PennState College of Engineering | BERNARD M. GORDON LEARNING FACTORY

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Exploring the Feasibility of Remote Monitoring of Allostatic Load and Delivery of Ecological Momentary Interventions (EMI) to Quarantined COVID-19 Patients Using Wearable Biodevices

Overview

LAB FOR SCHOOL-BASED PREVENTION
PENN STATE UNIVERSITY COLLEGE OF EDUCATION

Stress rates have increased drastically in adults throughout the U.S. because of economic and social hardships created from the COVID-19 pandemic. Our team was tasked to create a way to indicate and notify a wearable device user when their allostaticload is high. Allostatic Load is defined as the cumulative stress a person feels in reaction to their environment and can be measured through bio markers taken from smart watches.

Objectives

The objective of the team is to analyze the feasibility to obtain smart watches data and create an AWARE plug-in that will notify a user when they are stressed. The plug-in will send ecological momentary interventions through the AWARE app to prescribe the user some breathing exercising to control their stress.

Approach

- Sponsor meetings gave the team a handle on the customer needs and requirements for the project.
- Literature on the causes of stress was compiled to help understand the calculation of allostatic load. These included patents of other bio devices stress analysis such as Garmin.
- A bio device review was generated to select the most accurate and compatible wearable devices.
- Documentation of AWARE was read and meetings with AWARE creators were held to understand the program.
- AWARE coding was performed on GitHub Repositories to adapt the code to our project's needs.
- Meetings were conducted with Garmin to see the options and feasibility of obtaining real-time data.
- Open Authentication for different devices were investigated to obtain user's data.
- Various other programs were explored to obtain data from the wearable device such as LabFront and PhysioQ.

Outcomes

The team performed well and compiled a variety of options moving forward for the client to get the plug-in and EMI working across various platforms.

As a result of this project, Dr. Frank's team has:

- An understanding of Garmin's API and SDK and how it can be integrated into the plug-in
- A prototype for the Apple Watch that sends notifications through AWARE when the user is stressed
- Future instruction on developing Fitbit as well as developing an Android version of Fitbit and Garmin.
- An Ecological Momentary Intervention Video that is pushed through AWARE when the user is stressed