text[6]. The Proposed system that uses different sensors and Arduino nano to detect pulse rate and oxygen level in blood. When the heart rate or temperature exceeds the normal range, it will alert the people involved and the GPS module will provide the user's current location[7].

III. METHODOLOGY

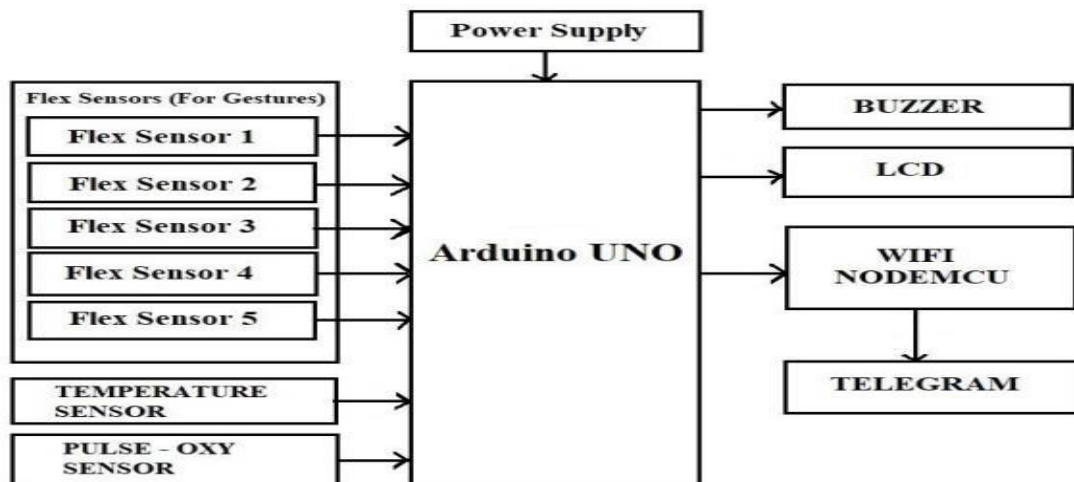


Fig. Block diagram for methodology.

In this project, we are communicating the patient’s needs with the help of gestures using flex sensors. Using flex sensors, the gesture will be allotted to the needs of the interface user with the caretaker. We have used the Arduino UNO microcontroller, which is more accurate, efficient, and rich in features when compared to Arduino. This glove consists of a pulse-oxy sensor, temperature sensor, flex sensor. When the finger of the user bends for the threshold angles the sensors start reading input values from the user. The taken values are analysed by the Arduino UNO microcontroller.

Then Arduino starts sending data to the cloud, and the mobile app i.e., Telegram starts retrieving data from the cloud as notifications. For the health sensors if the values read by the sensors are more than the given threshold values, then the caretaker receives alerts in the mobile app.

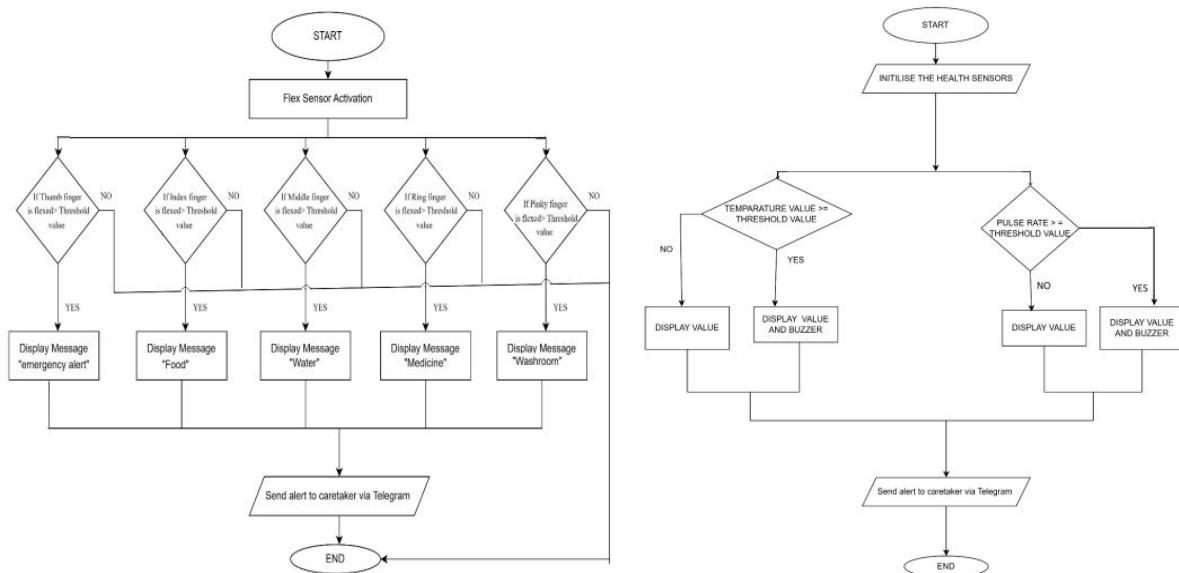
Pulse oximetry is a frequently used medical sensing method for measuring heart rate. pulse oximeter measures absorption with a constant stream of light and a complex calculation, filtering out muscle, tissue, and fingernail interference.

DHT11 is a temperature and humidity Sensor. A capacitive humidity detecting element and a thermistor for temperature detection make up the DHT11 sensor. A negative temperature coefficient thermistor is used in this sensor, which reduces resistance as the temperature rises.

A flex sensor is used to communicate the needs using hand gestures. When the user bends their finger, the strip is twisted and the resistance changed, we measure those resistance values using Arduino.

The glove relates to flex sensors to all the fingers of the user hand and when the flex sensor is bent the resistance of the sensor changes, that change in resistance is used to detect the needs of the user. And when user is feeling like emergency then one of the gestures will be alerting the caretaker and further the caretaker will check for user health parameters The input data is sensed and transferred through Arduino to the mobile app via WIFI module and, at the same time, display the data on the LCD display.

In case of an emergency and needs, the system alerts the caretakers by activating the buzzer and sending emergency alerts to the user using the mobile app then also the information can be transmitted to the concerned caretaker anytime. His needs can be conveyed to the caretaker by just using his fingers. The message reloaded is transmitted using the microcontroller to the application and displayed on the LCD display on the glove.



The first flowchart shows Gesture conditions that are allotted to each finger via flex sensors. Where thumb finger is given with Emergency alert, Index finger with Food alert, Middle finger with Water Alert, Ring finger with Medicine Alert and finally Pinky finger with Washroom alert for the user. The second Flowchart shows patient health parameter conditions. Which consists of a pulse-oxy sensor, temperature sensor where these sensors keep on monitoring the user health status continuously and display the values on LCD Display. If the sensed value is greater than the threshold value of that sensor, then it displays the value and buzzers. And the data is sent as alert to the caretaker via Telegram.

IV. EXPERIMENTAL RESULTS

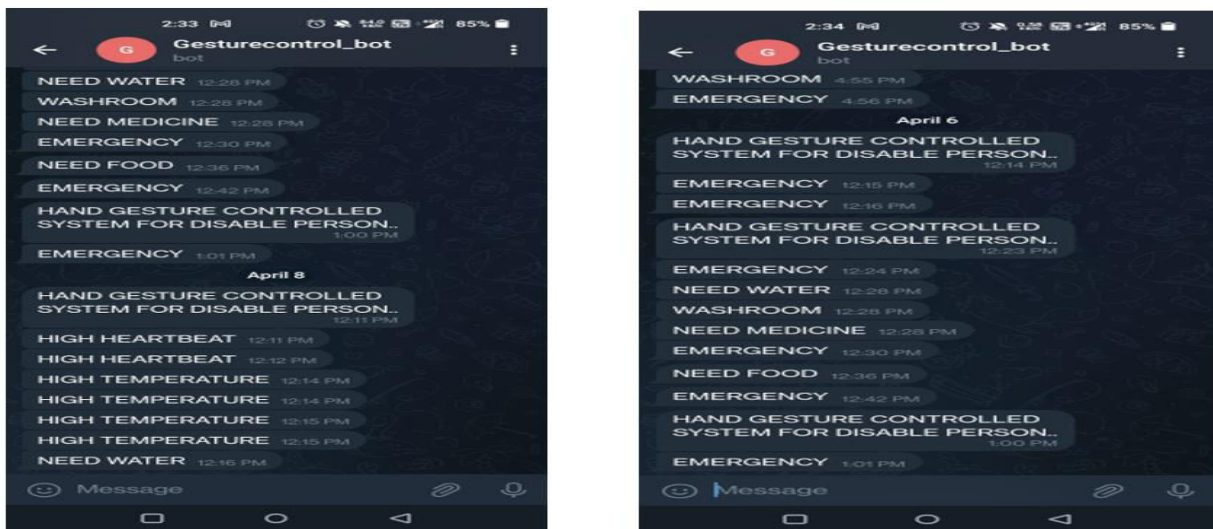


Fig 1. Telegram Bot results

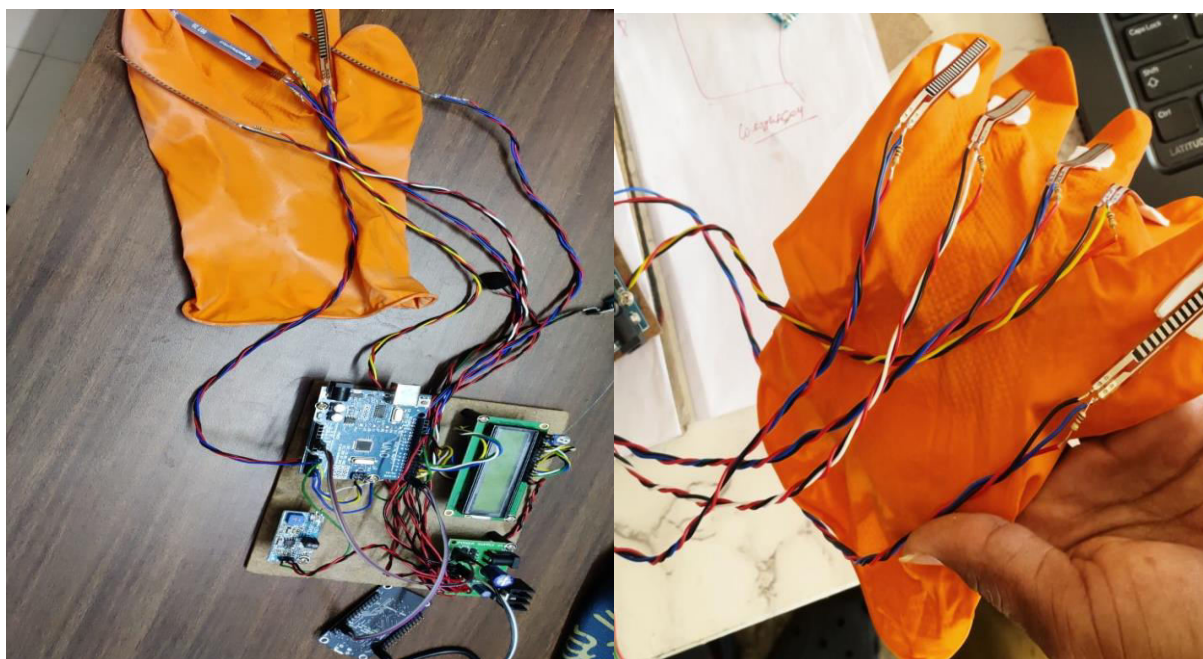


Fig 2. Smart glove with the Arduino Uno

V. CONCLUSION

Proposed prototype provides practical solutions for persons who are paralysed, dumb, deaf, and confined to beds. This paradigm creates an intuitive interface between the user and the carer. The user doesn't need any special training to use this model. Due to the automatic nature of the alert systems, in the event of an emergency, hospitals are informed so that the appropriate steps can be taken to save the users' lives.

In order to improve the effectiveness of the existing model and broaden the range of communication between users and carers, this model can be developed using machine learning and artificial intelligence. By creating a smart band with EMG sensors—which use electric impulses and machine learning to identify movements between muscles—this model can be further enhanced.

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