

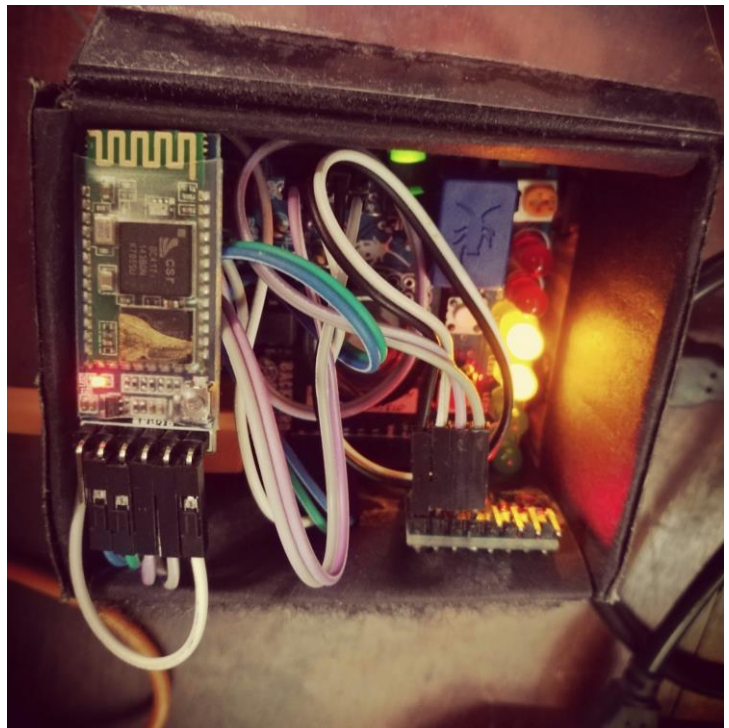
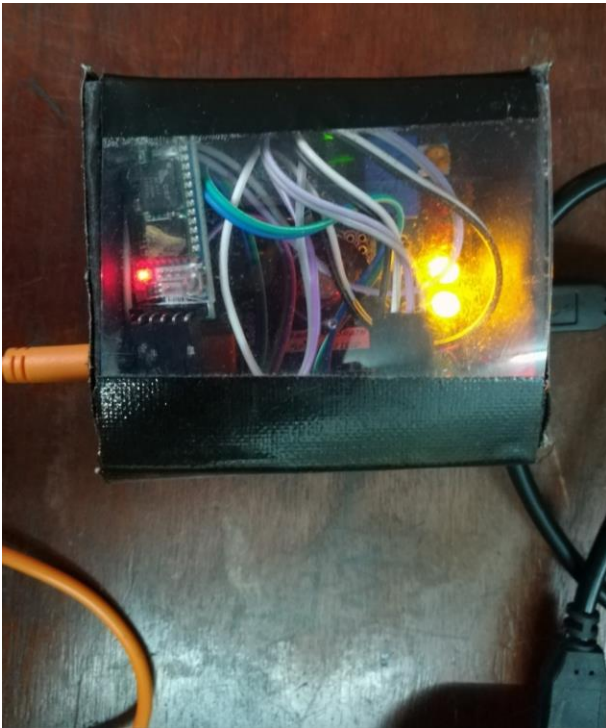
Emotion based safety measures for drivers

Abstract

A major research focus in automobile development is improvement of safety. The main cause for road accidents is the distractions to the driver. Most distractions are in the form of emotional changes that result in unfitting states of mind. Existing methods of detecting a sleepy driver using image processing are proven to be challenging in practice due to the variations in the lighting condition. Further, it is insufficient to detect sleepiness and fatigue as there are several other emotional conditions which could cause a driver to be in an unfitting state for driving. Such states of the driver could be identified using basic parameters of an ECG. In this project, different patterns in the ECG of the driver and patterns in the motion of the vehicle were identified for each emotional state to predict the driver's emotional condition and warn if it tends to unsafe driving. Patterns in the motion of the vehicle were analyzed in terms of the vehicle speed and the change in the acceleration. A Heart and Brain SpikerShield was used to obtain the ECG of the driver and an MPU-6050 IMU was used to gather the acceleration data of the vehicle. Collected data was sent to an Android device via Bluetooth for further processing. We were able to recognize the changes in the ECG and the driving pattern of a drowsy driver and an angered driver. Accuracy of the emotion detection was verified by comparing the results against an image processing based facial expression recognition method. Out of eight drowsy instances, detected using image processing based facial expression recognition, our method detected seven instances.

The setup

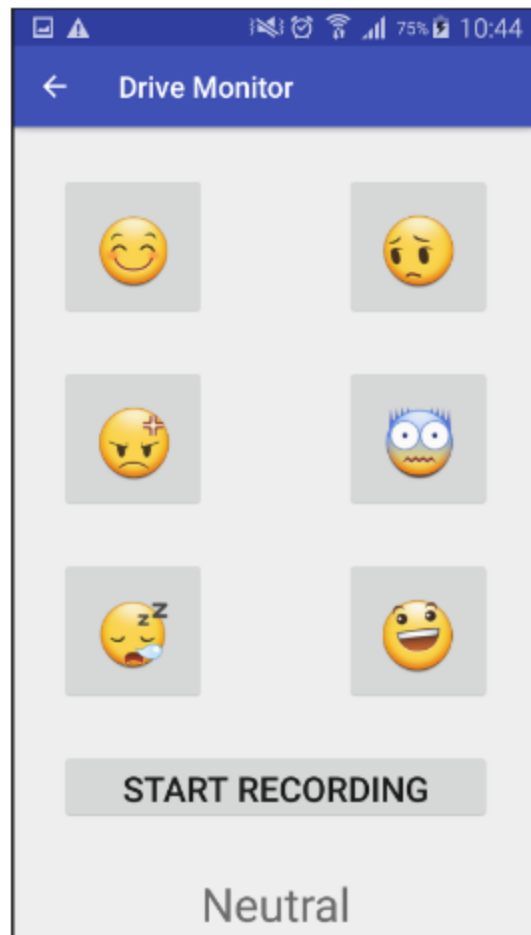
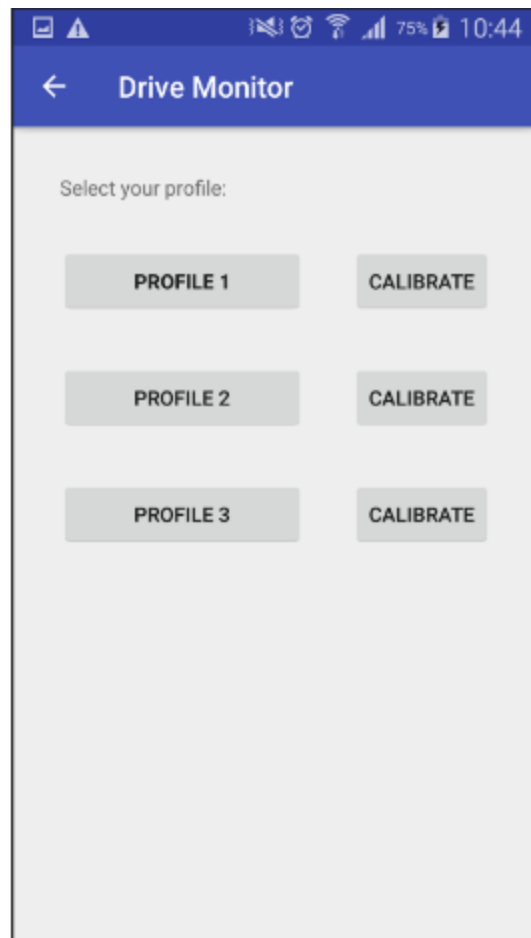
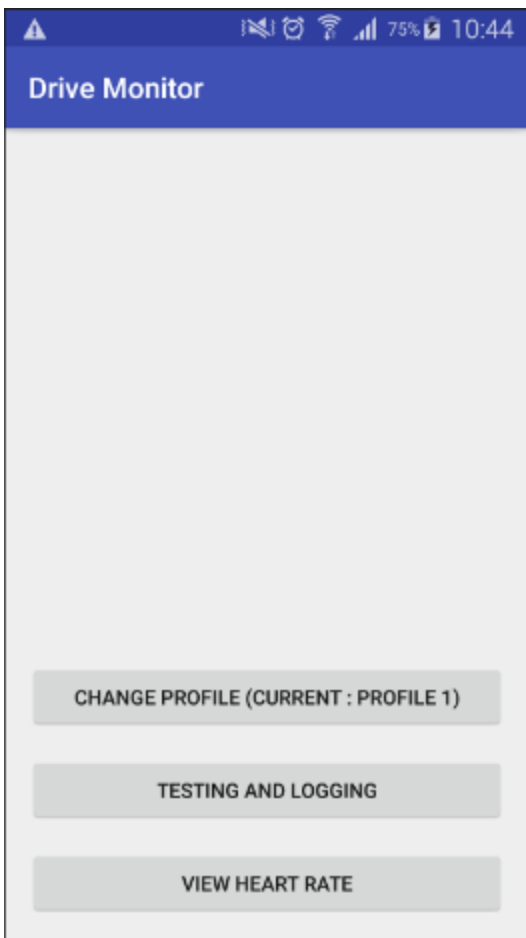
The wearable portion of the system which contains the sensing elements was made using a Backyard Brains SpikerShield, HC-05 Bluetooth module and a MPU-6050 IMU. Data collected using the SpikerShield and the MPU-6050 are transmitted via Bluetooth to the Android application which does the processing.



The experiment setup



*Recording the ECG using **BYB Spike Recorder** app*



The Android app: **Drive Monitor**