

# Brain Computer Interface (BCI) Game for Mindfulness Training

## Introduction

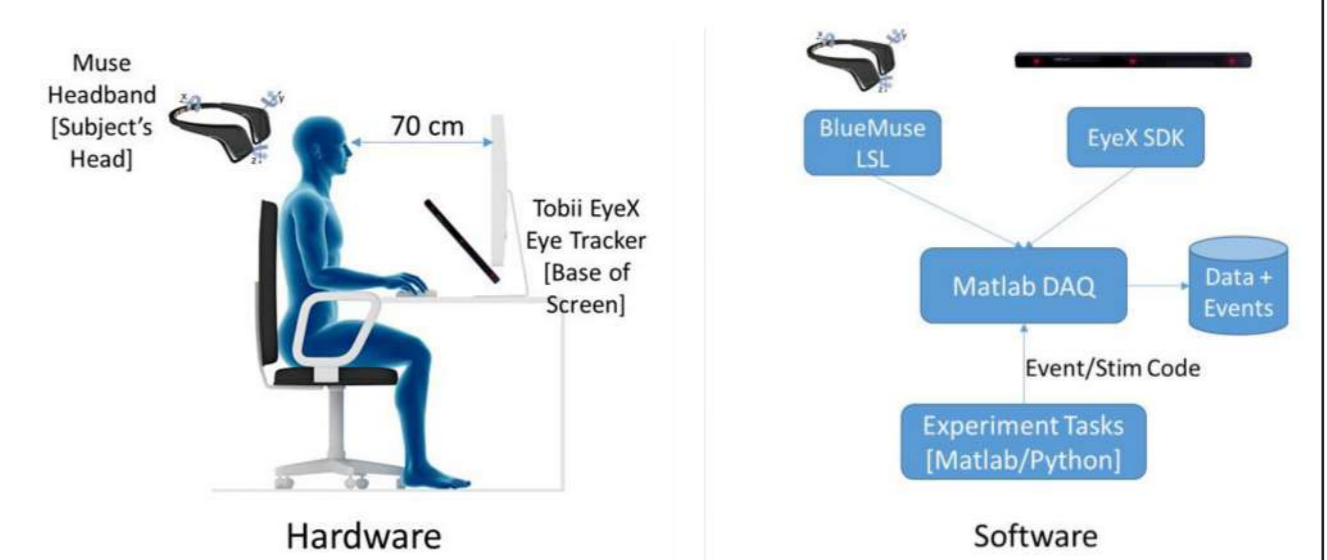
- Studies has shown that mindfulness helps with stress and anxiety
- Mindfulness training is difficult for beginners and even experienced practitioner
- Brain Computer Interface (BCI) can be used through Electroencephalogram (EEG) to help users train mindfulness

## Objective

- Create experiment for EEG Dataset
- EEG Dataset for training classification model
- Develop a mindfulness game application
- Provide non-intrusive and real-time feedback for players
- Help players ease into mindfulness training with game-based approach

## Experiment Setup

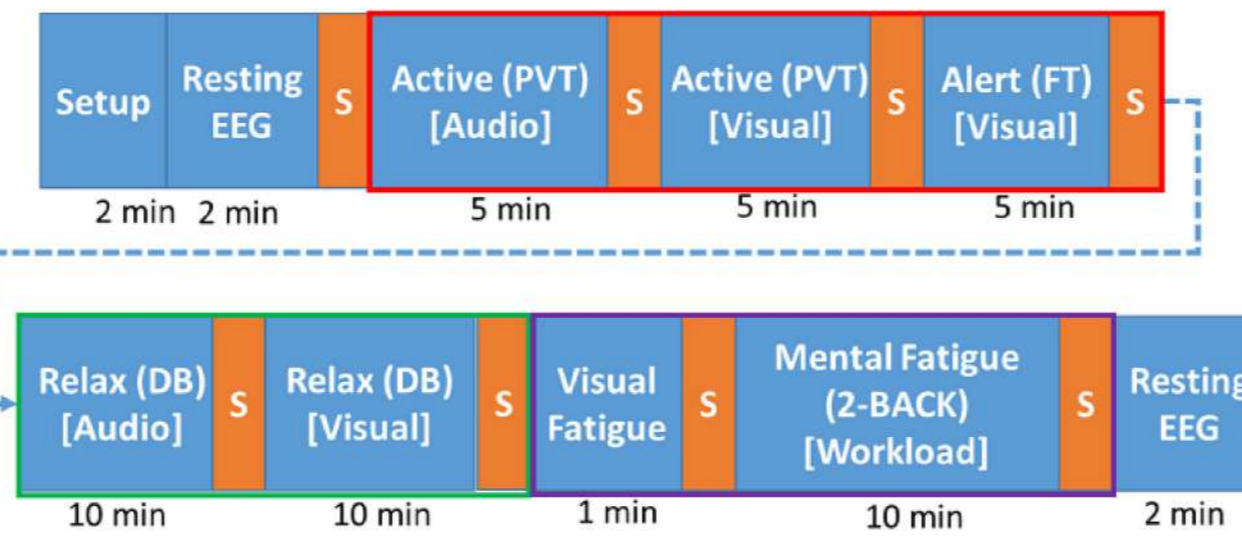
- Muse headband fully charged and connected to PC.
- Tobii Eye Tracker setup and calibrated to the participant's eye.
- Muse Direct connected to Muse headband and start recording
- OpenSesame experiment running.



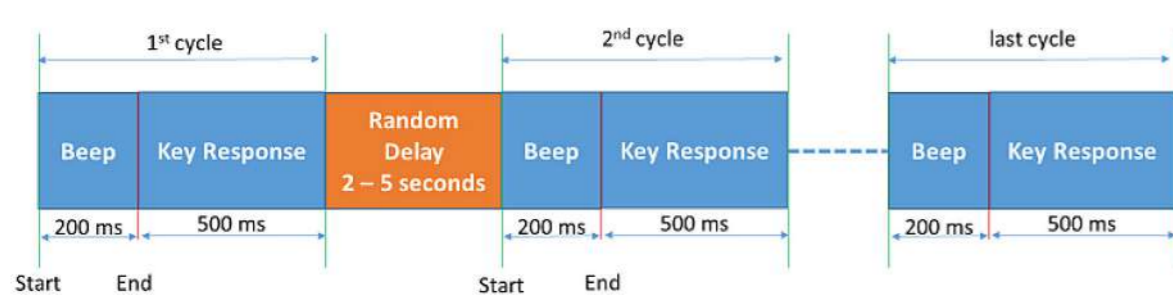
Modality	Data	Purpose
Muse EEG	EEG + ACC signals	To control the game using attentive scores
Tobii EyeX	gaze coordinates and eye positions	Use to remove blinks artefacts and check behavioural states in labelling data

## Experiment Design

- Experiment Duration: 50 – 60 minutes
- Resting EEG: Baseline EEG data
- Survey: Subjective assessment
- Active PVT [Audio & Visual]
- Guided Relaxation [ Audio & Visual]
- Fatigue [2-back workload]

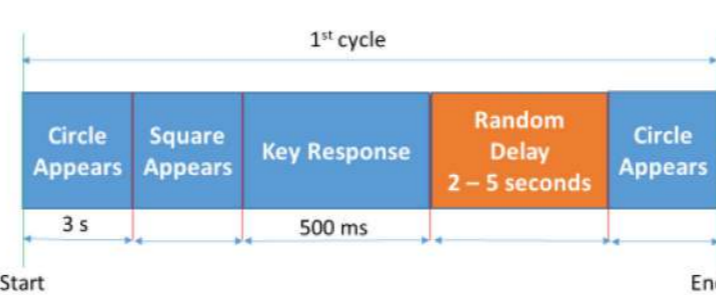


### Audio PVT



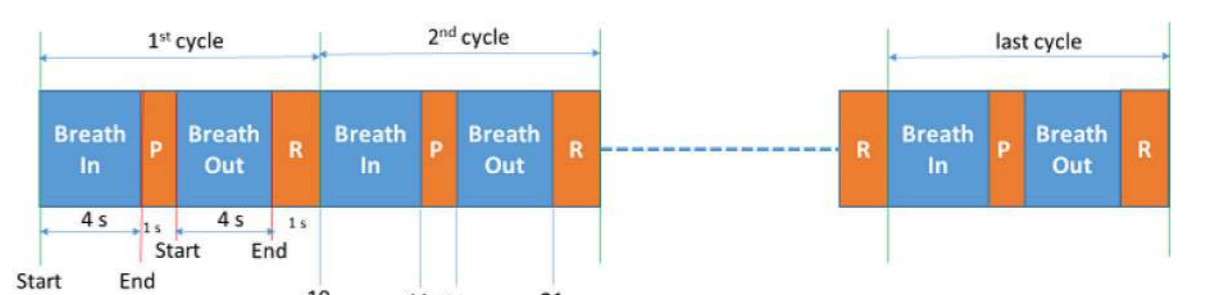
- Key Response**
- Timeout after 500ms if not key response detected.

### Visual PVT



- Repeat**
- After every shape change, users has to hit spacebar before timeout of 500ms.

### Relaxation Tasks

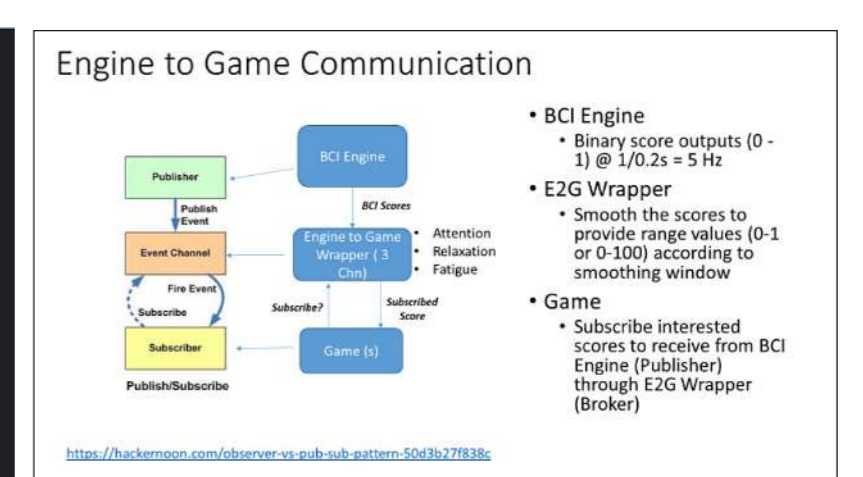
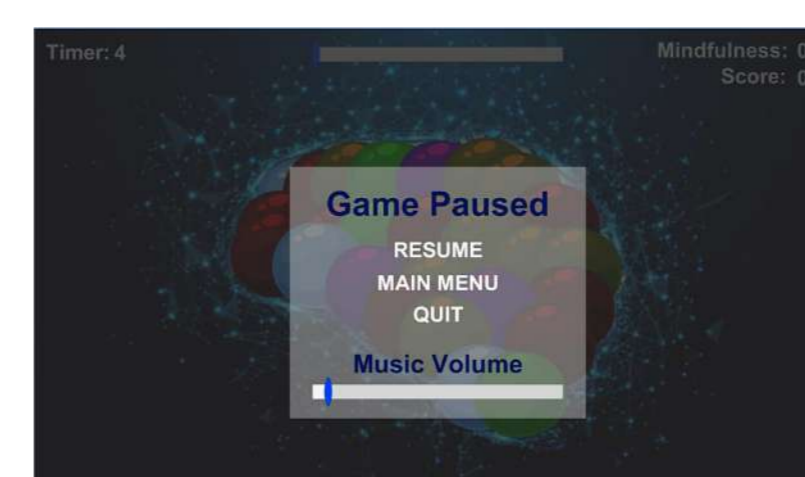
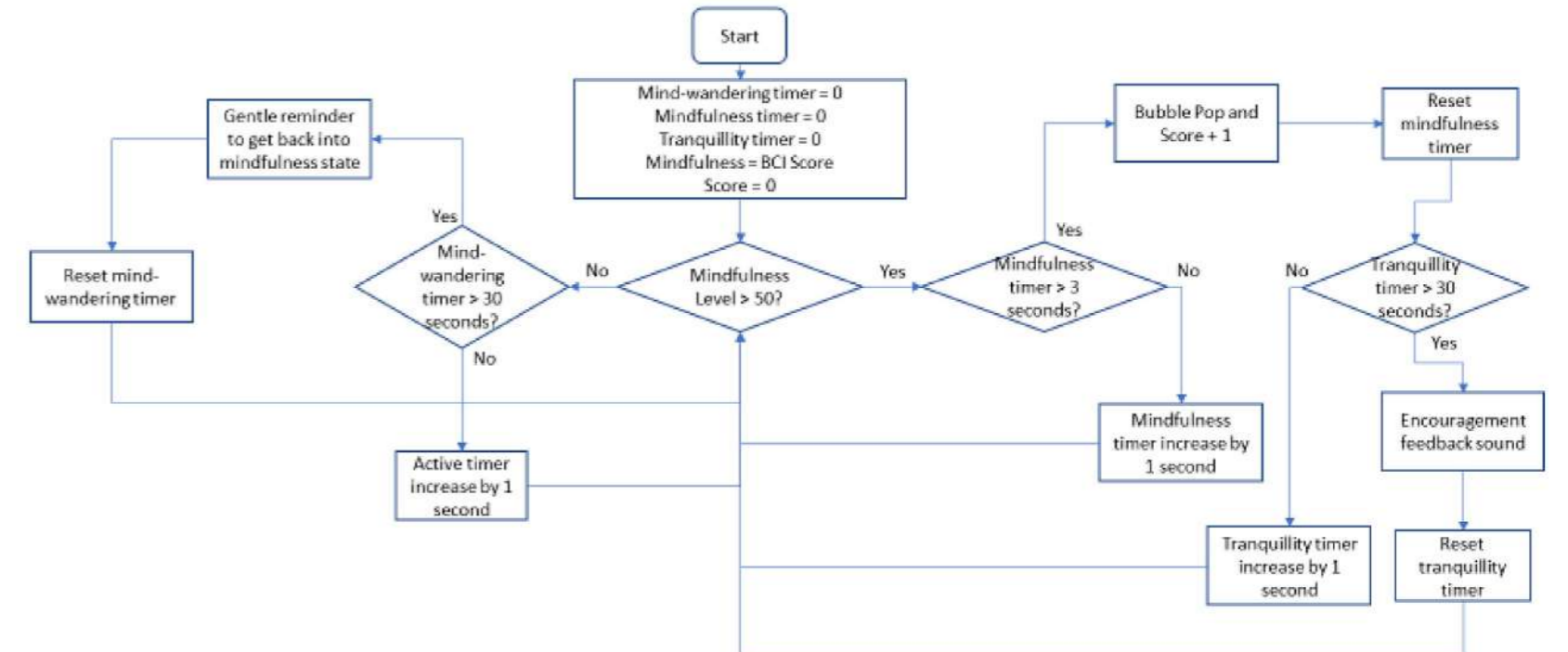
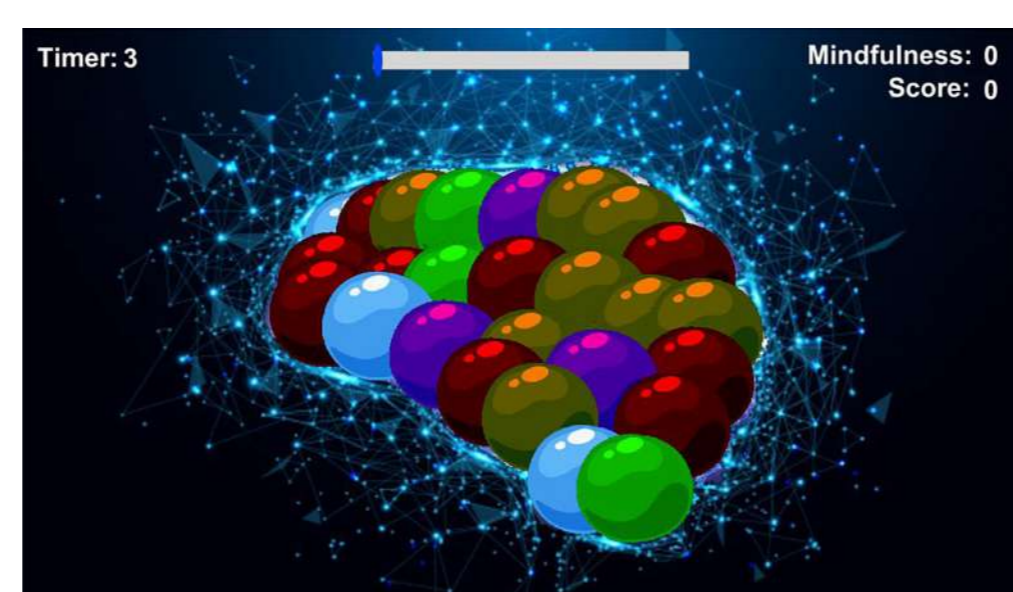


## Game Design

- "PopThoughts" is a game designed to provide audio and visual feedback for players practicing mindfulness

### Game States

States	Conditions	Trigger
Mind-wandering	Mindfulness Score < 50 && Duration >= 30 seconds	Gentle voice to remind players to get back into mindfulness state
Calm	Mindfulness Score > 50 && Duration == 3 seconds	Bubbles visually "pop" and popping sound effect to feedback to players
Tranquility	Mindfulness Score > 50 && Duration >= 30 seconds	Gentle voice to let players know that they are on the right path and provide encouragement



## References:

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