Introduction to Eye-Tracking and Biometric Experiments: Equipment Setup, Recording and Analysis

Dr. Craig Hennessey, PhD, P.Eng

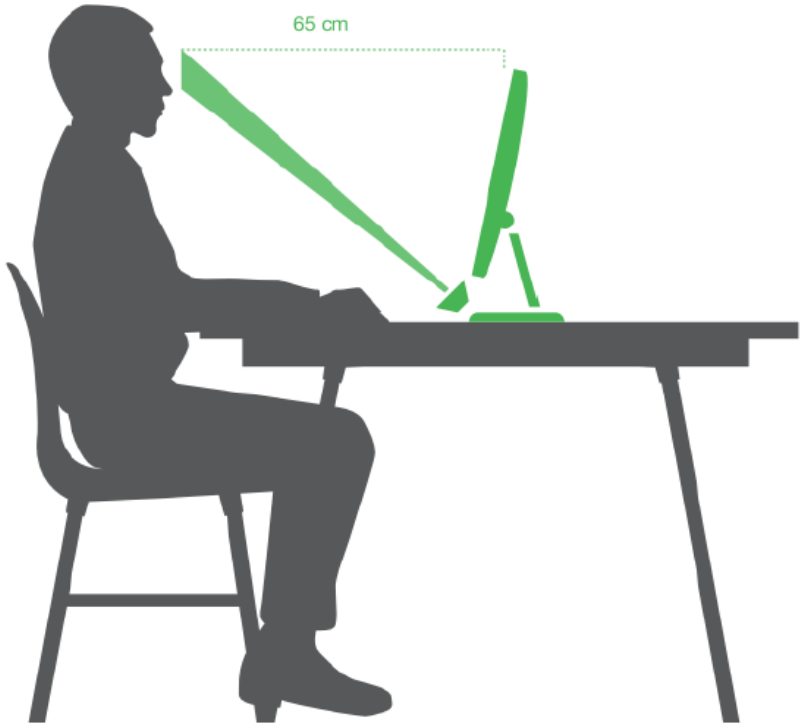
Gazepoint, BCIT, UBC

Eye-tracking: Where and what you are looking at

- Applications (Why are you looking?)
  - **Diagnostic: Usability, market research, dyslexia, medical conditions, …**
  - Control: Assistive and Augmented Communication (Microsoft Eye Control)
- Where are you looking?
  - Equipment – Eye-tracking (desktop/mobile device) and biometrics
  - Participants – Variability, behavior
  - Image Tracking
  - Calibration
- What are you look at?
  - Static / Dynamic content
  - Web content
  - Mobile device content
- Data Analysis

Eye-tracking Equipment

- Eye-tracker
  - Non-contact, remote, single camera
  - Update Rate – sampling / CPU / movement
  - Headbox – field of view / depth of focus
  - Accuracy - ~1˚ of visual angle
  - Demo: Gazepoint GP3 HD
- Mounting
  - Tripod, VESA, Laptop
  - Position
  - Mobile Device
- Biometrics



Research Participants

- Glasses / contacts
- Age (youth and elderly)
- Jewelry / cosmetics
- Gender / ethnicity
- Medical issues

Tracking

- Bright pupil / dark pupil images
- Pupil and glint
- Field of view
- Participant
  - Movement
  - Recovery time
  - Blinking
- Sunlight / ambient light
- Biometrics
  - GSR/EDA, HR, Pulse

Calibration

- First time participant
- 5 pt vs 9 pt
- Real-time observation
- Eye-tracking sanity check
- Biometric sanity check
- Children / Primates

Point-of-Gaze

- Point-of-Gaze estimate (X,Y)
- Fixation (X, Y, Start, Duration, ID)

What are you looking at?

- Screen Capture
  - Dynamic content, any application
  - Difficult to aggregate / AOI
- Image / Text / Video
  - Easy to aggregate
- Web Browser
  - Web is very dynamic, difficult to aggregate
- Web Aggregate
  - Browser plug-in, possible to aggregate
- Mobile Device
  - Similar to Screen Capture

Analysis

- Fixation map
- Heat map
- Bee swarm
- Graphing
- AOI
  - Static / Dynamic
- Export
  - Image/Video
  - Data (CSV)

Application

- Time for your unique research …

* If there is time cover API Interface (real-time applications)