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Team Tired

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Sponsor:
ASU's Center for Accelerating Operational Efficiency

Transportation Security Administration

Team Members

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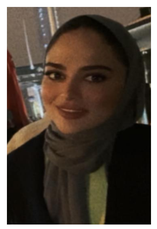
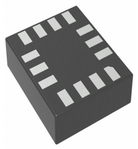


Alkawthar Mirza

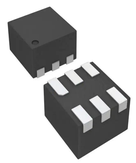
Components

PPG Sensor



IMU Sensor

Temperature Sensor



Voltage Regulator

MCU

Voltage Translator

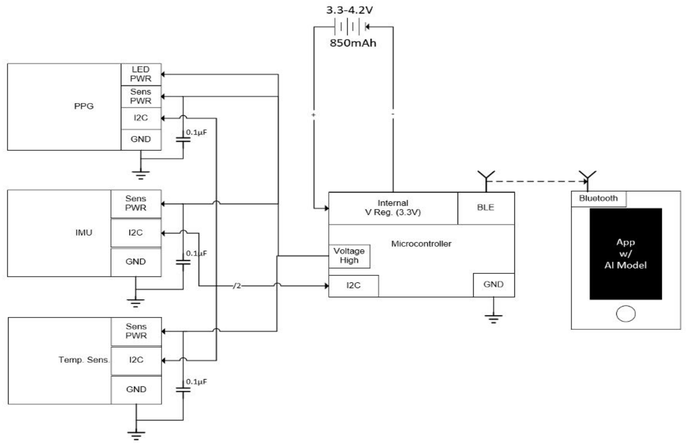
Tests

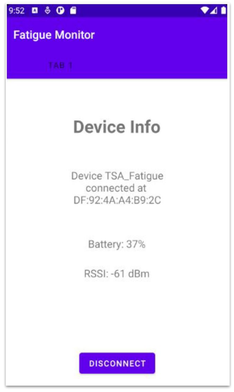
- The IMU sensor will attempt to read the acceleration value of the sensor while in freefall. Success.
- The PPG sensor will attempt to read the reflected light amplitude while a finger is placed on the led and transmit a result. Success
- The temperature sensor will read the most recent temperature reading. Success.
- Bluetooth Low Energy signal will be advertised through the microcontroller. A third-party scanner will be used to analyze nearby Bluetooth devices. Success.
- The app will scan nearby BLE devices and try to connect to the nearest one whose UID matches the devices. The device will be powered on within 10 feet of the app. Success.
- The machine learning model is trained by feeding it biometric data and subject user feedback on their current fatigue level. The model extrapolates correlations between sensor data over time and the user's initial fatigue level, determining the user's current fatigue level.

Project Overview

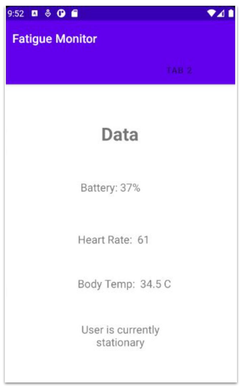
The Tired Tracker device was created as a proof of concept for a centralized system to allow users to view their fatigue level in real time by recording biometric data and transmitting it to an Android application over Bluetooth. The physical device consists of a small wearable embedded system strapped to the user's wrist which collects body temperature, heart rate, and arm motion data in a non-intrusive way. An accompanying app analyzes the data and displays the user's fatigue level on a scale of 1 (low) to 10 (high). TSA will use this information to optimize shift rotations in real time to avoid overly fatiguing their agents.

System Diagram

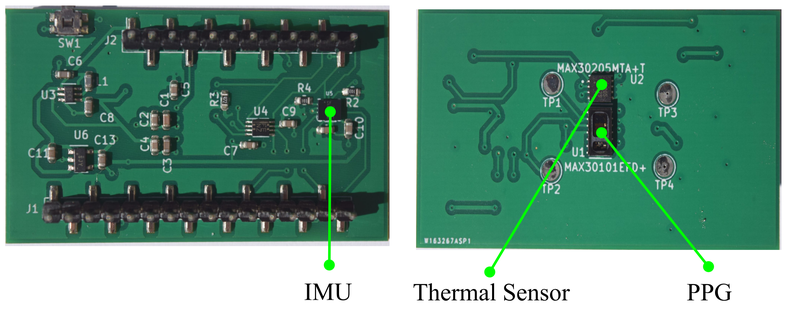




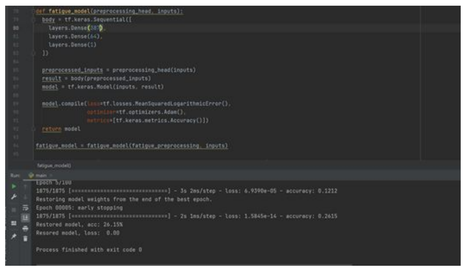
App connects to device via Bluetooth and reads data from sensors



Final Product



PCB



Machine learning model tested using pseudo-random values with varying levels of correlation to the "output" fatigue level.

Spring 2021