IARJSET

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

3rd-International Conference on Muti-Disciplinary Application & Research Technologies (ICMART-2024)

Geetanjali Institute of Technical Studies

Vol. 11, Special Issue 2, May 2024

VISUALLY IMPAIRED HUMANS: DESIGN AN IOT-BASED HEALTHCARE INFORMATION SYSTEM FOR INDOORS AND OUTDOORS

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Abstract: The Internet of Things, or IoT, is currently a developing research topic. Home appliances, health monitoring, Industry Internet, and many other applications use IoT. An essential part in the Internet of Things is played by sensors and actuators. This research presents a prototype that can alert visually impaired people of impending challenges and barriers. The suggested system is designed with an ultrasonic sensor. Through their smartphone, the visually challenged individual will receive alerts and their position will be logged. It will alert the vision impaired individual once again if they approach that location. This low-cost technology will take the place of the stick that is typically utilized by all those with vision impairments.

Keywords: Visually impaired, IOT

I. INTRODUCTION

The Internet of Things [1] is increasingly permeating human daily lives. The Internet of Things, or IoT, is a system that links things (items) that have internet connectivity. Any object that can be issued an IP address and has the capacity to sense and send data across a network can be considered the keyword thing. These devices contain built-in sensors that are linked to a server on the Internet. The server combines data from the devices from various locations and runs analytics on it to provide meaningful information. These highly customized systems are capable of determining what information is relevant and what may be disregarded. (Fig. 1) shows an overview of the Internet of Things.

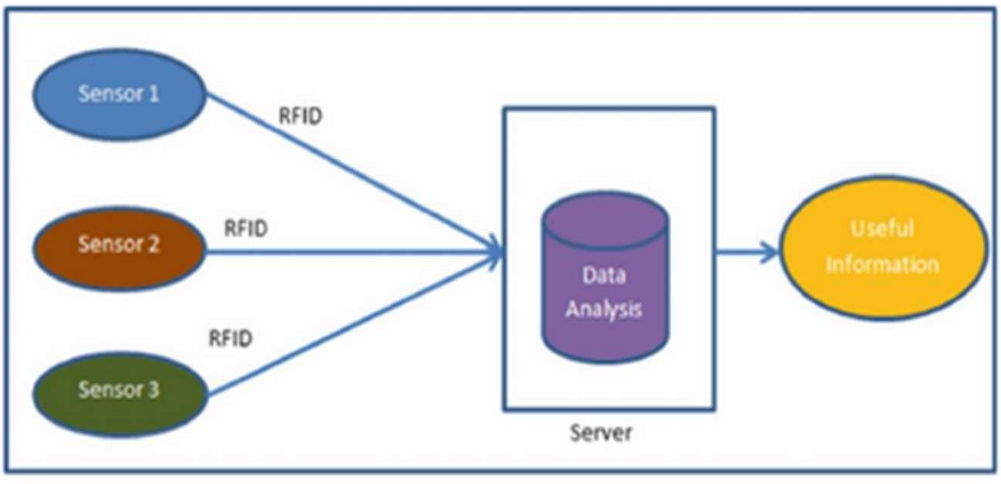

Fig 1. overview of internet of things.

As an illustration [2], a patient's hands are used to frequently assess their pulse rate and are coupled to a pulse rate monitor. The patient's current location will be sent to a relative when the pulse rate drops or increases. With a modest cost of only Rs. 215 for the pulse rate sensor (EC-0567) and Rs. 1500 for the GSM module (SmartElex), a heart patient may go anywhere in safety with this system.

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II. IOT APPS FOR PEOPLE WITH VISUAL IMPAIRMENTS

A. Making use of body nano- and micro sensors Certain eye illnesses, such as Retinitis Pigmentosa and age-related Macular Degeneration, have the potential to cause blindness due to the death of rod and cone cells in the retina that receive light from the outside world [8]. The issue can be resolved by placing an artificial implant made of body micro-sensors on the damaged outer retina and using a customized camera mounted on the patient's glass. The photos are first received by the camera, which subsequently sends them to the implanted chip. The electrical impulses from the picture data that the camera receives and transmits stimulate the target neurons, which then translate the impulses into nerve signals that are sent to the brain through the

B. Devices for assistance based on RFID The navigation system steers users away from obstructions and shields them from potential mishaps, enabling blind persons and those with vision impairments to travel securely on sidewalks or through unfamiliar roads [8]. The system is supported by two types of parts: an RFID reader mounted on the blind cane and RFID tags scattered along a predetermined route and spaced apart at specific intervals [9].When an RFID tag is within range of the RFID reader's radio waves, it receives the signal, downloads its stored data—the tag ID—onto it, and sends the data back to the reader. In response, the reader uses to transmit the tag data to the monitoring station

The position of the blind person and the separation between him and the edge of the road can be detected by the system [11]. When a blind person approaches the edge of the sidewalk, the device can vibrate or deliver audio messages to inform them [9]. When there is a short distance separating him from the barrier, audio messages sent to his smartphone can also be used to guide the blind person to his objective and enable safe walking [8, 10, and 12]. An RFID cane has an ultrasonic sensor attached to it, and several sensors are fitted to the blind person's shoe to help identify and avoid obstacles. They both broaden the range of impediments that may be perceived, which in turn

III. IOT APPS FOR IMPAIRED HEARING

There are several different kinds of sensors that are widely available and have the capacity to detect and record a variety of events and to communicate wirelessly with assistive devices used in ears that are hard of hearing. The sensors used in assistive devices can be internal (within the ear) or external (behind the ear). They can detect noises and events such as doorbells, telephone bells, clock alarms, and oven alarms. The sensors can transmit alarm signals to monitoring stations, which then magnify and resend the signals to the helpful devices. Vibration and visual messages can be received by those with hearing impairments [14]. With the use of a glove fitted with wireless communication technology, individuals with hearing impairments can communicate with those who are not accustomed to using or comprehending American Sign Language (ASL).The inexpensive wireless glove has sensors that can detect and record the bending of the fingers in relation to ASL. These sensors can then transmit the observed data via Bluetooth to a monitoring station, such as a smart phone.

The received data are matched at the monitoring station to ASL sign data that is kept in the station database; if they match, the data are transformed into text and speech [8, 15].

IV. IOT APPLICATIONS FOR PEOPLE WITH PHYSICAL IMPAIRMENTS

A. Making use of neurochips, actuators, and body sensors Persons with physical impairments can have their desire to utilize a certain muscle sensed by sensors placed near their motor neurons. Actuators may trigger and activate paralyzed muscles to move again and sensors and actuators are employed to stimulate the paralyzed extremities [8, 16].Radio frequency waves and digital command data are generated by an external power source that is wirelessly coupled to the actuators, neuro-chips, or sensors. The micro-implants then transmit electrical pulses to activate the paralyzed muscles and motor neurons. Impaired motor neurons following a stroke or spinal cord injury may result in weakness in one or more extremities. Through the use of sensor technology, the paralyzed body parts may move again thanks to an electrical stimulation mechanism.

Functional Electrical Stimulation (FES) is performed using this technique in several applications, such as neuro prosthetics applications that allow for the restoration of movement ability [8, 17]. American researchers have created neurochip applications, which are small implanted Brain-Computer Interfaces (BCIs) that run on batteries. Neurochips were first implanted in animals, but they are currently being utilized in people [8, 18]. The motor cortex cells in the brain, which provide signals to the spinal cord to regulate the contraction of the muscles in the extremities, are responsible for the body's voluntary movements, including those of the limbs. As a substitute for other compromised neural connections within the body, the human brain uses neurochips to maintain the activity of motor cortex cells, which function as a stimulus that is repeatedly used to send signals to the muscles and spinal cord. Brain Computer Interfaces, or BCIs, are categorized.

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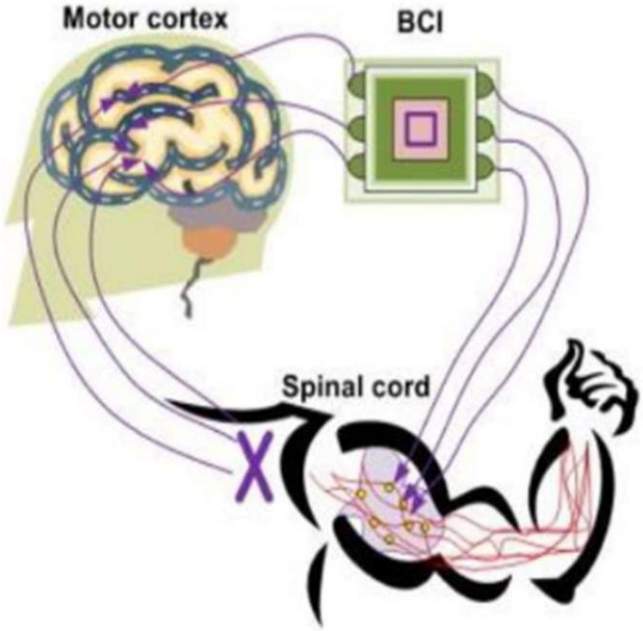

Fig 2: BCI for spinal cord injury [8]

B. RFID technology and body sensors People with physical impairments may experience bedwetting; treating this issue can be aided by the integration of RFID technology with sensors. Implanted into the patient's bed, wetness sensors and Radio Frequency Integrated Circuit (RFIC) antennas are assembled on a Flexible Printed Circuit Board (FPCB). In order to transfer the data collected to the monitoring station in real-time so that caregivers may make the appropriate choice, they can detect the wetness and send the information to a nearby RFID reader device equipped with a Bluetooth transmitter [8, 19].

IV. CONCLUSION

This article describes many Internet of Things (IoT) based smart healthcare applications for those with impairments, such as apps for the hearing, vision, and physical disabled. It was discussed how blind persons may be given eyesight through the use of cameras and implanted sensors. In a similar vein It was suggested that blind individuals can walk on sidewalks securely and safely avoid obstacles and accidents by using systems that employ RFID technology. People with hearing impairments can detect noises with the use of external or internal assistive devices and sensors affixed to their ears. A wireless glove with sensors included in may detect and record the bending of the fingers in relation to American Sign Language (ASL), which can then be translated into a text or voice that is quickly explained. How Actuators and sensors are utilized to assist. We conclude by noting that there is a persistent need for more dedicated research aimed at improving the quality of life for those with impairments.

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