Tempurature Sensors For Veterans With Paralysis

DESIGN DOCUMENT

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BAE Systems
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Team Member: Role
Evan Rosonke: Uncertain
CJ Reitz: Uncertain
Ethan Houts: Uncertain
Thomas Kivlahan: Uncertain
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Revised: 09/07/2023 V1.01

Executive Summary

Development Standards & Practices Used

List all standard circuit, hardware, software practices used in this project. List all the Engineering standards that apply to this project that were considered.

- We will need to use a communication standard, most likely Bluetooth
- Commenting code for the application for others to read easily
- Document hardware as it is implemented, as well as document hardware changes
- Standardize among hardware for an easier pairing of devices and one location for purchasing

Summary of Requirements

List all requirements as bullet points in brief.

- Temperature sensors that read body and air temperature
- Means of attaching the sensor to the body
- Phone application that uses data from the sensor to alert the user if the temperature is too extreme
- Data control center to store historical data

Applicable Courses from Iowa State University Curriculum

List all Iowa State University courses whose contents were applicable to your project.

- EE285
- CPRE288
- EE330

New Skills/Knowledge acquired that was not taught in courses

List all new skills/knowledge that your team acquired that was not part of your Iowa State curriculum in order to complete this project.

- Project Management
- Communication among a large team

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1 Team

1.1 Team Members

Evan Rosonke, Thomas Kivlahan, Ethan houts, CJ Reitz, Mensanh Namessi

1.2 Required Skill Sets for Your Project

Electronic system integration and software development. Understanding of microelectronics and their uses within temperature sensors with Bluetooth compatibility.

1.3 Skill Sets Covered by the Team

(for each skill, state which team member(s) cover it)

Project Management- Evan Rosonke

Testing- CJ Reitz, Ethan Houts

Hardware Design- Evan Rosonke, CJ Reitz, Thomas Kivlahan, Mensanh Namessi

Software Development- Ethan Houts

1.4 Project Management Style Adopted by the team

Our team is adopting a single project manager role with leaders for each division of the project, including but not limited to a software lead, a hardware lead, a test lead, and an overall project management lead.

1.5 Initial Project Management Roles

Overall Project Management - Evan Rosonke

Software Lead - Ethan Houts

Test Lead - CJ Reitz

Hardware Leads - Mensanh Namessi and Thomas Kivlahan

2 Introduction

2.1 Problem Statement

The goal of this project is to implement a series of temperature sensors to allow individuals with paralysis in the limbs to know if their body temperature is too cold or too hot in the areas without feeling. We will then use the sensors to alert the user of any abnormality in there body temperature through a phone application.

2.2 Requirements & Constraints

Hardware Requirements

- Small temperature sensors with Bluetooth communication
- potential for a moisture sensor?

Software and UI Requirements

- easily usable phone application with simple functions
- has a notification center that shows all recent warnings
- has multiple levels of warnings
- receive data every minute when sent by sensors, only alert through notification if outside an acceptable range

Aesthetic Requirements

- able to be attached to the person
- not disrupting typical body movement
- minimal as possible to not be easily seen
- not irritable to the skin
- not interfere with sweat production

Performance Requirements (Data rate and frequency of data collection and upload)

- data collection once per minute from sensors?
- send data to the phone app as collected

2.3 Engineering Standards

Skin Interfaced Electronics

FDA has a list of allowable chemicals that can be used in contact with the body for microelectronics

Wearable electronics (IEEE 360-2022)

Personal health devices (IEEE 11073)

2.4 Intended Users and Uses

Our project will mainly impact those with limb paralysis or loss of feeling within limps. The idea behind this is to allow these people to do the things they love without having to worry about running the risk of the body becoming too hot or too cold. One example of people would be people who go adaptive skiing and run the risk of frostbite in their toes and would not be able to feel it. This will allow them not to worry because if this were to come close to happening, they would receive an alert beforehand to know something needs to change.