

Wearable Light Logger to Facilitate Full Spectrum Light Dosing for Mood Disorders

Date: November 1st to November 7th, 2024

Client: Dr. Jean Riquelme

Advisor: Dr. Brandon Coventry

Team:

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Problem Statement

Currently, there are no affordable wearable light-logging devices on the market. Full-spectrum light therapy has been proven to be successful in treating mood disorders, especially seasonal affective disorder, but patient response studies are lacking. A wearable allows for accurate representation of light intensities that reach the retina, the presumed site of action. A wearable light logger would provide convenient research into what correct dosages for optimal patient response look like for patients suffering from mood disorders.

Brief Status Update

This week, we met with our advisor once again at WIMR and decided to change the circuitry of our sensor circuit board to include just one sensor instead of two. Our team also purchased fabric to attach to the headband containing the wire connecting both circuit boards. We are continuing to fabricate and reach the final design

Summary of Weekly Team Member Design Accomplishments

- Team:
 - The team went to WIMR to solder with advisor
 - The team went to a fabric store to pick out fabric

- Molly Wilhelmson:
 - Purchased the last of the materials
 - Brainstormed ways to make our sensor visible

- Ella Eklund:
 - Started constructing new circuitry with one sensor
 - Researched materials for fabric

- Neel Srinivasan:
 - Added code for battery power sensing/alerting
 - Purchased fabric with team

- Kate Briesemeister:
 - Purchased fabric with the team
 - Continued on making CAD design for box

Weekly/Ongoing Difficulties

Waiting for parts to arrive to construct the circuit

Upcoming Team and Individual Goals

- Team:
 - 3D print boxes for circuitry
 - Connect the two circuits together
- Molly Wilhelmson:
 - Construct and test the final circuit design
- Ella Eklund:
 - Construct the final sensor circuit
 - Attach fabric containing wire to the headband
- Neel Srinivasan:
 - Build circuit with team
 - Specify code to data sheet values
- Kate Briesemeister:
 - 3D print initial box prototype

Project Timeline

Project Goal	Deadline	Team Assigned	Progress	Completed
Meet with client	09/13	All	100%	Yes
→ Product Design Specification	09/20	All	100%	Yes
Preliminary Presentations	10/4	All	100%	Yes
Preliminary Deliverables	10/9	All	100%	Yes
Show and Tell	11/01	All	100%	Yes
Poster Presentations	12/06	All		
Final Deliverables	12/11	All		

Expenses

Item	Description	Manufacturer	Part Number	Date	QTY	Cost Each	Total	Link
Component 1								
Happy Light	Light for testing sensor	Verilux	N/A	9/13/24	2	\$49.99	\$99.98	Link
Component 2								
Battery	Battery for chip	PGSONIC	CR2045	9/19/24	1	\$1.15	\$1.15	Link

Component 3								
Head Lamp	Light that attaches to head	Fire Supply Depot	FL8210-6SM D	9/26/24	1	\$11.92	\$11.92	Link
Component 4								
Raspberry Pi	Chip for coding	Raspberry Pi	Raspberry Pi Pico W	10/4/24	1	\$7.20	\$7.20	Link
Component 5								
Comparator	Building circuit	Texas Instruments	LM393PE4	10/4/24	2	\$0.25	\$0.50	Link
Component 6								
Battery Holder	Holder for coin battery	Digikey	BS-2450	10/4/24	1	\$3.84	\$3.84	Link
Component 7								
OPAMP	Building circuit	Digikey	AD8276ARZ	10/4/24	1	\$7.37	\$7.37	Link
Component 8								
IC DAC 12BIT V-Out	Building circuit	Digikey	MCP4726A0T -E/CH	10/4/24	3	\$2.16	\$6.48	Link
Component 9								
OPAMP	Building circuit	Texas Instruments	UA741CN	10/25/24	2	\$0.25	\$0.50	Link

Component 10								
Breadboard	Building circuit	Busboard Prototype Systems	BB400	10/25/24	1	\$2.00	\$2.00	Link
Component 11								
Sensor 550NM	Measure light values	Digikey	OPT3007YM FT	10/31/24	1	\$2.79	\$5.42	Link
Component 12								
Sensor Photodiode 900NM	Measure light values	Digikey	BPW34S-ND	10/31/24	1	\$1.58	\$4.21	Link
Component 13								
DFN to DIP SMT adapter	Allows for soldering components to breadboard	Digikey	IPC0083-ND	10/31/24	1	\$4.79	\$7.42	Link
Component 14								
Ribbon Cables	Flexible wire connection around headstrap	Amazon	B08LPFX7QN	10/31/24	1	\$10.39	\$10.39	Link

Spandex	Flexible wire enclosure around headstrap	Joanne Fabrics	N/A	11/6/2024	1	\$7.92	\$7.92	N/A	
TOTAL:								\$173.8	