EyeMove: Using Electrooculography to Provide Mobility for the Disabled

Balsara, Burzin

This engineering project is about investigating and developing an affordable system that is capable of controlling an electric wheelchair using ocular tracking based on electrooculographic (EOG) signals, which are captured through electrodes around the vicinity of the eyes. Based on available literature, quadriplegics and individuals with severe paralysis, lose almost all muscular control and the eyes may be the only part of the body left that they can control. For such people, an EOG based wheelchair system provides the possibility of independent mobility, and hence an overall improvement in the quality of their lives. In this project, a scaled prototype using off-the-shelf components was designed and successfully implemented using two independently controlled motors on a chassis. To do so, an EOG signal acquisition system was designed, implemented, and verified to work across different conditions, such as gender and various age groups. This system used several filter and gain stages to acquire and digitize very low-amplitude EOG signals. The digital signals were then subsequently used as inputs to a motor controller that was designed and programmed using the Arduino UNO microcontroller. Upon completing the project, a cost analysis of the system indicated that it is affordable and can be implemented across the world for a lower cost than most existing independent mobility systems. Lastly, with respect to implementation, it is easy to retrofit an existing electric wheelchair with the EOG based system developed within this project, which reduces the cost of the system, as a new electric wheelchair is not required.

Awards Won:

Fourth Award of $500