

ChargeForge: gang charging system for newly developed physiological monitoring device

Client: Ms. Isabel Erickson
Aptima Inc.

Alternate Contact: Mr. Kevin Durkee

Advisor: Prof. Chris Brace

Team: Allison Rausch (Team Leader)
Jake Maisel (Communicator)
Yeanne Hwang (BSAC)
Kenan Sirlioglu (BWIG)
Luke Blaska (BPAG)

Date: September 16, 2024 - September 19, 2024

Problem Statement

A new wearable device for physiological monitoring, specifically designed for occupational safety in environments like heat stress and confined spaces, is currently being developed. The design contains a hard-shelled carrying case which provides protection but lacks trays that can connect physiological sensing devices with charging cables. Thus, the team is tasked to design and fabricate a gang-charging system to help solve this problem effectively and efficiently. Overall, the design should be able to transport, charge, and recuperate 40-50 sensors. The charging system ideally should indicate charge and UV levels. The final design should balance cost, durability, and manufacturability.

Brief Status Update

The team met with the client to gather information about the problem and expectations for the design project throughout the semester. Information regarding the budget, access to equipment and knowledge, device measurements, and expectations for progress were used to guide the research for and to complete the product design specification (PDS).

Summary of Weekly Team Member Design Accomplishments

- Team:
 - Met with the client over Zoom on Tuesday
 - Used researched data and client requests to complete the product design statement draft
- Allison Rausch

- Researched the safety concerns of voltage flow for the PDS
- Continued researching the mechanisms of the sensors
- Created a list of questions to email the client
- Started Progress Report 2
- Jake Maisel
 - Worked on researching the operating environment of the device
 - Answered the question list with the information our client gave
 - Completed a section of the PDS
 - Contacted client about project information and next available meeting times
- Yeanne Hwang
 - Researched on the lightweight/small charging system
 - Make a list of questions to ask the client
 - Completed a section of PDS
 - Completed Progression Report
 - Imaging the potential design for the prototype
- Kenan Sirlioglu
 - Researched about common Patient related concerns and potential competition for the gang charging system.
 - Sketched and labeled a potential prototype for the gang charging system on Ipad
 - Completed a portion of the PDS and reviewed it over.
- Luke Blaska
 - Researched standards that will be important to our project, specifically having to do voltage and UV
 - Complete the standards and a few other sections of PDS

Weekly/Ongoing Difficulties

The team continues to research to understand the charging system portion of the project as well as the regulations. Research regarding tray materials and tray designs will also begin. The team may initially divide with half researching the tray and half researching the charging system.

Upcoming Team and Individual Goals

- Team:
 - Complete editing and review of the product design specification prior to submission
 - Begin creating design ideas for the tray and charging system
 - Continue researching and updating the LabArchives team notebook
- Allison Rausch
 - Draw up multiple preliminary designs
 - Research durable yet relatively lightweight materials for the tray
 - Research the instrumentation aspect of the project
 - Research ISS and other safety requirements
- Jake Maisel

- Set up a meeting with the client and Vigilife, the company that makes the physiological devices
- Come up with potential designs for the device
- Research more about charging devices and the electrical components that will go into making the device
- Yeanna Hwang
 - Attend BSAC meeting and discuss about projects
 - Draw up the preliminary design
 - Research the efficient way to minimize the weight and size of product
- Kenan Sirlioglu
 - Brainstorm more prototype ideas as well as logistics
 - Study how to mitigate common patient related concerns
 - Research how the environmental effects of the U.S. marine base could affect the functionality of the gang charging system
- Luke Blaska
 - Meet with team about client responses and make a plan for the week
 - Begin brainstorming prototyping ideas and have continue discussing material possibilities
 - Continue material research
 - Attend BPAG meeting

Project Timeline

Project Goal	Deadline	Team Assigned	Progress	Completed
Product Design Specification (PDS)	September 19, 2024	All	100%	9/18/24
Design Matrix	September 20, 2023	All	0%	
Preliminary Presentations	October 4, 2024	All	0%	
Preliminary Deliverables	October 9, 2024	All	0%	
Show and Tell	November 1, 2024	All	0%	

Poster Presentations	December 6, 2024	All	0%	
Final Deliverables	December 11, 2024	All	0%	

→ Arrows indicated dependencies