

ABSTRACT

DESIGN AND DEVELOPMENT OF AN ARDUINO NANO-BASED COMMUNICATION DEVICE FOR SPEECH- AND HEARING-IMPAIRED INDIVIDUALS

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Communication is a crucial aspect of human life as social beings, enabling interaction and information exchange among individuals. For those without disabilities, communication occurs seamlessly; however, for people with speech and hearing impairments, expressing messages can be highly challenging, particularly when interacting with individuals unfamiliar with sign language. To address this barrier, this study developed a smart glove communication aid designed to translate sign language gestures into readable text. The glove is equipped with flex sensors attached to each finger to detect hand movements, with data processed by an Arduino Nano microcontroller. The output is displayed as alphanumeric text on a 16x2 LCD screen. Based on experimental testing, the system demonstrated recognition capabilities with an average accuracy of 94.8% for words, and corresponding recognition readings from Flex Sensor 1 and Flex Sensor 2, indicating significant responsiveness, though data instability was observed due to finger position variations during motion. This prototype highlights the potential of Arduino-based wearable technology to facilitate real-time communication for individuals with speech and hearing disabilities, enhancing inclusivity and social interaction.

Keywords: Communication, Sign Language, Smart Glove, Flex Sensor, Arduino Nano

