Written summary of our Project

Our video game collects brain signals while you are playing. Different situations will occur in the video game based on your concentration level(relaxed or focused). The project contains two main sections, data collection and the video game.

For data collection and visualization, we used the Muse 2 to detect brain signals, then we used the [boilerplate](https://github.com/neuralbertatech/natHACKS_2022_Python_Boiler) provided by NatHack2022 to collect electroencephalography(EEG) data. Then we computed the alpha and beta ratio using the numpy library.

The video game was created mainly using the python “arcade” library. Boilerplate code from “arcade” documentation was used as a template. No other software was used for the game portion of our project, but the tilesets from RPGMaker were used to create images for the game map. If our game receives data that the player has a focus level that is too low, it will give the player a jumpscare, such as a mirror shattering, a shadow on the wall, or hearing maniacal laughter. If the game detects a high level of concentration, the monster will be more likely to spawn nearby.

PyQT5, along with helping us build the cross platform GUI, helped in displaying the extracted data collection from the Muse 2 hardware, and this was done with the help of the library “numpy” to form an array. Several libraries were used in our project, and some of the few critical ones are listed as follows:

1. Brainflow: It was used to analysing and processing the data
2. pyqtgraph: It was used to help us in graphing

We determined the alpha: beta ratios for the data from the 4 channels for EEG before the data was stored in a text file, as we needed real time data instead of predetermined data and did not need to save it. This data was thus used in finding the ratio, and the lower the concentration, the more focused the player was, and vice versa. Once we had found the ratio, we took the average of the 4 ratios from the csv file and took the average of them, and saved the latest one to a “.txt” file, and depending on the ranges of the average ratio, the mechanics in the game works.