

**HEAD AND EYE OPERATED COMPUTER INTERFACE
FOR A PHYSICALLY DISABLED PERSON**

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Dissertation submitted in partial fulfillment of the requirements for the
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Department of Electrical Engineering

University of Moratuwa

Sri Lanka

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DECLARATION OF THE CANDIDATE & SUPERVISOR

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Signature:

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The above candidate has carried out research for the Masters Dissertation under my supervision.

Signature of the supervisor:

Dr.A.G.B.P. Jayasekara

Date:

ABSTRACT

Human computer interaction has the physical and theoretical limit among the human being and the input/output devices of a computer. Studies of severely disabled people have shown that most of disabled people can be able to direct head and eye motions. This can be applied to build new human computer interface mechanisms, then it helps to communicate between others otherwise control certain specific devices. The proposed and designed system is a head and eye operated mouse which is expected to be used by a disabled person. The system is divided into main two parts, first one is a Wearable glass module with Arduino Nano, Accelerometer sensor, Eye blink sensor, Bluetooth Module, Voltage regulator and Lithium polymer battery (Transmitting part), Second one is Base station with Processor and Bluetooth module (Receiving part).

Developed mouse have accelerometer sensor to identify the head movement of user, to control mouse cursor in real time. Infrared sensor to identify the intentional eye blink of the user to activate mouse clicks (single / double) in real time. Developed mouse uses Bluetooth technology to communicate tirelessly with a computer.

A usability testing survey was conducted to validate the product, a group of 20 was volunteered in conducting the survey including a disabled person, among the considered group 90% were strongly agreed to the product as a new concept to be used by disabled person. 65% were satisfied with the functionality when compared to the existing mouse. Further 60% of the users were satisfied with the usability in different environments. Finally, 40% were in the position of not satisfied with the wear ability by a disabled person by himself. Survey results validate the product that have smooth control, proper perfect movements and good sensitivity as normal mouse operation. Wireless , portable Head and eye controlled mouse will be an easy input device for paralyzed and hand disabled people. The overall operation of device complied with all of the requirement set out in the original design proposal.

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LIST OF ABBREVIATIONS

HCI - Human Computer Interaction
MEMS - Micro Electro-Mechanical System
HID - Human interface device
EOG-Electro-oculography
EEG - Electroencephalography

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