

Eye tracker with free head movement

Seyed Mohsen Mousavi^{1*}
Mahdi Saadatmand²

¹ MSc, Medical imaging lab, Electrical engineering group, Engineering Faculty, Ferdowsi university of Mashhad, seyedmohsen.mousavi@mail.um.ac.ir

² PhD, Medical imaging lab, Electrical engineering group, Engineering Faculty, Ferdowsi university of Mashhad, saadatmand@um.ac.ir

Summary of patent

Presented system is built for eye tracking and people's gaze point estimation in the space in front of them (such as a monitor). In his system, gaze point estimation is performed in real time. Also, while the system is in use, free head movements in a space with dimensions $30 \times 20 \times 30$ cm (horizontal \times vertical \times depth), is allowed. This system is head mounted, so that does not annoy the user and free head movements is performed easily.

Applications

- An interface between disabled peoples and computer
- Driving systems
- Computer games
- Realizing the psychological and mental diseases
- Neuroscience



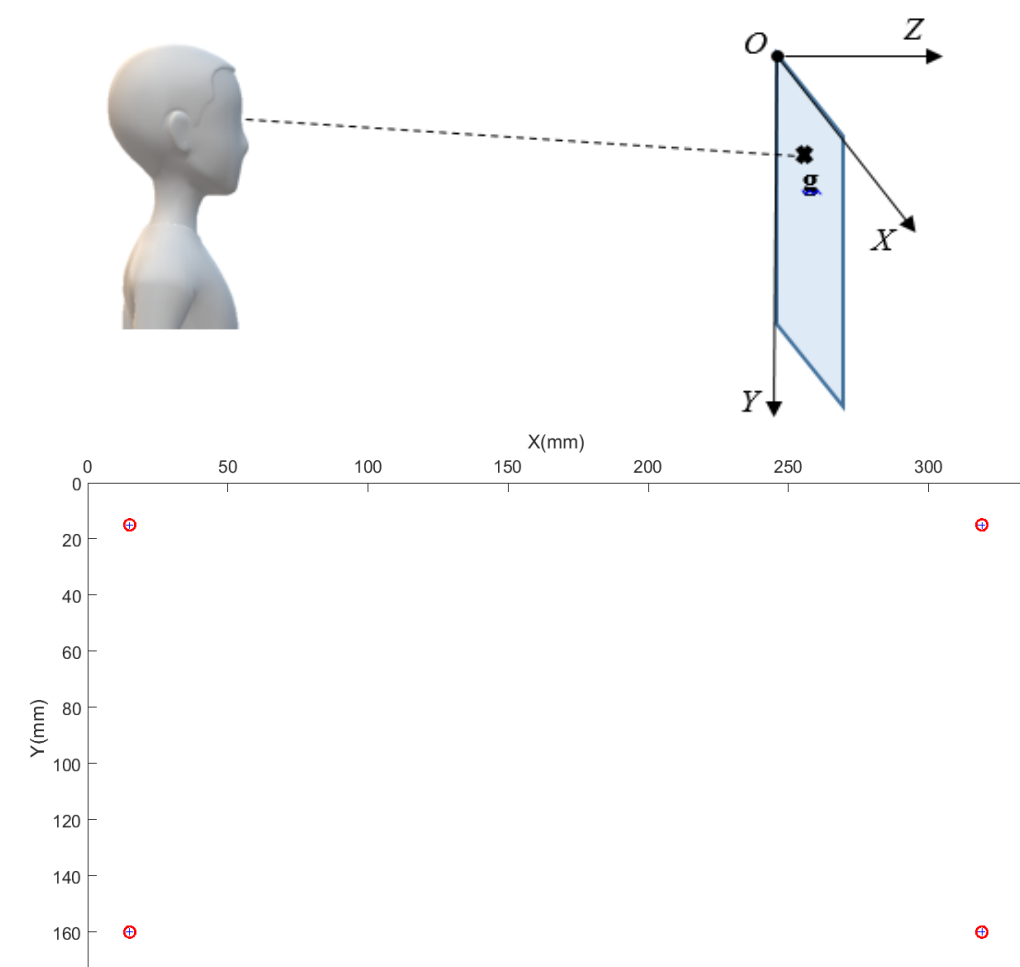
Challenges

- Head movement support
- Real time estimation and tracking
- Minimum number of calibration points
- Robustness and reliability
- working in various lighting environment

setup

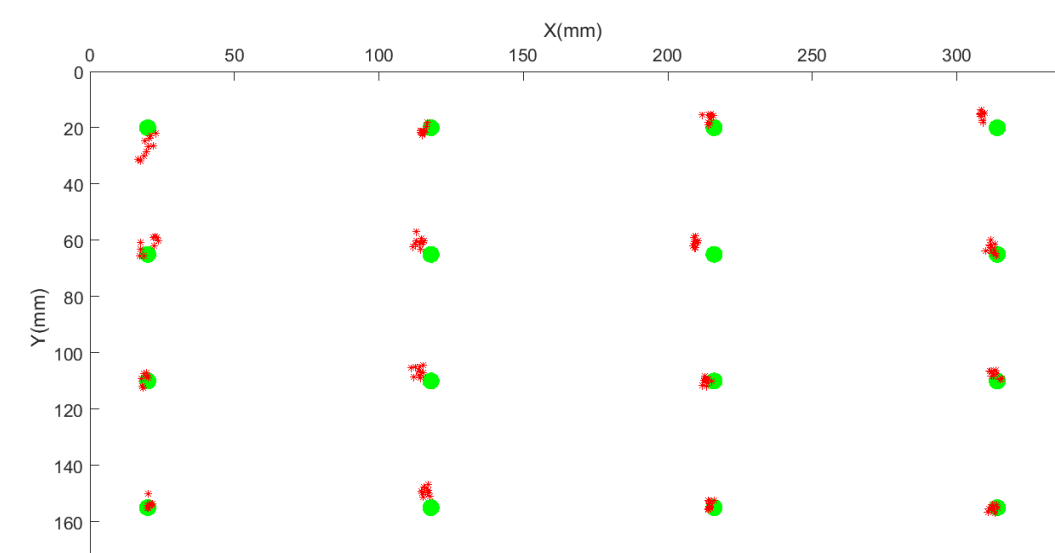


Calibration

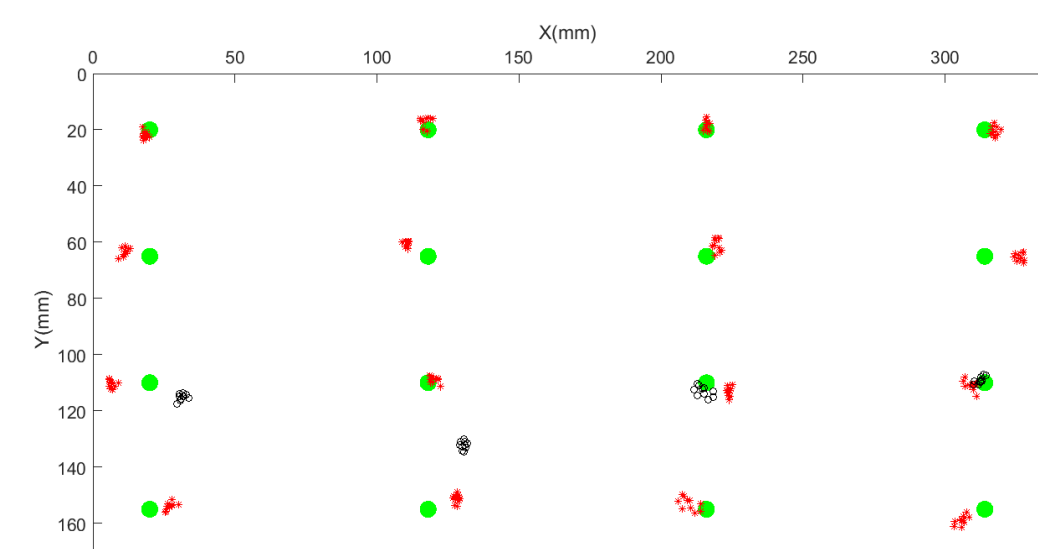


Results

- Fixed head estimation Accuracy: 0.3⁰



- Moving head estimation Accuracy: 0.7⁰



Novelties of project

- A new method for head movement compensation
- A new method for pupil extraction in eye images
- Decreasing number of calibration points to four points

other features of system

- Robustness and reliability
- Real time gaze point estimation: 28 points per second (fixed head) and five points per second (moving head)