Tongue Controlled Mouse to Interact Tetraplegia and Disabled Patient to the Computer

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Abstract— Tongue controlled mouse is an ingenious human computer interface specially designed for disabled person and people with tetraplegia. Here we present a paper that evaluate the permanent magnet and metal detector to control an input device. Based on the tongue position we can define the result is shown in this paper. In this paper we demonstrate the following experiment with simple hardware technique but actually the result system is very compact like dental retainer. This paper becomes very useful for future research studies to operate a computer input device.

Key words: Human-Computer Interface, Magnet (Temporary or Permanent in the Form of "Tongass"), Magnetic Detector, Pointing Device

I. INTRODUCTION

Human computer interface main goal is to interact every human into the electronic brain. The following sentence is not true for every humans because some of them loss their hands due to some accidents and some person can't utilize their limbs due to spinal injuries. The main motto of this project is to encourage the following tetraplegia patient to interact with the world. Here, we introduce tongue as a interface between human and the computer.

The spine contains many nerves and it may extend from the brains base down the back, ending close to the buttocks. The spinal cord is responsible for sending messages from body to the brain. Feeling of pain and limb movement all are performed by the message which are send by the spinal cord. If the spinal cord is injured then some or all of these impulses may not be able to pass to the certain region. The result cause complete or total loss of sensation and mobility below the injury. The spinal cord injury closer to the neck will typically cause paralysis. Spinal cord injury may be broadly classified into two they are: incomplete and complete.

A. Incomplete Spinal Cord Injurie

In this type, cord is damaged partially. Injured person can retain some function. The degree of function depends on the extend of injuries.

B. Complete Spinal Cord Injuries

Spinal cord is damaged fully. Though treatment such as physiotherapy, it may possible to retain some functions.

Tetraplegia is the spinal cord injury coming under the complete spinal cord injuries. In this spinal injury all limbs get paralysed. For example if the person is injured in the neck region then the region below the neck got paralysed (i.e.) all the four limbs losses their function. It is otherwise called as quadriplegia.

For tetraplegia patient we can improve the level of independence and we found the answer is the tongue. It is the part of our body that we don't appreciate it. We should look at the cross section of the human brain called "homunculus". We see that the area in the brain "motor cortex" that is dedicated to tongue and mouth actually rivals the area that is dedicated to hand and fingers this is why we can talk, this is why we can eat and this is why you can touch every single tooth in your mouth with the tip of your tongue without concentrating or thinking about it very rapidly and that's the power of tongue. Even more benefit of tongue is that it can directly connected to the brain. So even those people with highest level as final cord injury cannot breathe on their own because the diaphragm is connected to the brain through spinal cord.

Whereas tongue is connected directly to the brain therefore there is no malfunction in the mouth even if the spinal cord injury is severe. An innovative human-computer interface using tongue is discussed in this paper. It provides an excellent potential and the major contribution to access the computer.

II. SCOPE

The following proposed tongue controlled system is a human computer interface in the form of dental retainer. This dental retainer is fixed to the patient mouth to interact with the computer such as to operate the wheel chair, access the social media and other general purposes. Some special characteristics of the tongue controlled mouse is to be listed as:

1) This device is fixed to the human mouth therefore, person feel comfortable.
2) Tongue is a flexible organ at the same time it is easy to move or rotate therefore, it is not difficult to control the cursor.
3) Person can perform any action quicker than the limbs. We already discuss in the power of the tongue.

TCM interface is utilized as a hand for paralyzed patient here, we are controlling the movement of the cursor by using simple magnetic sensor and magnet. This project is very essential now a days because radiation is increasing day by day may majorly affect the limbs of the persons and children who were born in the radiation area are in disabled condition. We think about the future to develop this project.

III. BLOCK DIAGRAM

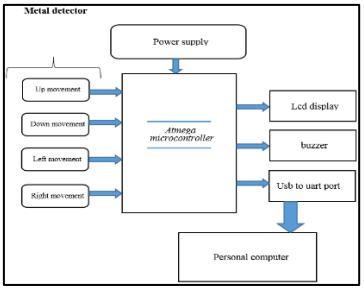

Fig. 1: TCM architecture

IV. TCM DESCRIPTION

TCM architecture is very simple and effective. In tongue controlled mouse metal detector perform the major task because it is a sensor used in this project to sense or detect the metal or any other magnet. Based on the metal and metal detector attraction command is loaded in the at mega microcontroller to perform certain task. The resultant task is the cursor movement. As per mentioned earlier here we gave demonstration of the simple hardware technique.

Here, we are using four different types of metal detectors. Each metal detectors perform the specific task based on the command loaded (i.e.) up movement, down movement, right movement and left movement. At mega microcontroller is considered as the heart of this project. It perform the task similar to pc. From microcontroller the connection is given to the LCD display, buzzer and USB to UART port.

LCD display used to view the movement of the cursor (movement in the form of left, right, up and down) Buzzer is used to indicate the every movement in the LCD display.

USB to UART port is additionally utilized to interact with the computer. Here, Dock light software is used to display the command such as "cursor moved right" if the cursor moved right and vice versa for other different types of cursor movements.

V. RESULT

The movement of the cursor in the LCD display is the final result of the project which represent the cursor movement in the personal computer and at a same time buzzer is alarmed to indicate the movement and one more result shown in this project is the command in personal computer by using the dock light software to indicate the direction of the cursor movement.

VI. CONCLUSION

In our project many problems can be solved by using a simple interface. Most of the disabled person thinking that their life is gone and facing death due to discourage and non-involvement. Our experimental technique is mainly developed to overcome the following above problems. In this paper we submit a simple handing device and this device is used to encourage the patient such as tetraplegia and disabled person to withstand in their life without any guiltiness.

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