Rehab Remote

Design Review Presentation

Client
Dr. Zachary Lerner

Team
Kylie Cook
Brandon Roberts
Robert Bednarek
Katarina Marsteller

Mentor
Felicity Escarzaga

Our Client: Dr. Zachary Lerner

- Assistant Prof. for the Dept. of Mechanical Engineering

- Co-Founder of Biomotum

- Aides in the development of exoskeletons made by Biomotum

Problem Statement – Introduction

<u>Area</u>

- In the US, 1 in 345 children has cerebral palsy
- Cerebral palsy is a set of neuromuscular disorders effective around the time of birth
- Around 58.9% of children can walk independently
- 7.8% walk with assistance
- 33.3% have limited or no walking ability [1]

Biomotum's Role & Problem

- Assisting by creating an ankle-exoskeleton
- Exoskeleton will be given to hospitals and clinics
- Children currently trial exoskeletons
- A Biomotum app is used for patient log in
- Problem: Patients and admin don't have a way to see progress via desktop

Problem Statement – Technical Issues

Data Processing

- User left to interpret and process large amounts of raw data
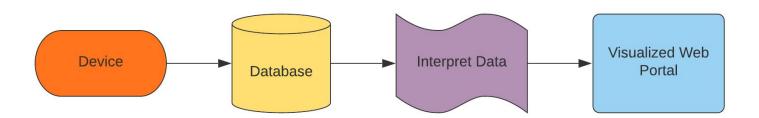
Visualization

- Currently there is no way to visualize the data in an appealing way by desktop

	TStep	1	2	3	4	5	6
0	RTorque	-0.07	0.02	-0.09	-0.07	0	-0.04
1	RSetP	0	0	0	0	0	0
2	RState	0	0	0	0	0	0
3	LTorque	0.02	-0.02	-0.18	-0.15	-0.01	0.03
4	LSetP	0	0	0	0	0	0
5	LState	0	0	0	0	0	0
6	Voltage						
7	ErrorCount						
8	StepCount	0					
9	LFsr	0	0	0	0	0	0
10	RFsr	0	0	0	0	0	0
11	Biofeedba	0					
12	Biofeedba	0					
13	Biofeedba	0					
14	Marks	0	0	0	0	0	0
15	Left Torqu	1.13					
16	Right Torq	0.93					

Envisioned Workflow

General Solution

Create an interactive web portal that interprets data directly from the database and displays it in a visually appealing way

Solution Overview

- A web-portal that allows users to log in and see the data collected by the ankle exoskeleton that they use

<u>Features</u>

- Raw data is processed by the web-portal
- Processed collection of data is displayed for the user
- Admin and users have access to specific data

Key Requirements

Requirements Acquisition Process

- In person/online meetings with client and Biomotum workers as needed
  - Gather questions before meetings

User Level Requirements

- Be able to see individual data (users) and global data (admin)
- See data in graphical form
- Admin can access data in different groups/filters
- Graphical and raw data can be collected for offline use
- Easy to understand user interface

Key Requirements

Functional

- User Account System
  - Username and Password Database
  - Connection to the User's Data
    - Data Pinging
- Secure Accounts
- Data Visualization
- Hierarchy of Data
- Downloadable Data

Performance

- Easy to Use Interface
- Data Pinging
- Data Load Time

Environmental

- The Dataset
- Web Hosting Technology

Risks and Feasibility

Risks

- Patient data breach
- Unauthorized user access
- Inaccurate display of data

Feasibility

- Protection for patient privacy
- Security for the users
- Accurate data collection

Current Schedule

	Week 1	Week2	Week3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16
Team Inventory			██	██												
Team Standards				██	██											
Mini-Intro					██	██	██									
Team Website				██		██		██		██		██		██		██
Tech Feasibility							██	██	██	██						
Team Updates											██					
Requirements Document												██	██	██	██	██
Design Review Presentations												██	██			
Prototype Demo													██	██	██	██
Project Info Mini-Video													██	██	██	

Spring Schedule

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Admin Data Visualization	▓	▓	▓													
User Account Authentication				▓	▓	▓										
Hierarchy Data Filter						▓	▓	▓	▓							
AWS pinging									▓	▓						
Downloadable Raw Data											▓	▓	▓			

12

Conclusion

Rehab Remote aims to create a web portal in conjunction with Biomotum to visualize the data being collected from the exoskeletons they manufacture.

References

[1] [Centers for Disease Control and Prevention. (2020, December 31). Data and statistics for Cerebral Palsy. Centers for Disease Control and Prevention. Retrieved November 5, 2021, from https://www.cdc.gov/ncbddd/cp/data.html.