Project Proposal

***Project teams:***

Belabbaci, NazimAhmed A, [Nazimahmed\_belabbaci@student.uml.edu](mailto:Nazimahmed_belabbaci@student.uml.edu)

Yibo Li, [Yibo\_Li@student.uml.edu](mailto:Yibo_Li@student.uml.edu)

***Project title:***

Driver’s Physical Condition Detection by EEG Signal to Prevent Fatigue Driving

***Project description:***

In this project, we attempt to use the EEG sensor to capture the real time EEG signals from driver brain, analysis the signal frequency domain and compositions. Then, we will train a machine learning classifier model by using a fatigue EEG dataset. Finally, the model can be used to distinguish the driver physical conditions especially the fatigue condition to judge if the driver is suitable to continue operate the vehicle or not.

***Project objectives:***

1. Successfully capturing the real-time human brain EEG signals by using the EEG sensor, filtering the signal background noise, and extracting the useful frequency domain in analysis.
2. Finding and utilizing the EEG motion-imagery dataset such as Seed-VIG and training a classifier model to distinguish driver brain status, e.g., focus or fatigue, then to judge if the driver’s physical condition is ok to continue drive the vehicle or he must take a rest.
3. Deploying the whole system into android cellphone or laptop platform, the system should monitor the change of person’s brain activity in real time and give the necessary warning.

***Project plan:***

10/15 to 10/31

In this period, we want to familiar with the applications and usage of EEG sensor because we have not used this equipment before, we need to see how the real EEG signals look like, and based on its behavior, hopefully, we can monitor human brain activities by filtering the signals noise, finding the useful frequency components, and analyzing the activities pattern. The EEG signals may not be acted as what we expect, it is very likely that we can only capture the background noise due to the environment influence such as hair moisture, the signal enhancement methods may be considered depending on the measurement status.

11/01 to 11/20.

In this period, we collect and find some scientific well-done EEG datasets in Motor-Imagery such as SEED-VIG (<https://github.com/meagmohit/EEG-Datasets>) to train a machine learning classifier like decision tree and neural network, and eventually, we will use this model to make the class prediction of the real-time EEG sample collected by the sensor. In this step, we prefer to use the machine learning libraries of Keras or TensorFlow to achieve this purpose.

11/21 to 12/14.

In this period, the system will be deployed in an android cellphone, and we must figure out how to send the EEG signals from the sensor to the phone. In addition to the android device, we can also show the demo based on the laptop platform, this could be much easier for us to achieve. For the sake of saving time, a part of the demo may be recorded by camera and displayed in the classroom. Also, we need to prepare the final presentation and write the project report in the end.