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Paralysed Patient Healthcare Monitoring Device

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Abstract

We are all aware that paralysis results in a loss of muscular function throughout the body. It can happen to any region of your physique at any time, and you might not even notice any pain in the place that is being affected. Innovations in technology and medicine exist to enhance the standard of living. Our objective is to create a gadget that combines a basic health care monitoring system with nursing care, should be simple to use, and should be inexpensive. We are aware that these persons are unable to communicate their wants or messages. To solve this, we developed a technology that enables these patients to convey messages by extremely basic movements. This gadget may be made to fit within a person's clothing or be put on their finger.

Introduction

Loss of muscular function in the human body can result in paralysis. There are two different types - temporary and, in rare situations, lifelong paralysis. Despite the fact that paralysis can affect any part of the human body, it is most frequently seen in the limbs. Partial or total paralysis might happen. The most frequent cause of either partial or total paralysis in patients is a stroke. When a muscle is partially paralysed, the patient can still control that muscle to some extent. Complete paralysis means that the damaged muscles are completely uncontrollable [2]. Most frequently, injury to the neurological system, particularly the spinal cord, results in paralysis.

Other significant causes include multiple sclerosis, spina bifida, poliomyelitis, stroke, trauma with nerve damage, cerebral palsy, peripheral neuropathy, Parkinson's disease, ALS, and Guillain-Barré syndrome. Temporary paralysis occurs during REM sleep, and this system's dysregulation can cause periods of paralysis when a person is awake. Paralysis can also result from medications like curare that disrupt nerve function [3]. Currently, paralysed persons are either left by themselves or under a nurse's observation. Sadly, the Care Taker routinely abandons these patients without giving any regard to their basic requirements. In the planned study, wearable technology will be developed that will allow patients to instantly communicate with their caretakers and track their health [1].

The IOT-based paralysed patient healthcare system is a programme designed to help the patient communicate with medical personnel from home or over the internet [4].

Objectives

Providing thorough and ongoing monitoring, treatment, and support for those who are affected by paralysis or mobility limitations is the goal of a paralysis healthcare monitoring system. Injuries to the nervous system, such as spinal cord injuries or neurological conditions like stroke, frequently result in paralysis, which is the loss of muscular function in a portion of your body [5].

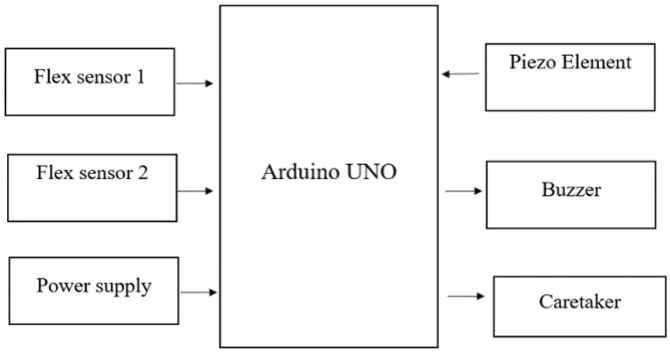

Fig. 1 : Block-diagram of the developed system

The main objectives of the project are

- Continuous health monitoring system: to make it possible for relatives, friends, and medical staff to check on the patient's health and wellbeing from a distance. For people who need constant care but who wish to retain some degree of independence, this can be extremely helpful [6].
- Communication and support: to make it easier for the patient, their care takers, and medical professionals to communicate.
- Data analysis: to gather and examine data over time in order to spot trends, possible health hazards, and advancements in the condition of the subject. Treatment strategies and actions can be guided by this data-driven approach.
- Fall detection and Prevention: to recognize circumstances where the person may be at risk of falling and to send out notifications to stop mishaps. This is crucial for people who have limited movement and may be more susceptible to falling [7].

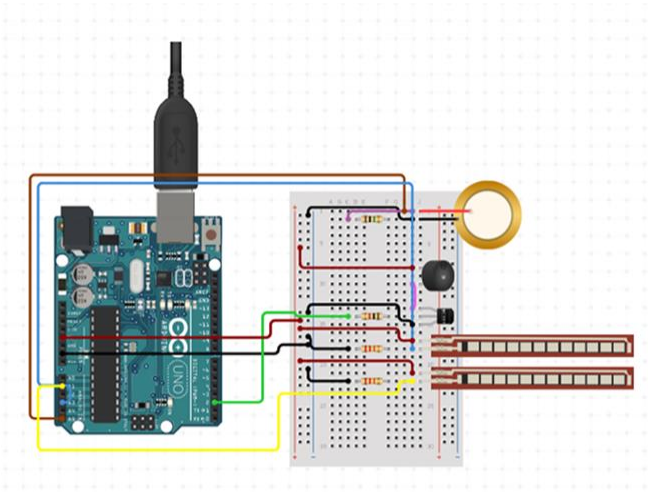

Fig. 2 : PCK Layout design of the developed system

Proposed methodology and block diagram/circuit

- Take two flex sensors.
- Connect the flex sensors to the Arduino
- Write a program for the Arduino that will read the data coming from the flex sensor.
- Connect the piezo element to the existing circuit.
- Also the add buzzer to provide an alert or siren.
- Update the program for the Arduino that will read the data from both flex and piezo element.
- Output from flex sensor shows the basic needs of the patient such as food and washroom.
- Output from piezo element gives the alert on falling.

Simulation Results

The results or the outcome of the mini-project work could be summarized as follows…

Through our initiative, we created a productive system for meeting the basic requirements of patients who are paralyzed, such as providing them with access to food and drink as well as help with bathroom needs. The use of continuous observation of patients, which considerably lessened the workload on nursing personnel and carers, made this accomplishment feasible.

Real-time patient monitoring is the primary component of our project's functionality. Our technology guarantees that patients receive prompt help without the need for a nurse to be monitoring signs displayed by the patients. This encourages patient autonomy while simultaneously allocating healthcare resources as efficiently as possible.

Our project's capacity to identify life-threatening medical situations, particularly those in which a patient collapses to the ground, is one of its most notable results. The quick response necessary in life-threatening situations is made possible by this skill. Caretakers are immediately notified by our system, enabling them to act quickly and render the support that is required. The potential for saving lives and improving patient safety for paralyzed patients emerges by means of this early detection along with notification system.

In conclusion, the primary outcome of our study is a complete healthcare monitoring system which interacts with patients and autonomously responds to their fundamental requirements when they are paralyzed. This is accomplished by continually monitoring patients, decreasing the need for nursing personnel, and offering crucial notifications in case of an emergency. This new invention is really important.

Insist on how well our system works at quickly identifying and handling medical crises. If, in terms of response speed or accuracy, it beats comparable initiatives.

Our project provides cost-effective solutions in comparison to alternatives, especially it lowers long-term healthcare expenditures. This emphasizes the financial benefit.

Results in another angle

The obtained results are shown in below photographs

Upon bending the first finger we got the results which shows that the patient requires food or water

Fig. 4 : Output - 1

```
15:27:40.896 ->
15:27:40.896 ->
15:27:41.924 -> I NEED FOOD, WATER
15:27:41.924 ->
15:27:41.924 ->
15:27:42.907 -> I NEED FOOD, WATER
15:27:42.907 ->
15:27:42.907 ->
```

Fig. 5 : Coding part - 1

Upon bending the second finger we got the results which shows that the patient need to use washroom.

Fig. 6 : Output - 2

```
15:27:32.868 ->
15:27:32.868 ->
15:27:33.897 -> I NEED TO USE WASHROOM
15:27:33.897 ->
15:27:33.897 ->
15:27:34.879 -> I NEED TO USE WASHROOM
15:27:34.879 ->
15:27:34.926 ->
15:27:35.906 -> I NEED TO USE WASHROOM
15:27:35.906 ->
15:27:35.906 ->
```

Fig. 6 : Coding part - 2

The piezo element used shows us the data if the patient falls or not.

Fig. 7 : Output - 3

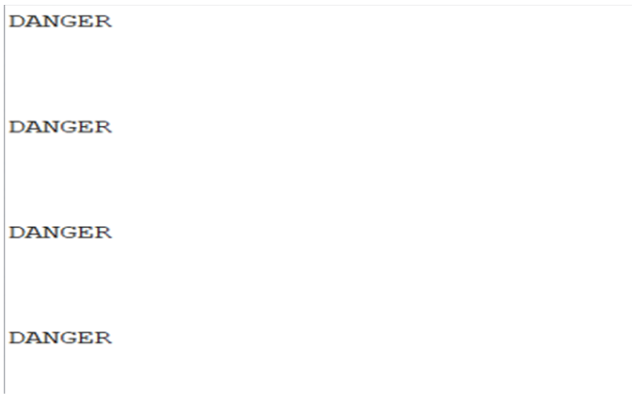

Fig. 7 : Coding part - 3

Advantages & Applications

In this section, we present the advantages & dis-advantages

Advantages

- Easy communication through movement of fingers for paralyzed patients' requirements and help.
- Early warning system.
- Secured and reliable communication.
- Cost – effectiveness.

Applications

- Real time health monitoring.
- Elderly care
- Helps paralyzed patients
- Bedridden patients who are not capable of speech can use.

Conclusions

In conclusion, a paralysis healthcare monitoring system is crucial in revolutionizing the assistance and care given to paralysed people. This system aims to improve the quality of life for paralysis sufferers and provide them the tools they need to live more independent and healthy lives by including a variety of features and functions. This wearable Internet of Things-based device for monitoring paralyzed individuals serves as a useful tool for such patients. If an attribute in the device shifts from an acceptable range to a hazardous range, the patient's family or carer is immediately notified, enabling critical care to be delivered to the patient before he or she reaches a perilous state.

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