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E-Assistant for Paralyzed Patients using Internet of Things

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Abstract: *There are lots of hospitals and clinics that serve paralytic patients who have their entire or part of their body disabled by the Paralysis attack. In most of the cases, these people are not able to convey their needs as they are neither able to talk properly nor do they convey through sign language due to loss in the motor control by their brain. Many innovations are developed to improve the quality of life. So, the aim of our system is to develop a system or a device which is easy to use and should also be affordable to all kind of people. It should also consist of a person's basic health care monitoring system. This paper presents the development of an E-Assistant device for paralytic patients, aimed at improving their quality of life by providing an affordable and easy-to-use system that can monitor basic health care and assist in communicating their needs. The device uses simple motions, such as finger movements or angle-based controls, to enable patients to display messages. This device can be designed in such a way to be mounted on the back of their hands and their fingers, or other voluntary organ. The device has the potential to significantly improve the lives of paralytic patients by addressing their communication and healthcare needs. In this way the E-assistant for Paralyzed Patients automates the care taking ability of the patient which makes sure a healthy and periodic attention to the patient and thus results in a good health of the patient.*

Keywords: IOT, Paralysis Patients, Communication device, E-assistance, healthcare, patient care

I. INTRODUCTION

The "E-Assistant for paralyzed patients using IOT" is a recognition system designed to help those who are vocally disabled, particularly those who are paralytic and have difficulty communicating with others. This project utilizes motions and sensors to provide a medium for communication, and includes the use of various electronic components such as sensors and microcontrollers.

The project's goal is to develop an electronic automated paralysis patient healthcare system that is portable and easy to use. An angle sensor is used to convert physical parameters into an electrical signal that can be observed by an instrument or an observer. With the help of this system, the barriers faced by paralytic individuals in communicating with society can be significantly reduced.

Paralytic attacks can be caused by various factors, such as stress, high blood pressure, and improper functioning of the central nervous system. Paralytic patients often have partial

or total body disabilities and cannot speak or express their demands or wishes. Due to the lack of coordination between their vocal systems, limbs, and brain, their reflex system is slow or non-existent. In such cases, this proposed project can be of great assistance, as patients can communicate by displaying messages on an LCD screen using simple motions of their functioning body parts. Additionally, if no one is nearby, the patient can send a message to their family members or caretaker in the form of an SMS using the developed mechanism.

II. LITERATURE REVIEW

[1] S.A.C.Aziz proposed this paper presented an automatic healthcare system where the system able to help and facilitates the paralysis patient to complete their daily life . It will be hard for medical staff to understand what they want to convey and in helping them to manage their daily needs such as eating, drinking and bathing. [2] Divya Shetty,

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proposed this paper that We come across hospitals and NGOs serving paralytic patients who have their whole or partial body disabled by the Paralysis attack. These people in most cases are not able to convey their needs as they are neither able to speak properly nor do they convey through sign language due to loss in motor control by their brain. [3] S. Remina proposed this paper that Our goal is to develop a device which should be easy to use and should be affordable which consists of basic health care monitoring system with nursing care. We know that these people can't able to convey their messages or needs. To overcome this, we come up with the system that helps these patients to display messages by very simple motion. This device can be designed to be mounted on the finger or to be inbuilt in their clothes. [4] Komal V. Sindagi, proposed this paper to achieve independence in mobility for people with physical disability, right mobility equipment has to be designed based on the severity and type of disability. This is not a trivial job just because the nature and type of disability varies from person to person. [5] Vidya Sarode. The noble aim behind this project is to design a health care system which will be helpful for paralyzed and mute people. This project is to develop an algorithm for detecting a heart attack and if so, then to alert doctors, family members and emergency services. Hence here we introduce a smart health care system which will take care of problems and need of paralyzed and mute people and will also help in detection of heart attack. [6] Sanket Kad, in health care centers case's data similar as heart rate needs to be constantly covered. The proposed system monitors the heart rate and other similar data of case's body.[7] Rajendra Prasad Patil, Brain-Computer Interface enables interaction between the human brain and the computer.Studies say that this may result in causing burns, headaches and visual disturbance.[8] Ali Mohammed Ridha, Paralysis is the loss of muscle functions in any part of the body at any age and can be temporary or permanent. Even though the communication for paralysis patients sounds more efficient than other methods,cost wise it's not effective.[9] Sujin J S, In this IoT based observation and intimation of a paralyzed patient healthcare system, is designed to help the patient to convey their health issues/status and various messages to the caretaker. It helps the caretaker to monitor the patient but patient will not be able to convey his or her needs.[10] Hsin-Chuan Chen proposed blowing control method, which uses the principle of airflow vibration to make the microphone induce a small signal, and then converts it into a corresponding pulse width. It resulted in irritation for the patient for breathing as well as consuming food.

III. PROPOSED METHODOLOGY

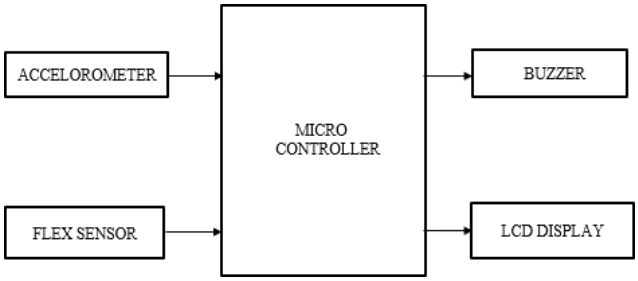

Figure 1: Schematic Representation of the Proposed system

This device consists of the 2-input device and the 2-output devices. It consists of an App designed to get the message display and the notification of the mobile apps. Hardware implementation consists of the two input and two outputs. Microcontroller is used to process the input data and give the output. The input devices are Accelerometer and Flex sensors to sense the angles in terms of tilting, moving and the finger behavior. output devices consist of the OLED display to display the message the patient wants to share. It also consists of the buzzer to generate a beep sound. two devices can be implemented on the patient's hand. The accelerometer is placed above the fingers and on the hand using the gloves and the Flex sensors under the finger message that is displayed in the output. When the patient moves his hand, the message will be taken by the software with the help of Mpu_6050 microcontroller as it detects the angle it will be taken by the Arduino code and then the microcontroller and the message will be displayed. sensors are used when the doctor wants to ask the question with yes or no. If the finger is bent little the yes message will be displayed. When little more the finger is bent it is displayed as No. Mpu_6050 microcontroller is used as it consists of the inbuilt Wi-Fi module and it consists of the inbuilt interface. Buzzers are used to alert using beep sounds. We are setting 3 beeps, 1 beep normal message display, 2 beep for less message, 3- No message. The software implementations are

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designed using the cloud. The data will be stored in the cloud. This helps the doctor to analyze and prepare a report and track the performance. The doctor can ask the questions to the patient with the help of application. That will be visible on the patients OLED Display.

Node MCU Microcontroller

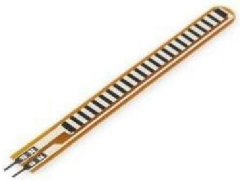
The NodeMCU (Node MicroController Unit) is an open- source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266.

MPU 6050 Accelerometer

The MPU6050 consist 3-axis Accelerometer with Micro Electro Mechanical (MEMs) technology. It used **to detect angle of tilt or inclination along the X, Y and Z axes.** Acceleration along the axes deflects the movable mass.

Flex Sensor

A flex sensor, also known as a bend sensor, is a low-cost, simple-to- use sensor used to measure the **amount of deflection or bending**.



LCD Display

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that **uses the light- modulating properties of liquid crystals combined with polarizers**. Liquid crystals do not emit light directly but instead use a backlight or reflector to produce images in color or monochrome.

Buzzer

A buzzer or beeper is an **audio signaling device**, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train, and confirmation of user input such as a mouse click

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IV. EXPERIMENTAL RESULT

4.1 Dataset

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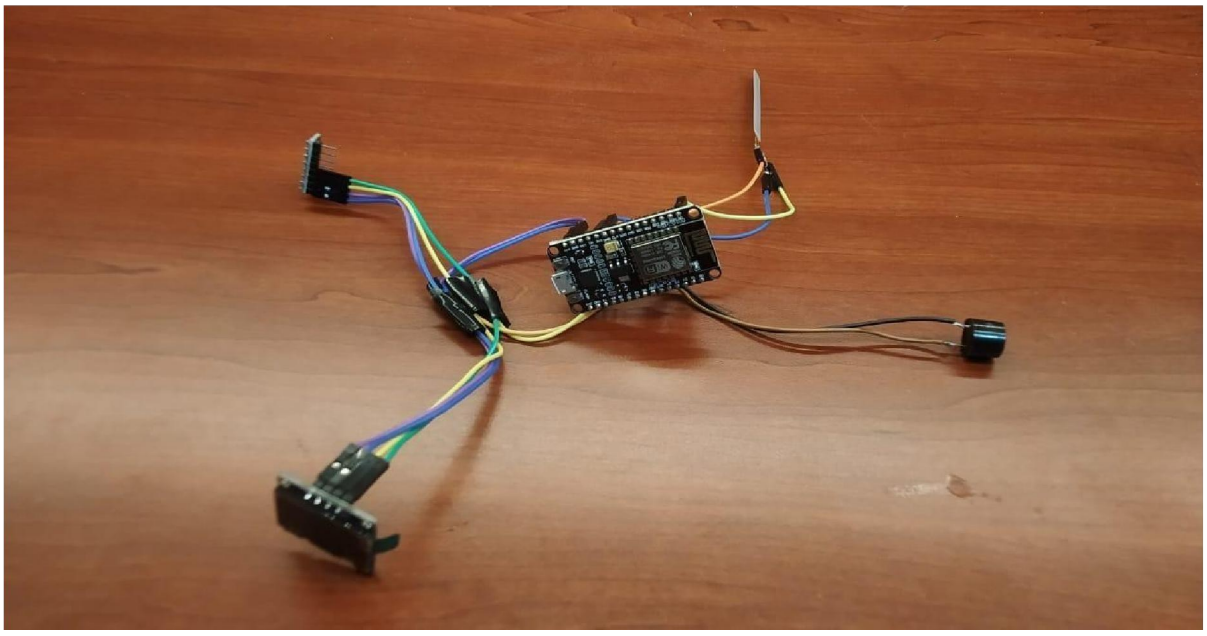
Arduino program code

```
#include <Adafruit_MPU6050.h>
#include <Adafruit_Sensor.h>
#include <Wire.h>
Adafruit_MPU6050 mpu;
#include <Adafruit_GFX.h>
#include <Adafruit_SSD1306.h>
#define SCREEN_WIDTH 128 // OLED display width, in pixels
#define SCREEN_HEIGHT 64 // OLED display height, in pixels
Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, -1);

#define flex_Sensor     A0
int def_flex;
int flex = 0;
int counter = 0;
int flex_status = 0;
boolean flex_flag = 0;

void setup(void) {
  Serial.begin(115200);
  if (!display.begin(SSD1306_SWITCHCAPVCC, 0x3C)) { // Address 0x3D for 128x64
    Serial.println(F("SSD1306 allocation failed"));
    for (;;);
}
  def_flex = analogRead(flex_Sensor);

  while (!Serial)
    delay(10); // will pause Zero, Leonardo, etc until serial console opens

  Serial.println("Adafruit MPU6050 test!");
```

Hardware Implementation:



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V. CONCLUSION

In conclusion, the development of an e-assistant for paralyzed patients using IoT and an Android app developed using Java is a promising solution to improve the quality of life for individuals who are paralyzed. The system provides a user-friendly interface that allows patients to control their environment and communicate with their caregivers effectively. By leveraging IoT technology, the e-assistant can integrate with various devices, such as smart home appliances, to automate routine tasks and reduce the dependency on caregivers.

Furthermore, the use of an Android app developed using Java makes the e-assistant accessible to a broad range of users, as Android is a popular mobile operating system. The app provides an intuitive interface that enables patients to interact with the e- assistant easily. Additionally, the app's use of machine learning and natural language processing allows the system to learn and adapt to each patient's unique needs, making the experience more personalized.

Overall, the e-assistant for paralyzed patients using IoT and an Android app developed using Java has the potential to revolutionize how paralyzed patients interact with their environment and their caregivers. It can provide a sense of independence, enhance their quality of life, and reduce their reliance on others. As technology continues to advance, we can expect further innovations in this area, leading to even more significant benefits for patients with paralysis.

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