

## Invited Speech

### ICCCAS 2023

**Title:**

Prospects and Challenges of an EOG-based Human Machine Interface (HMI) for Physically Challenged People.

**Abstract:**

EOG known as Electrooculography is a technique for measuring the corneo-retinal standing potential that exists between the front and the back of the human eye. The existing EOG recording devices are expensive and raw data can't be accessed without purchasing licenses. In addition, they are not suitable for interfacing with machines. We plan to design and develop a portable EOG recording device by low-cost and interface it with an external machine to control it through EOG signals that will be converted to commands. Through this project, we hope that a physically challenged person who has difficulty in using traditional mouse cursor and keyboard or difficulty in controlling wheelchair or controlling any external machines/appliances, will be able to control the movement of mouse cursor/wheelchair/robotic arm using his/her eye movements and eye blinks. The proposed system is being designed, developed, and implemented at the lab of EEE Dept. of IUB with locally available resources and with relatively lower cost compared to the commercially available HMI systems.

The objectives of the proposed system are as follows:

- To be able to control the mouse cursor of a PC/Laptop by intentional eye blink and eye-ball movements (i.e. EOG signals) for people who are unable to use a traditional mouse.
- To be able to control the electric wheelchair by intentional eye blink and eye-ball movements (i.e. EOG signals) for people suffering from Quadriplegia or Quadriparesis.
- To be able to control any robotic arm by intentional eye blink and eye-ball movements (i.e. EOG signals) for physically challenged people (who lost their functionality of) arms in accident or due to diseases).

The proposed system has been tested on subjects for controlling wheelchair and mouse cursor and achieved an acceptable accuracy, however, the challenges and limitations are also required to be addressed in the future work to make it an easy-to-use and with more degree of freedom.