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

Date: October 25th to October 31st, 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 decided to change the circuitry aspect of our project by using two different sensors after our meeting with our advisor. We have ordered the materials for this design. We are continuing to prepare for show and tell by gathering materials to gain feedback on from our peers.

Summary of Weekly Team Member Design Accomplishments

- Team:
    - The team met to prepare for the show and tell
    - Decided on the new two-sensor circuit design

- Molly Wilhelmson:
    - Researched sensors for our design and planned out the new schematic

- Ella Eklund:
    - Researched the new sensors purchased
    - Prepared individual sections of show and tell

- Neel Srinivasan:
    - Continued to develop code
    - Prepared code in a manner to be viewed easily at show-and-tell
    - Met to prepare for show and tell

- Kate Briesemeister:
    - Ordered additional parts for the circuit
    - Prepared for show and tell

Weekly/Ongoing Difficulties

Waiting for parts to arrive to construct the circuit

Upcoming Team and Individual Goals

- Team:
    - Continue designing circuitry and code
    - Begin drafting a Solidworks file for the circuit boxes
- Molly Wilhelmson:
    - Test the circuit with the happy light and ensure the selected components are sufficient
- Ella Eklund:
    - Construct circuit when parts arrive
- Neel Srinivasan:
    - Calibrate sensor to datasheet values and lux conversion for code
- Kate Briesemeister:
    - 3D print the box to hold the circuit components

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	90%	
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	FL8210-6SMD	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	OPT3007YMFT	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
TOTAL:								**$165.88**