UQ Business School Behavioural Science Lab Equipment

The UQ Business School Behavioural Science Lab provides researchers with access to the latest psychophysiological technology and equipment needed to gain highly reliable data regarding human behaviour. Our Lab Coordinators are trained in the following methods and equipment and can provide advice and training required to facilitate your research project.

Eye-tracking measures

Eye tracking is a sensor technology that makes it possible for a computer or other device to know where a person is looking. An eye tracker can detect the presence, attention and focus of the user. It allows for unique insights into human behaviour.

Equipment

Tobii Pro TX300 *(Lab based)*
- Collects gaze data at 300 Hz while allowing for large head movements.
- All hardware, including the eye tracking technology, user camera, and speaker, are fully integrated into the system.
- The desktop eye tracker shows exactly where people are looking and is designed for studies that require a higher sampling rate e.g. detailed research into minute eye movements such as saccades, fixations and pupil dilation.

Tobii Pro X2-30 *(portable)*
- Screen-based eye tracker capturing gaze data at 30 Hz.
- Snaps into place on the laptop, providing a compact and highly mobile solution for studies outside of the Lab e.g. in a coffee shop, at the mall, or in an office – wherever your subjects are.

Tobii Pro Glasses 2 *(portable)*
- Wearable eye tracker with wireless live view function for insights in any real-world environment.
- Live View allows researchers to see exactly what a person is looking at, wirelessly and in real time, providing immediate and actionable insights.

Psycho-physiological measures

Skin Conductance (EDA), also referred to as Galvanic Skin Response (GSR), techniques can be used for emotion research. Our equipment measures emotional arousal levels via frequency and amplitude of Skin Conductance Responses. Note: Continuum ranges from quiet to excited. Research method can't tell us the direction or valence of the emotion.

Equipment

BIOPAC EDA *(Lab based and portable)*
The Electrodermal Activity (EDA) BioNomadix module pair consists of a matched transmitter and receiver and is used to indicate eccrine activity (skin sweating).

Shimmer3 GSR+ *(Lab based and portable)*
This device provides real-time physiological data collection and wireless streaming with high-quality, scientifically reliable data. The Shimmer3 monitors and wirelessly transmits skin conductivity GSR and optical heart rate between two reusable electrodes attached to two fingers of one hand and heart rate with a third electrode.

Empatica Wristband *(portable)*
- Includes ability to measure skin conductance, heart rate, blood volume pulse, skin temperature and motion-based activity.
- Allows for research in the field and Lab, meaning researchers can measure consumers' physiological signals in daily life.

Facial Expression Analysis

The face reveals both conscious and non-conscious reactions. Our software analysis platform iMotions integrates Affectiva's Affdex technology to gain deeper insight into human emotional reactions via facial expressions. The powerful algorithms give expression metrics for 21 different nuanced facial expressions and seven key emotions (joy, anger, surprise, fear, sadness, disgust, contempt). Expression metrics indicate when users make a specific expression (e.g., a smile) along with the degree of confidence. The metrics can be thought of as detectors: as the facial expression occurs and becomes more apparent, the score rises from 0 (no expression) to 100.

Electroencephalography

Electroencephalography (EEG) records electrical activity using electrodes placed on the surface of the scalp and outputs this electrical activity as a series of underlying brain waves.

Measuring electrical activity from the brain is useful because it reflects how the many neurons in the brain communicate with each other via electrical impulses, and how they are associated with cognitive processes such as drowsiness/alertness, wakeful relaxation, and approach or avoidance.

With EEG, you can obtain insights into how the brain works by detecting the cognitive processes underlying human behaviour. From language and visual processing to executive functioning and memory encoding, EEG data can tell us a lot about how alert, motivated, or engaged we are or how difficult a task is if interpreted correctly.

Equipment

ABM B-Alert X10 EEG *(lab-based)*
- Mobile 10-channel wireless EEG headset that allows for multiple analysis opportunities to meet the needs of researchers across many fields.
- Integration with the iMotions EEG Module enables researchers to seamlessly conduct studies and validate results faster. The flexible software connects, records, and live visualises EEG data and metrics from a range of different EEG headsets, and is a complete experimental suite for EEG, from calibration and stimuli presentation, to export of results.

Emotiv EpocX Portable Wireless EEG *(portable)*
- Tracks regional brain activity during interventions in high resolution and extrapolates neural activity into multiple emotional responses e.g. excitement, engagement, relaxation, interest, stress and focus.
- 14-channel headset with 9-axis head motion tracking and rotatable headband for greater participant comfort e.g. can be used in sleep studies.
- Capable of raw EEG output, tracking user facial expressions, and storing multiple brain-computer interface (BCI) commands.

Emotiv Insight Portable Wireless EEG *(portable)*
- Lightweight portable brain and face-tracking headset with 9-axis head motion tracking and 9 hours battery life.
- Sensors are mess-free and does not require applying gel or saline solutions on the participant's head to function.
- Can be utilised to track brain activity to stimulus during an intervention, and as a multi-channel (up to 5) brain-computer interface (BCI).

Facial Electromyography (EMG) *(Lab based)*
- BIOPAC EMG can be used to measure human and animal subjects from large and small muscle groups, including facial EMG for analysing facial expressions and startle paradigms through Acq*Knowledge*®.
- EMG data is commonly used as an indicator of emotional valence (the intrinsic attractiveness or non-attractiveness of an event, object, or situation) via electrical potentials generated by muscle cells.

Virtual Reality Technology

Virtual reality technology can be used in research as an intervention or stimulus in fields like tourism, business community, filmmaking, medicine, architecture, space exploration, and the battlefield.

Equipment

Oculus Rift *(Lab based)*
- The Oculus Rift enables the sensation of presence – the feeling as though you are actually in an environment you're not. This equipment can be used for:
  - virtual tours of an environment and or an experience
  - training of new employees
  - a 360 view of a product
  - improving quality of life for those with limited mobility.

Leica BLK360 Imaging Laser Scanner *(portable)*
- Captures full-colour 3D panoramic images for use in virtual reality environments.
- Takes less than three minutes to fully image a real-world commercial environment.
- Capable of thermal imaging, high dynamic range imaging and 150-megapixel spherical image resolution within a 60-metre radius.

HTC VIVE Pro Eye *(Lab based)*
- This high-fidelity computer-tethered VR system can:
  - allow research participants to explore 3D-scanned environments from real commercial contexts in virtual reality
  - track biometric performance during interventions
  - track eye and facial movements
  - track user movements within up to 100 square metres (10m x 10m)
  - undertake off-site training protocols for new employees, with high resolution and realism.
- Inputs 3D and scanned environments in Unity and Unreal graphics engines.

Oculus Quest 2 *(portable)*
- This portable wire-free virtual reality system with 2-3 hour battery life is capable of facilitating field research, accessing remote participants and as a mobile education to deliver training programs on-site.
- The all-in-one system doesn't require tethering to external computing or tracking devices when participant is sitting down.
- Includes two trackable controllers.

Social Robotics Technology

Social robots allow for new and existing customer-focused roles to be performed by an autonomous worker, in industries such as hospitality, retail, education, aged care and administration.

TEMI Robots *(portable)*

- For research involving human-computer interactivity, testing of robot integration in live commercial environments, and role automation.
- Has built-on Amazon Alexa functionality, autonomous navigation and human recognition, simple coding-free interface, Zoom meeting facilitation and is capable of carrying a drinks tray.
- Can facilitate interactions with participants through voice recognition and touch screen interface.
- Automatically returns to charging base station when battery is low.

For more information about the UQ Business School Behavioural Science Lab and equipment available to support your research needs, please visit the UQ Business School Behavioural Science Lab website.