

Eye Gesture Controlled Wheelchair for Quadriplegia Patients



Technology Overview

Disabilities such as quadriplegia and paraplegia are the result of injuries to the spinal cord and neuromuscular disorders such as cerebral palsy. Particularly for patients suffering from quadriplegia, their impaired motor movements prohibit them in performing quotidian tasks such as controlling their wheelchair. This invention is a control system which allows quadriplegia patients to control their electric wheelchair by emulating joystick control via their eye movement.

The control system consists of a PC with an eye tracker which reads in the coordinates of the patient's eye-gazing direction with respects to the PC's monitor. The system control is developed with a filtering algorithm to remove undesired eye jittery movements. Together with a customized GUI, the system empowers the patient to control the wheelchair by their eyes in natural, intuitive manner.

Existing inventions such Sip-and-Puff methods (i.e. control signal generated by sipping and puffing via a straw) and Brainwave-controlled wheelchairs are either invasive or require a steep learning curve to be able to operate the wheelchair. This invention utilizes movement of the eye to emulate mouse activation on a customized GUI screen to manipulate the steering of the wheelchair. The GUI also provides a video-screen of the front and back view of the wheelchair to facilitate the wheelchair control.

Technology Features & Specifications

The technology of this invention consists of software algorithm and design of control circuitries to permit the "Eye Gesture Controlled" of the Wheelchair.

The invention has also been further developed to demonstrate the feasibility of applying the same interface methodology for controlling of home appliance, thus making home automation a possibility for these patients.

Potential Applications

This technology can be applied for Hospital and Household usage (for quadriplegia patients) in:

1. Controlling of wheelchair;
2. Means of text input for communications;
3. Control of electrical appliances, i.e. Home Automation;

Beyond usage on quadriplegia patients, it can also be applied as a technique for man-machine interface, e.g. Elimination of the need for the joystick to control the pan-tilt motion of a CCTV camera.

Customer Benefits

- Empowering Quadriplegia Patient with the freedom of mobility without assistance from their caretaker;
- Offer a more nature, intuitive method of controlling the electrical wheelchair compared to existing methods such as Sip-and-Puff methods and Brainwave-Controlled technique;
- It can be extended for Home Automation - controlling of electric home appliances and communication devices.

OVERVIEW

- Technology Category Healthcare - Medical Devices
- Technology Status Available
- Technology Readiness Level [TRL5](#)



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