

Dynamic Balance Device, BME 200/300

Client: Mr. Daniel Kutschera

Advisor: Dr. James Trevathan

Team: Gabriela Cecon cecon@wisc.edu (Team Leader)

Gracie Hastreiter ghastreiter@wisc.edu (BWIG / BSAC)

Jack Zemlock zemlock@wisc.edu (Communicator)

Kyle Komro ktkomro@wisc.edu (BPAG)

Date: October 12 to October 17, 2024

Problem Statement

Many elderly people—especially those who have suffered from strokes—sustain lasting mobility problems as they attempt to recover and return to “everyday” life. Currently, the solutions for physicians to use in addressing this issue are either too expensive to easily acquire, or are inadequate and are too hard to use while giving sufficient attention and support to the patient. The goal of this project is to provide a solution that remedies the issues with current designs at an affordable cost.

Brief Status Update

This week, the team met with our client to further discuss our design and the expectation and goals of our project. The team also met to finalize our material selection and order our materials. Moving forward, we are planning on beginning fabrication and testing next week once our materials are delivered.

Summary of Weekly Team Member Design Accomplishments

- Team:
 - Decided on a prototyping plan and some testing procedures
 - Ordered materials for the shaft and the LED matrix
 - Decided to try and 3D print a handle
- Gabriela:
 - Brainstormed prototyping and testing ideas
 - Made a plan for mechanical testing of the shaft in SolidWorks

- Gracie:
 - Met with the client to discuss our designs and the next steps of the fabrication process
 - Continued to research arduino microcontrollers and how we will program our display screen
- Jack:
 - Created a rough prototype of the device to see where the center of mass would fall
 - Researched and created a threaded cap for the handle of our device
 - Attempted to learn the basics of Solidworks
- Kyle:
 - Ordered shaft and LED matrix, logged in budget spreadsheet. Expecting arrival over the weekend
 - Refamiliarized with Solidworks and looked into simple handle designs available online
 - Visited client at hospital, got to see what he's working with
 - Began thinking through weight distribution and finer points of manufacturing

Weekly/Ongoing Difficulties

The biggest challenge we encountered this week was trying to decide how we were going to produce a handle for this device. While we looked online for some simple ones, we decided that with the battery pack and wiring that we'll need, it may be easier to fabricate one ourselves, and we have started looking into prototyping that, along with the electronics. Other than that, we're waiting on materials to arrive to start fitting our pieces and electronics together.

Upcoming Team and Individual Goals

- Team:
 - Start prototyping and testing once the materials arrive
- Gabriela:
 - Make SolidWorks model of the shaft and perform mechanical testing
 - Go to the Makerspace and see 3D-printing material options for the handle
- Gracie:
 - Begin working to program the LED matrix with an arduino microcontroller.
 - Work on creating fabrication plans for the display box.
- Jack:
 - Finish Onshape model of handle that has screw in bottom
 - Start designing and brainstorming storage box on the end of the device
- Kyle:

- Receive materials and distribute them/start working with them
- Start thinking about the wiring of the device and what kind of battery we may need.
- Keep in touch with our client on what we've purchased and what we're working on.

Project Timeline

Project Goal	Deadline	Team Assigned	Progress	Completed
Preliminary Presentations	Oct 4	All	Completed	Yes
Preliminary Deliverables	Oct 9	All	Completed	Yes
Show and Tell	Nov 1	All	–	No
Poster Presentations	Dec 6	All	–	No

Final Deliverables	Dec 11	All	-	No
--------------------	--------	-----	---	----

Expenses

Item	Description	Manufacturer	Part Number	Date	QTY	Cost Each	Total	Link
Component 1								
LED Matrix	An LED matrix that should be easy to wire and Arduino, the main component of display panel.	Loamlin	WS2812B	10/17/2024	1	\$12.5 1	1	link
Component 2								

Carbon Fiber Shaft	Piping that we're using for the length of the rod itself, carbon fiber casing, should be lightweight yet very durable	Carbon Kevlar Supply	843728109361	10/17/2024	1	\$47.46	1	link
Component 3								
TOTAL:								\$59.97