

BME 484 Biomedical Engineering Capstone Design
Project Proposal

Project Title: Biofeedback Assisted Self Regulator Device

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Abstract: Studies have shown that within the autonomic nervous system, biological markers such as skin resistance and heart beat fluctuation can be indicative of different emotions within human subjects. These signals could be used as biofeedback from the autonomic nervous system to pick up on emotions expressed by a patient. Specifically, negative emotions such as anger, fear, or sadness can be detected with in people who have difficulty regulating emotions, such as anger management patients. Creating a biofeedback type program could alert these individuals to when they are starting to become dysregulated and help them raise their own awareness of their feelings. Biofeedback sensors for skin resistance and heart rate could pick up on symptoms of the autonomic nervous system given off from negative emotions. Teaching regulation by learning to control some aspects of the autonomic nervous system during a dysregulated state such as anger could be done with a survey in a smart phone application, aiding in bringing the user back to a controlled state.

Innovation: The innovation in our idea would be to use a common technology like a smartphone as a display to visually re-regulate the subject. There would be a ball in the middle of the screen that can expand and contract to a desired threshold, and this ball would also change colors based on the body temperature of the subject. There could also be a reference to skin resistance along with heart rate and body temperature in the bottom corner of the smartphone screen. There are a few technologies that use heart rate and temperature for biofeedback and to train the person to be in a relaxed state but our idea would trigger the app when the sensors detect that the person may be dysregulated.

Materials: Smartphone/Tablet, EKG AgCl electrodes, thermistor, skin resistance sensors, peak to peak heart rate detection (PCB, we have).

Subtasks:

1. Understand how heart rate sensor works along with a temperature sensor and skin resistance sensors in order to trigger an application running on a smartphone.
2. Develop an app that will use the two sensors as triggers.

Timeline:

- 1) We already formed our team and picked our project.
- 2) Design our app and obtain a smartphone, smartwatch, and temperature sensor.
- 3) Apply for IRB application.
- 4) Mid-year progress report.
- 5) Project prototype.
- 6) Test and improve the project.
- 7) NEBEC Conference paper.
- 8) Grant proposal.
- 9) NEBEC Conference.
- 10) Final report.

References:

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