ABSTRACT

Individuals with hearing or speeching disabilities face challenges in conveying their physical conditions through sign language to people who do not understand this form of communication. This issue creates a communication gap that limits social interaction. To overcome this problem, a sensor-based glove system was designed using flex sensors and an MPU6050, enhanced with machine learning, to recognize sign language related to physical conditions. The development of this prototype is important as it offers a practical and effective solution to support communication for individuals with hearing and speeching disabilities. The system design utilizes flex sensors to detect finger bending, an MPU6050 to detect hand orientation, an ESP32 microcontroller and expansion board as the main processor, and a 16x2 LCD connected via an I2C module as the output display. Sensor data are classified into eight different physical conditions, which are then displayed in real time. The system is assembled in the form of a glove to enhance user comfort. Testing results show that the system can recognize eight physical conditions cough, flu, diarrhea, neck pain, arm pain, leg pain, headache, and dizziness with an overall accuracy of 86% and an average response time of 0.10 seconds, which is considered fast. This design provides an efficient, affordable, and user-friendly communication tool for individuals with hearing and speeching disabilities in daily activities.

Keywords: *Sign Language, Glove, Flex Sensor, MPU6050, Machine Learning.*