Eye Movement Video Tracking A Moving Target

Status Available

Group Members TBD

Site(s) The NeuroKinetics* Assessment Room

Supervisor(s) Farid Golnaraghi, PhD, PEng, Associate Director/Professor, Mechatronics Systems Engineering

Project Description

We aim to upgrade and automate our specific biomedical assessment process. We routinely harvest patient data from 7 major testing areas, which include multiple measures each quantifying performance gain or deterioration in each of the test performed by the patient.

1. Binocular/monocular visual/ocular performance** [free head/eye and target tracking]
2. Visual-postural coordination in changing environment**
3. Spatial perception and orientation performance**
4. Postural controls**
5. Vertical stance balance performance [CoP path pattern and magnitude]
6. Sensory-motor controls/cognitive controls equation** qualification/quantification [paradigm modeling]
7. Executive laterality pattern** [paradigm – equation modeling]

Our ultimate objective is to identify space/time equations and design algorithmic tools for each test area in order to evaluate specific and global patient functional and responsiveness status.

Tasks and Project Deliverables

1 - Eye Movement Video Tracking A Moving Target

Refine pre-existing proprietary prototype to capture and report on binocular and monocular eye tracking movement, which can be used for multiple tests.

1. Eye tracking - Hardware and software components already exist and require strong upgrade.
   a. Objective PPC [Convergence
   b. Subjective PPC [Convergence] –

A horizontally moving target proceeds towards the face at a calibrated measured speed and the data for both eyes needs to be tracked, correlated, and compared to against the target location data. (**Phase 1**)

2 - Visual-Postural Coordination Space Perception and Orientation

   c. Binocular aiming – Measure where each eye is looking on a target field after performing an aiming test requiring both arms in full extension with

upwards movement from hanging vertically to horizontal position while holding a stylus by its base towards a “bull’s eye” target. This data is compared against norms. (**Pic 2**)

d. Monocular aiming –test pattern similar to the above binocular aiming but the subject is asked to close one eye during the ascending arms movement before stylus “lands” on the target. Need to check for conformance to test instructions, to note which eye is closed, and to note where the open eye is looking versus a bulls’ eye target. (**Pic 3**)