THEN – Proposal

Galvanic Skin Response Mittens

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GitHub at <https://github.com/Ahipsagh/CART360/tree/master/Assignments/THEN>

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# Non-Technical Project Description

The THEN proposal is the creation of Galvanic Skin Response, also known as Skin Conductance Response (GSR), fingerless mittens that house electronic components including two finger or palm sensors and possibly a pulse sensor, some neopixel lights, an arduino all powered by battery.  The goal is to be able to identify subtle body changes that use neopixels to communicate to the wearer the emotional state that they are experiencing in real time.

# Project Intention

The GSR Mitts combine function and form to deliver a wearable that provides biometric feedback via the embedded neoPixel lights.  According to the preliminary research, when we are emotionally aroused, GSR data can be quantified statistically. This results in distinctive patterns that can give information about a person's body state.  The sweat on hands and on the feet are the places where the sensors collect the GSR data. The intention for this project is to create an interactive wearable that provides the wearer with insight to their own physiological and phycological body condition. The wearer gets feedback that may incite them to control themselves as they wish.

## Phase 1

Galvanic Skin Response using arduino and two velcro sensors as a proof of concept.

## Phase 2

Create wearable fingerless mitten with integrated sensors with arduino and neopixel light indicators.  Goal is to determine a simple state of either stress or not stress

## Phase 3

Add a pulse monitor.  Identify a specific emotional state based on GSR.

## Phase 4

Correlate GSR and Pulse Monitor data to confirm a specific state or to indicate another emotional state that requires both collections of data.

# Storyboard - Interaction Design Strategy

|  |  |
| --- | --- |
| 1. GSR Sensor locations - hand | 2. GSR Sensor Location - foot |
|  |  |
| Source: Galvanic\_Skin\_Response\_\_\_The\_Complete\_Pocket\_Guide.pdf  Place two velcro sensors on the fingers (A, B). Or, tape down two sensors on the palm (C,D). | Source: Galvanic\_Skin\_Response\_\_\_The\_Complete\_Pocket\_Guide.pdf  Place sensors inside foot (A, B) or use big toe. This option is not chosen for this project. |
|  |  |
| 3. Arduino setup for GSR Hand | 4. Similar concept for design |
| https://lh3.googleusercontent.com/SdL903KaHPABqyyYo8y5l4HSBFjJKUIlyATYf5dUzfxXT4UF0yT1cCVE4DITfvuMfSlA98QSxA4pj2Kucv7N-nAphov1gqcPpowv3gHGSNm5xKGmIe6sOQLqDEZnGrMEbe1ekheC | https://lh4.googleusercontent.com/HFco3iTlW_n1AdSfLCGG1bNP9jkKYNBTg7NEAT04czVko4gdeFyAmmBbNkv5GkOjEybgPQq5zcEa2huKFa6NtG8Nd5WLK3NNMU7TGzrDZa6_lAcFYUTNnOX_vgaDdB1HGyG-YrDYhttps://lh4.googleusercontent.com/jAl2OCn072G8mFfxPz4QxBpLQEVaLB72haUcfEHSkLBOi5d52JgGZIG3_1mtp6YFcOOjaNk9Q1oSkJxls6MtMCDnBT1v-MPiqdPppQjhudc-wQ7CbEkEat2Pxg18Kow-guiUblT0 |
| Source: <http://thomaskosch.com/index.php/2017/12/17/galvanic-skin-response-powered-by-arduino/> | Source: <https://www.media.mit.edu/galvactivator/faq.html> |
|  |  |
| 5. Identify emotions with GSR | 6. Add pulse sensor |
| https://lh3.googleusercontent.com/GTGvgpERqDymaO2lv_1tswAhhtYsDhd9MiKSBb21gZQIkEVzTuiTgvGkVUiMH8utHlzSrkF39VuPK4GAiBgl__Qm5sZhj4QioMX2fMxcAfiEzinZk8-zGAFJMpNmUBydYguuXJ2I | https://lh4.googleusercontent.com/vQDeZUWJUFupqAvhz5Im4ztTDqJga6-Sx7_Igg0SwoF-JZ_lAx9oLkRkLJvHnQ_1ZaLIylT4PuRyu0WFwcIlmp3-o1mV6QlVILUVOo2EH_BuBhBwvinMKFylX6L1JuqLVFUNJhBp |
| Source: Galvanic\_Skin\_Response\_\_\_The\_Complete\_Pocket\_Guide.pdf  This will be done when we are testing the GSR data by triggering emotions through thought. | Source: <https://www.instructables.com/id/Pulse-Sensor-With-Arduino-Tutorial/>  The pulse sensor can do readings from  fingers. |
|  |  |
| 7. Arduino Pulse Sensor Setup | 8. Pulse sensor results |
| https://lh5.googleusercontent.com/aPeYIzQ6fuPuQC3qdJXM3CQ947n2q1YHFLYisZYawcLMFNpaTWo_IgUGrDpC7tKuTQU9zneKndosBUVVwPRyArCtmNrQ5u2MI5j2Id3kFME0rq5Vi7-52xDaXilfdjrQW1uVmIQH | https://lh6.googleusercontent.com/7Qp0kSdaKy42iuiTikxDVO1kSv5H_dWlgQSecj5v0rACZ4_XZrEG6Uhx4x2c4axIlbWbU2cP9m-N6GnF1dpT3zK-XLyNzgBxE3ysJ3DchDTDBWopV8aqV-Pe_ZeUbmuoc5Gf5BPW |
| Source: <https://www.instructables.com/id/Pulse-Sensor-With-Arduino-Tutorial/> | Source: <https://www.instructables.com/id/Pulse-Sensor-With-Arduino-Tutorial/> |

# Research of 3 similar projects

<http://thomaskosch.com/index.php/2017/12/17/galvanic-skin-response-powered-by-arduino/>

This the barebones set up for GSR using the Arduino. As such, it is plugged into the computer and the wearer is measured by sensors straped with Velcro to their fingers.

<https://www.media.mit.edu/galvactivator/faq.html>

The Galvactivar is a hand strap-on that uses GSR to determine whether the wearer is relaxed or stressed by way of a built in light.

Galvanic\_Skin\_Response\_\_\_The\_Complete\_Pocket\_Guide.pdf (Github)

The 34-page document created by IMOTIONS with headquarters in both North America and Europe is an overview of the GSR research that is a marketing document with the intention of promoting their computer software that analyses the GSR data. Further, their vision is to sell this software to industry. IMOTIONS contends that with GSR, industry can better serve their clientele by understanding the motivations and emotions of their customers.

# Different ?

The GSR mittens differ from the three research projects in that they are a functional wearable. This means that even if the wearer is not interacting with the feedback of the sensors, they still can use the wearable as fingerless mittens. The other difference, is that in phase 4 of this mid-level prototype proposal, we would like to combine the GSR data and pulse sensor data to give further insight to a to be determined emotional state.

# Research Sources

Galvanic\_Skin\_Response\_\_\_The\_Complete\_Pocket\_Guide.pdf (Github)

<https://forum.arduino.cc/index.php?topic=455550.0>

<http://thomaskosch.com/index.php/2017/12/17/galvanic-skin-response-powered-by-arduino/>

<https://www.media.mit.edu/galvactivator/faq.html>

[https://www.instructables.com/id/Making-Galvanic-Skin-Response-Finger-Electrodes/](https://www.instructables.com/id/Making-Galvanic-Skin-Response-Finger-Electrodes/*)

<https://youtu.be/ljVQpwVHpOo>

<https://www.instructables.com/id/Pulse-Sensor-With-Arduino-Tutorial/>