Motion Control of a Mobile Robot using Eye-Tracking.

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Abstract

According to the report, about 1 in 50 families live with paralysis – around 5.4 million individuals. It is the same number of individuals as the collective residents of Los Angeles, Philadelphia, and Washington D.C., which is almost 40% greater than the standard figures. Typical forms of paralysis include Monoplegia, Hemiplegia, Diplegia, Paraplegia, and Quadriplegia. Another paralysis, except for Diplegia, had lower limbs (either partly or wholly) requiring a wheelchair to support them in terms of mobility. Many wheelchairs, however, enable them to use their hands to maneuver around. It may concern patients with Hemiplegia or Quadriplegia, as their hand movements are very restricted. As a result, this study suggested a wheelchair motion control using eye-tracking. The wheelchair is portrayed by a differential mobile robot, where the same moving principle is shared. This project's key feature is that the patient determines the direction of travel of the wheelchair without physically stressing it. This project consists of a video streaming module, a face detection module, an eye recognition module, and a robot control module. The camera streams video to detect the face in live mode. The video frames will then be analyzed to identify the eye and decide the eye's location by interacting with the mobile robot to drive the robot forward, turn left, turn right, and stop. Machine learning is used to detect the face and identify the eye to achieve better results using the face hallmark detector that implements the One Millisecond Face Alignment and the Regression Tree Ensemble. Several studies carried out have shown that the concept of monitoring the motion of a wheelchair by eye-tracking is achievable.

Biography

Mohd Nadhir Ab Wahab currently hold a position as a senior lecturer at School of Computer Sciences, Universiti Sains Malaysia. He obtained his Ph.D. in Robotics from the University of Salford, M.Sc. in Mechatronics Engineering, and B.Eng. (Hons.) Mechatronics Engineering from Universiti Malaysia Perlis. His research areas are Optimization, Navigation and Path Planning, Computational Intelligence, and Mobile Robotics. He is currently teaching Artificial Intelligence, Computational Intelligence, Image Processing and Computer Vision, and Embedded System Design.