Brain-Tongue Vision for Physically Challenged People

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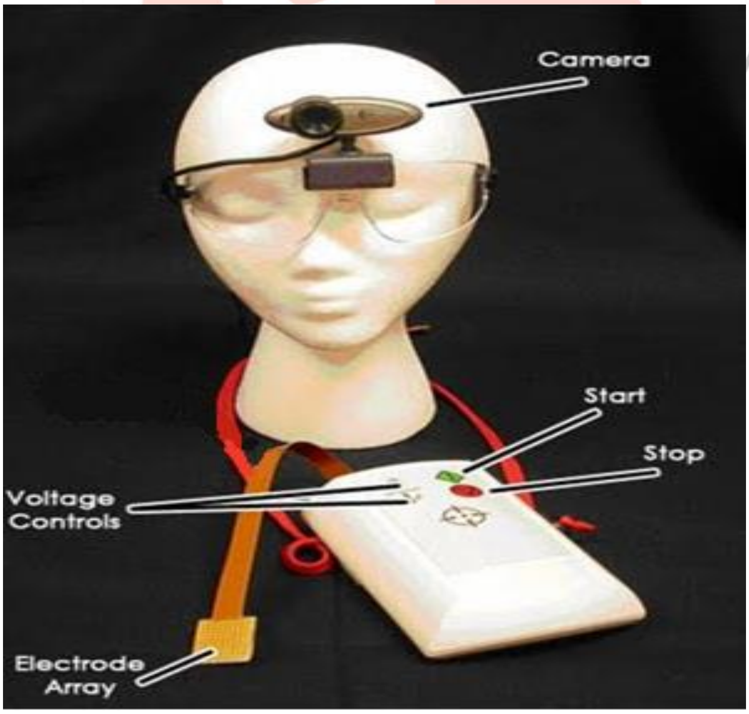
***Abstract* - The blinds have been dependent on others for almost everything. Many artificial devices have come and gone by but they did not make a drastic change to their life. In order to make their life independent it is necessary to develop some artificial device which can bring changes in their life. To achieve the above goal we can make use of mini-cameras and it is important to transmit signal. To the brain, we can use electrode array with voltage controller. As a result blinds can visualize objects or obstacles without touching them .the device which use a mini-camera and an electrode array is called as "Brain-tongue vision for physically challenged people".**

***Index terms*- inch long camera, hand-held control unit, electrode array, and accelerometer**

I. Introduction

This device is called brain-tongue vision, it relies on sensor substitution. About twenty lakh optic nerves are required to transmit visual signals from the retina-the portion of the eye where light information is decoded or translated into nerve pulses-to the brains primary visual cortex.

[*fig.1*]A small digital video camera about 0.75 centimeters of radius that is placed in the middle of a pair of sunglasses worn by the user in this device the head mounted camera serves as the "eyes" to gather white, black and grey pixels of visual information's. The camera captures the image and sends the signal to the handheld control unit along the cable.



Fg.1 layout of the device

II Hand-held device

Bypassing the eyes, the data is transmitted to the hand-held base unit which is little larger than a normal iPod. Figure 2 explains the hand held device with electrode array. This unit consists of features such as zoom control, light settings, shock intensity levels as well as central processing unit (CPU).this unit also houses one of the key component i.e. stimulatory circuitry. The hand-held base unit converts the digital signal into electrical pulses-replacing the function of the retina.

An user interface and a microprocessor presents the user with an interface for selection of one of a constant current mode or a constant voltage mode via the user interface, receives a selection of one of the modes from the user via the user interface. The microprocessor configures the device to measure using impedance measurement circuitry, impedance presented to simulation circuitry of the device based on selected mode. Using the impedance measurement circuitry, the presented impedance can be adjusted based measured impedance to deliver the simulation with a substantially with constant voltage amplitude, if the constant voltage mode is selected.

Fig.2 hand held device with electrode array

III Electrode Array

The electrode array (*Figure 3)* contains a square grid of 400 electrodes which pulse according to how much light is in that area of that picture. White pixels have strong pulse while black pulses give no signals. Each electrode corresponds to a set of pixels. Densely packed nerves at the tongue surface receive the incoming electrical signals.

The other side of electrode array is accelerometer. Figure 4 explains the accelerometer position. The accelerometer provides head and body position information to the brain through electrotactile simulation of the tongue. Sensitive nerve fibers on the tongue respond to electrodes to enable a rapid transfer of electrical information.

Fig.3 electrode array

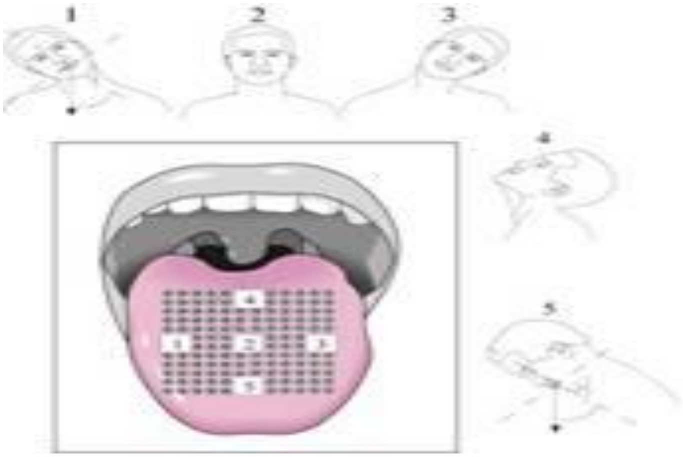


Fig.4 accelerometer position

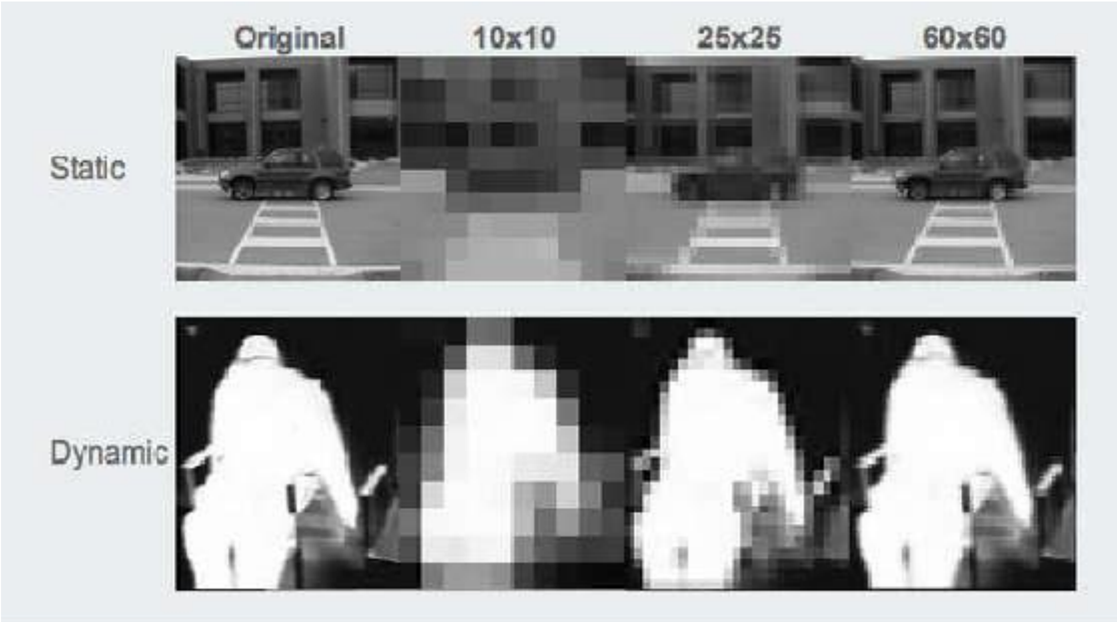


Fig.5 images of various objects

IV. Conclusion and Future works

The image is recreated on a grid of four hundred electrodes. User "feels" the shape and detects the movement on the tongue. [*fig.5*]Brain eventually learns to "see" the shape detected on the tongue. The signals from the tactile or touch receptors cells are sent to the somatosensory cortex in response to stimulation in the form of pattern impulses. The user the fell image on the tongue with practice, the signal activates the "visual" parts of the brain.

The brain-tongue device does not replace the sense of sight it acts to other sensory experiences to give users information about size shape and location of objects. Users can operate it independently with a hand-held controller. It uses a rechargeable battery.

It provides directional or navigational information for people who operate under central command and control scenarios, such as military and civilian rescue personnel. It provides vestibular or balanced information for people with balance disorder. It provides tactile feedback to the human operators of robots.

There is hope that a balance device that uses nerve fibers on the tongue to transmit information about head and body position to the brain can make a serious difference for patients whose sight cannot be replaced

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