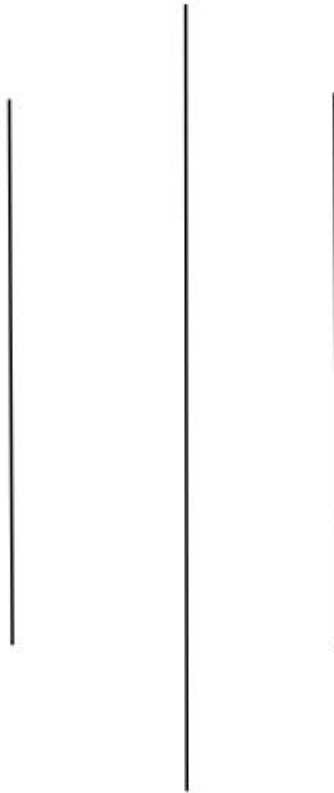# SENSES LAMP

HNRS 122-H02

Team Members:

Aiden Koon

Dikshant Lamsal

Jesse Llewellyn

Date: April 1, 2025

Instructor:

Dr. Michael Swanbom

Description:

Unlike traditional phone alarms that jolt you awake, our device gently simulates a sunrise by gradually fading in its LEDs as your set wake time approaches, helping your brain transition smoothly from sleep to wakefulness. When it's time to get up, customizable alarm sounds play to ensure you're fully awake and feeling refreshed.

Beyond just an alarm, this device includes a built-in Bluetooth speaker, real-time temperature and humidity display, snooze functionality, and the option to use it as an ambient lamp throughout the day.

List of sensors/devices:

- Button

- DHT11 Sensor

- I2S Amplifier

- Speaker

- Thumb-stick

- 1602A LCD

- Raspberry Pi Pico W

- DS3231 Real Time Clock Module

- WS2106A LEDs

- USB C Breakout

Homework 6 – Team   Questions 1-3

Q1)

Jesse Llewellyn Ideas:

1. Sunrise Lamp

2. Laundry Helper

3. Remote Control Leash

4. Digital Traffic Cone extension

Aiden Koon Ideas:

1. Skateboard Dashcam

2. Smart Bunsen Burner

3. Smart Bike Lock

4. "Safety robot" that follows you thought the night

Q2)

As a 2-person group, after heavy deliberation, we decided on going with the Sunrise Lamp idea. If anything, a process of elimination was used to come up with the idea we'd most like to go with.

Q3)

Mind Map
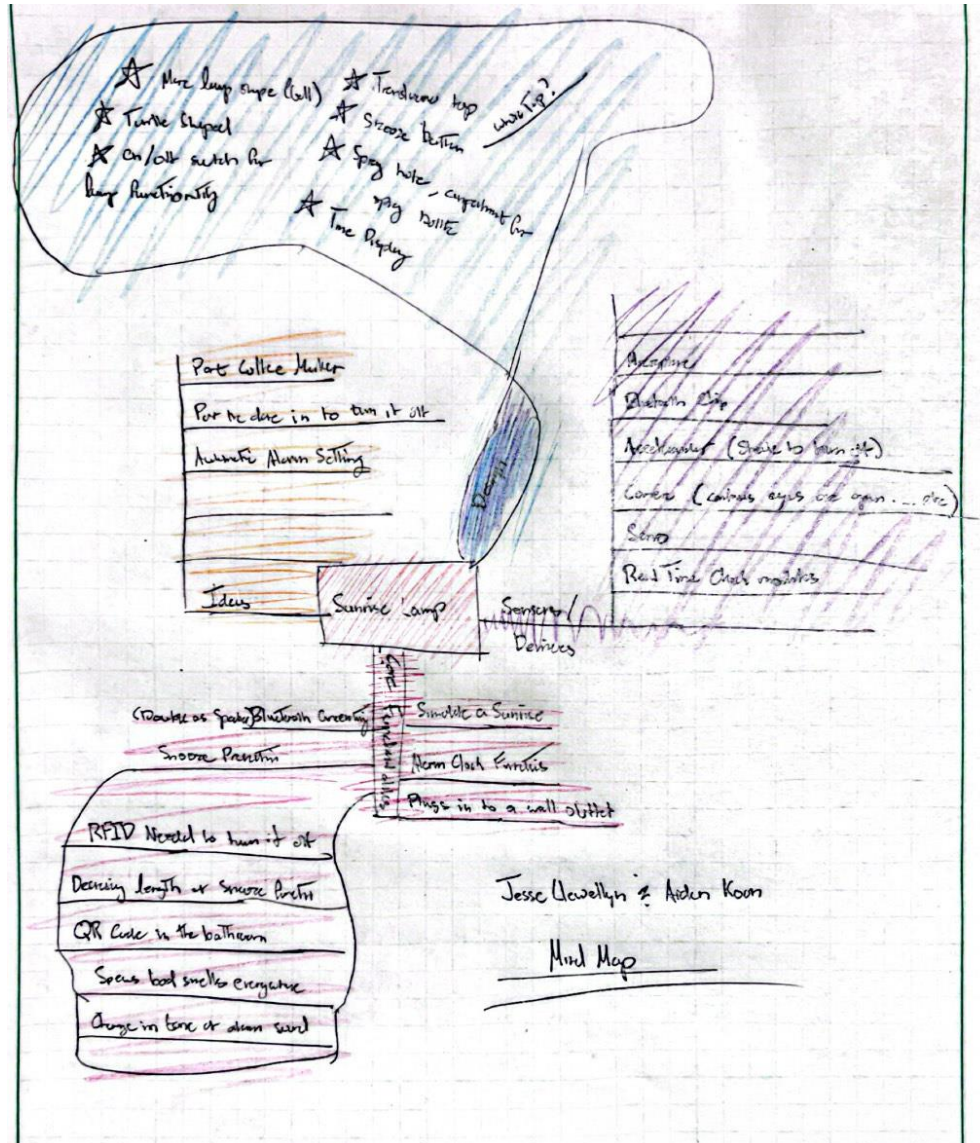
Homework 7 – Team   Questions 1-5

Q1)

People don't have enough reason to wake up because either they don't want to wake

up or they don't have the devices to wake up.

- Client- people that want to wake up but they cannot.

- Technology- led, servos, Arduino, wires, Bluetooth

- Constraints: cost effective, user-friendly

- Market: anyone who struggles waking up

Q2)

1. Public Health

> Sleep & Mental Health: Mimicking a natural sunrise, your lamp can regulate circadian rhythms, improving sleep quality and reducing insomnia, depression, and seasonal affective disorder (SAD).

> Reduced Eye Strain: Gradual, natural light awakening is gentler than harsh alarms, reducing stress on the eyes and nervous system.

2. Safety

> Safer Wake-Up: Unlike sudden alarms, a sunrise lamp helps people wake up more naturally, reducing grogginess and improving alertness (especially important for drivers or heavy machinery operators). Emergency Lighting: Some sunrise lamps include backup lighting features, which could be useful during power outages.

3. Welfare (Quality of Life)

> Accessibility: Helps those with visual impairments or sleep disorders by providing a non-auditory wake-up method. Work-Life Balance: Encourages healthier sleep routines, improving productivity and overall well-being.

Q3)

a.

Problem bugged me because I had to be somewhere but I didn't wake up. Different people responded to being low energy the whole day and stressed.

b.

        Students (Aiden Koon)

        Professor (Jesse Llewellyn)

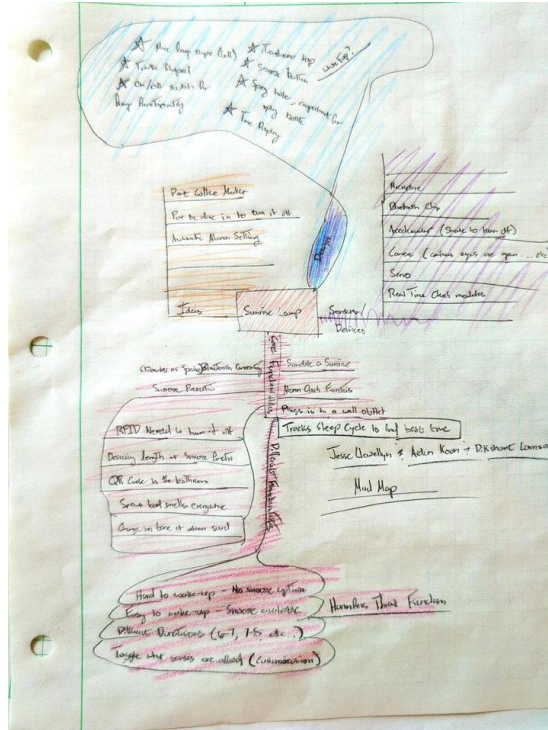   Staff (Dikshant Lamsal)

c.

-Sleep cycles (Aiden)

-Lighting for waking people up (Dikshant)

- Effective method of waking people (Jesse)

Q4) Step 3 of the IDEO process is to Visualize New-to-the-World Solutions.

a. See part C

b. Create a new mind map.

c. List all of your ideas for solving the problem

- Aroma Therapy

- Light with all types

- Different types of sound

- Feeling either in vibration or shock factor

- Removing snooze

- Off button away from away clock

Q5)

TO: DR. SWANBOM

FROM: AIDEN KOON, DIKSHANT LAMSAL, JESSE LLEWELLYN

DATE: APRIL 7, 2025

SUBJECT: HNRS 122 DESIGN TOPIC-

Poor sleep habits and ineffective waking methods are becoming a growing concern, particularly among students and professionals. Our team is designing a smart sunrise alarm system aimed at improving sleep quality and promoting healthier wake-up routines through light-based stimulation.

Our concept is rooted in public health, safety, and overall welfare. By mimicking a natural sunrise, the device helps regulate circadian rhythms, reduce insomnia, and lessen symptoms of seasonal affective disorder (SAD). Unlike traditional alarms, our system wakes users gradually, reducing eye strain and mental stress associated with abrupt sounds.

From a safety perspective, the device improves morning alertness, especially for individuals in high-responsibility roles such as drivers and machinery operators. It may also function as an emergency light source during power outages.

Regarding quality of life, the sunrise alarm is inclusive—helping individuals with visual impairments or sleep disorders. It encourages better sleep hygiene, promoting productivity and balance between personal and professional life.

While our initial idea uses LED lighting and timed brightness adjustments, we anticipate the final product will evolve as we apply the IDEO Design Process and explore user feedback, technology constraints, and market demands.

Signatures of Team Members:

AIDEN KOON   **DIKSHANT LAMSAL**

Aiden Koon   Dikshant Lamsal

JESSE LLEWELLYN

Jesse Llewellyn

Homework 9 – Team   Questions 1-5
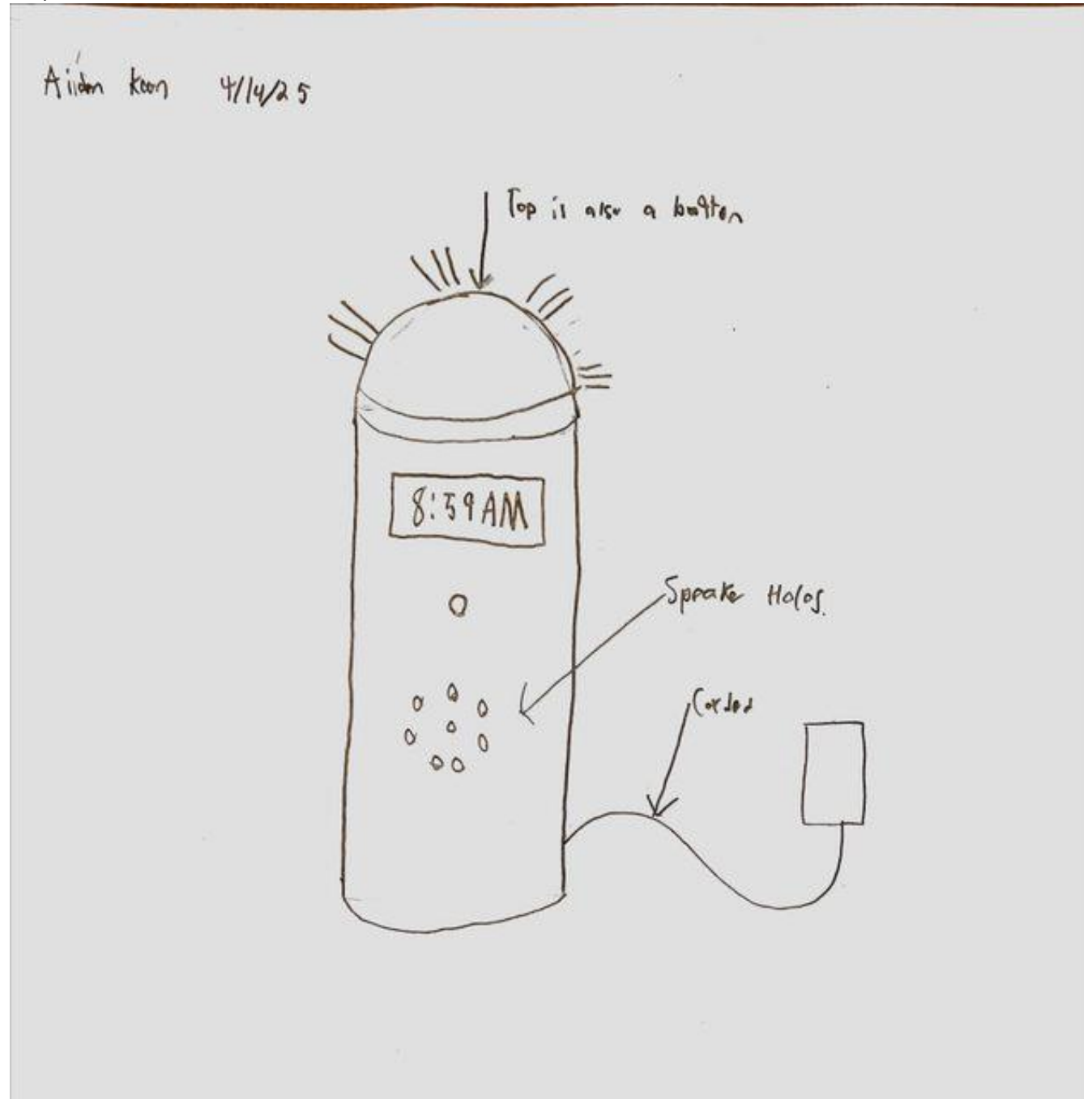
Q1)

(Contract at the end)

Q2)

1. Simulate a sunrise with light

2. RFID scan to turn it off in another room

3. Aromatherapy

4. (Anti-Aromatherapy)

5. Limit to amount of snoozes (gradual decrease) (adjustable)

6. Emergency Button

7. Change alarm sound

8. Bluetooth Speaker

9. Tracks sleep cycle

10. Shake to turn off

11.Can do either battery or wall plugged

12.Digital display
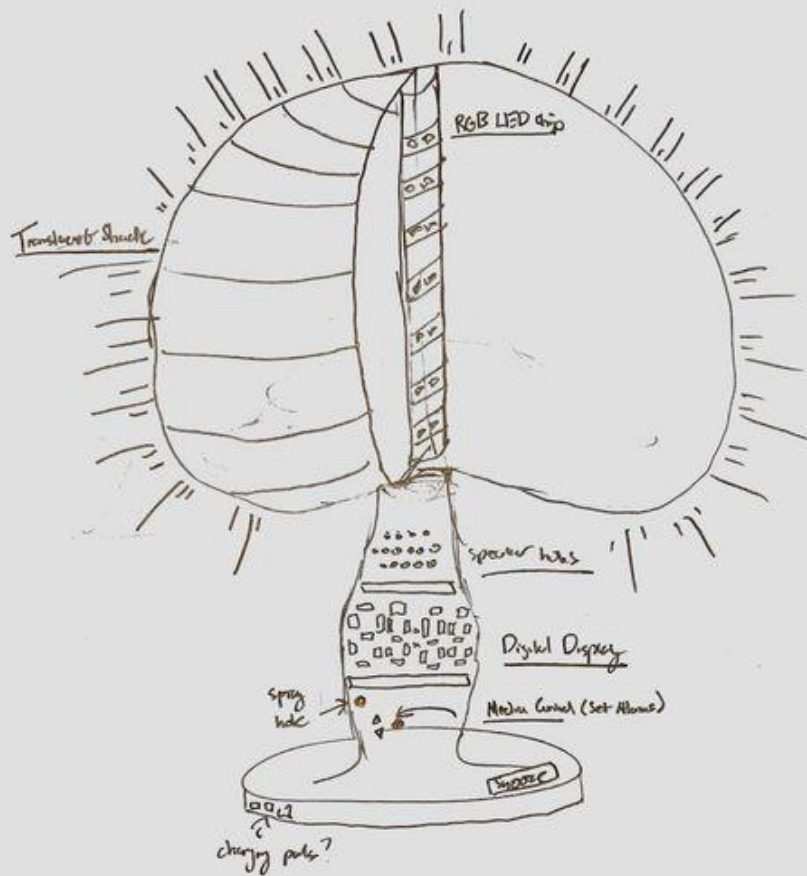
Aidan Likes 1, 3, 9, 10
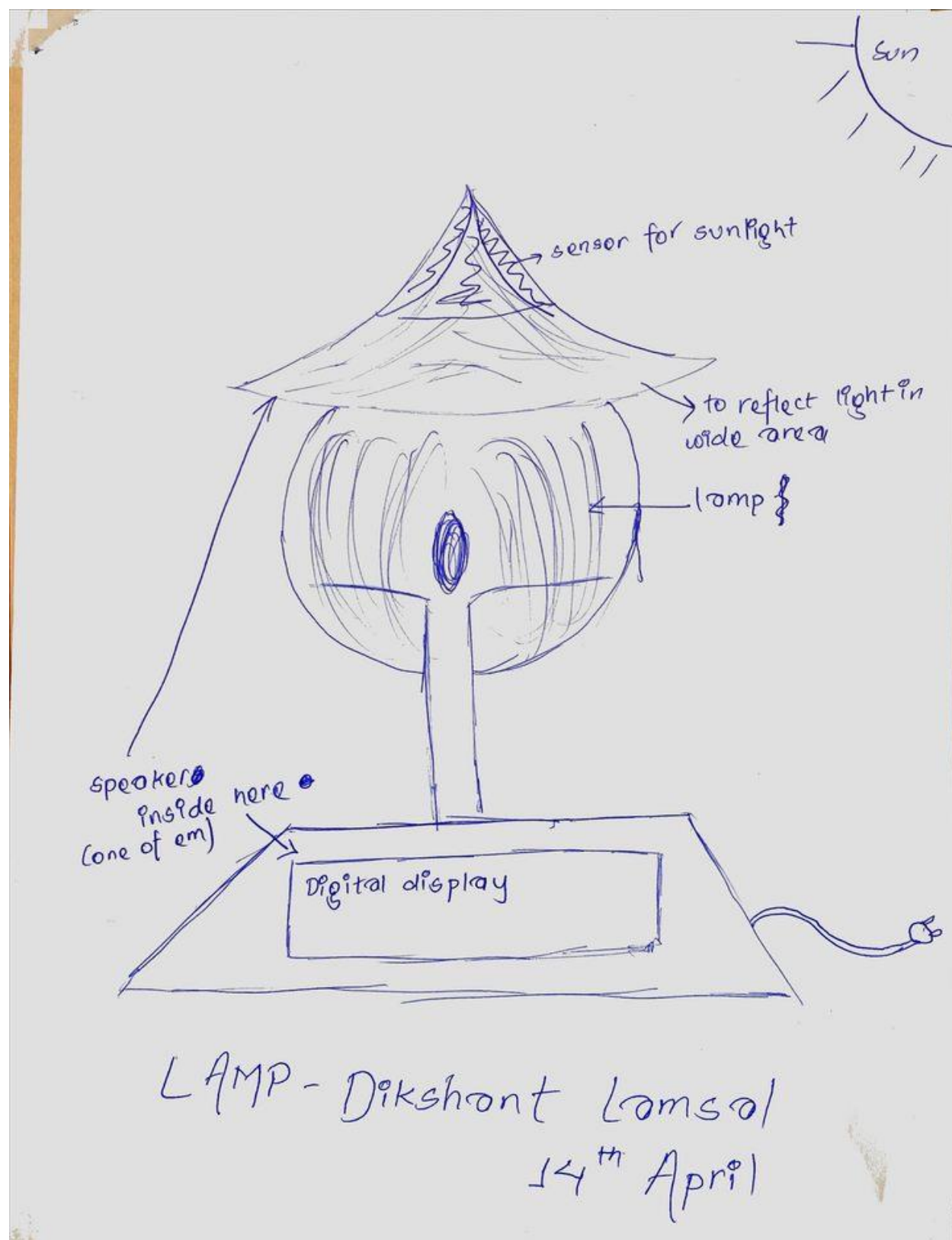
Dikshant Likes 1, 8, 11, 12

Jesse Likes 1, 3⁄4, 5, 12

Q3)

Aiden Koon   4/14/25

Top is also a button

8:59 AM

Speaker Holes

Corded

RGB LED strip

Translucent Shade

speaker holes

Digital Display

spray hole

Motion Control (Set Alarms)

SNOOZE

charging pads?

Sunrise Lamp — Jesse Llewellyn — 9/14/25

Sun

sensor for sunlight

to reflect light in wide area

lamp

speakers inside here (one of em)

Digital display

LAMP - Dikshant Lamsal
14th April

Q4)

Link to product compared against:

https://www.amazon.com/HAODINGMAI-Sunrise-Simulation-Machine-Atmosphere/dp/B0DBFHXK25?source=ps-sl-shoppingads-lpcontext&smid=AM3HFGZPASFHI&gQT=1

Criteria	Weight	Aiden	Dikshant	Jesse
Effectiveness	3	1	0	1
Looks	2	-1	1	1
User Friendliness	2	0	0	1
Features	2	0	-1	2
Score		1	0	11

Q5)

Prototype 1 Documentation:
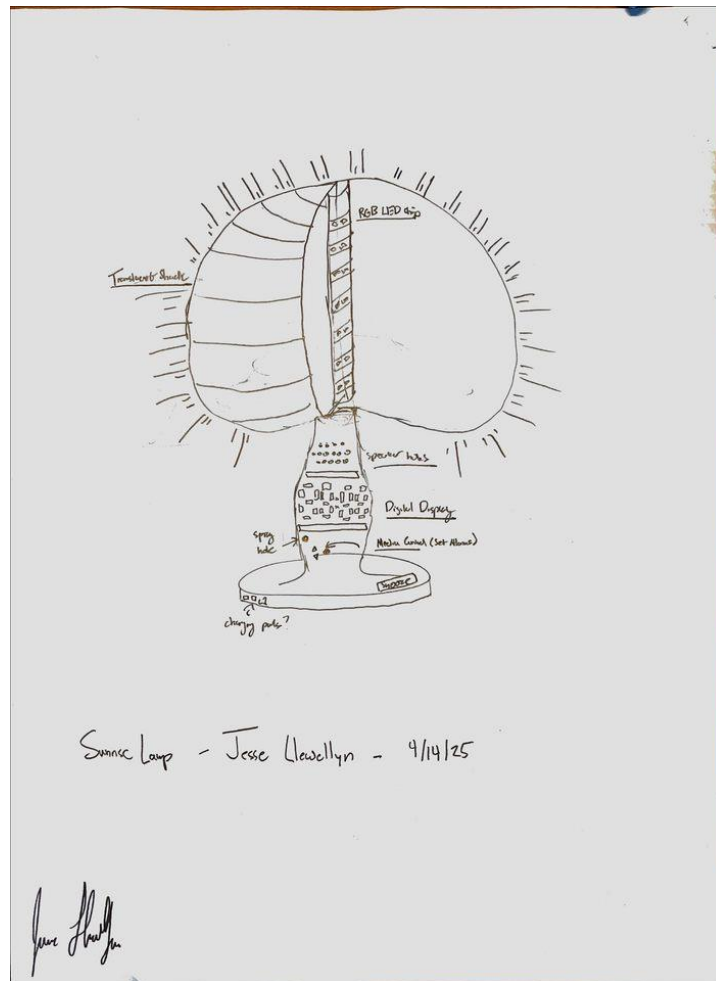
(Group Contract Here)

HNRS 122 Freshman Project "Senses Lamp"

Group Contract

Members:

Aiden Koon

Dikshant Lamsal

Jesse Llewellyn

Introduction:

In this contract, we intend to layout the responsibilities and duties associated with being a part of the HNRS 122 group "Alarm Lamp" (Name in progress). The point of this contract is to have, in a written format, the rules and regulations within our group.

The contents of this contract include:

1. Participation

2. Decision Making

3. Responsibility

4. Plagiarism

5. Leadership

6. Consequences

Participation:

Members of the HNRS 122 group are expected to actively participate in the planning and implementation of the group meetings. If a group member is under the assumption that they will not be able to attend one of the meetings and or they will be late for the meetings they have 3 hours to notify the rest of the group. This must be done through either the group me "HNRS 122 Freshman Project" or by a mass email with the subject line being "I'm

Sorry", unless extreme circumstances prevent them otherwise. Under the circumstances that 2 or more group members cannot attend the weekly meeting, the group can either reschedule or choose to attend. See consequences if these rules are not upheld.

Decision Making:

In the event that no one wants to uphold a particular task, group members will choose a color on the color wheel. This wheel will then be spun, and the loser will be given the task unless they're already overloaded with tasks. This does not apply when one member of the group is gone, they will automatically be assigned that task (unless extreme circumstances were demonstrated). Group decisions will be made by majority vote. This vote will be conducted as so:

1. Group leader counts to 3

2. On 3 all attending members will raise a thumbs up or thumbs down

In the event that a group decision is made into a tie (only possible if a group member does

not show up) the decision will be finalized by a 1 round game of rock paper scissors.

Responsibility:

Group members should have all assigned tasks completed no less than 8 hours before the due date. Once a group member has completed their portion of an assigned task, other members of the group should be notified through the group me titled "HNRS 122 Freshman Project" so it can be reviewed. If a group member is unable to complete their assigned portion of an assignment, they need to notify the other members of the group at least 24 hours before the due date so other plans can be made to complete the task. See consequences if these rules are not upheld.

Plagiarism:

Outside of this contract, plagiarism will not be tolerated on any assignment. See consequences if these rules are not upheld.

Leadership

Leadership will be a relaxed, open-discussion, democratic system with absolutely no tolerance for dictatorship. A primary meeting coordinator will be decided prior to meeting, no one can be group leader twice in a row. The coordinator will be responsible for overseeing the group meeting, making sure group members are on task. See consequences if these rules are not upheld.

Consequences

Consequences will be based on the rules outlined above. On every offence, the other group members are given the right to email and or talk to Dr. Swanbom about their concerns moving forward. This is not a way of getting them in trouble, unless Dr. Swanbom is on board, it's a way of documenting concerns for the future so that the professor is aware. There will be no exiling.

Signed: Phone:

_____Dikshant Lamsal_____3185121646_____

_____Aiden Koon_____3373498209_____

_____Jesse Llewellyn_____3373568175_____

Date:

_____4/14/25_____

Homework 10 – Team   Questions 1-3

Q1)

No Parts or Sensors will be borrowed from the university. All will be sourced by us.

Q2)

No Sensors Will Be Borrowed From The University					
Part:	Description:	Part Number:	Vendor:	Cost:	Expected
2x16 Serial LCD - backlit	Parallax Serial LCD that connecst via a single I/O pin, supports text wrapping, full cursor/display control, ASCII (32–127), and 8 custom characters	27977	Parallax	$ 35.00	Recieved
DHT11	Commonly used temperature and humidity sensor	DHT11	AdaFruit	$ 5.00	Recieved
Raspberry Pi Pico	Microcontroller w/ Bluetooth and Wireless Capabilities	5526	RaspberryPi	$ 7.00	Recieved
FEETECH FS90R Continuous Servo	Continuous Analog Servo compatible w/ Arduino	2820	FEETECH	$ 5.00	Recieved
WS2812B - RGB LED Strip	RGB LED strip compatible w/ Arduino and Rpi Pico	2305703	Amazon	$ 8.00	4/21/2025
Analog Joystick	Joystick w/ directional and button press capabilities	B0DQ37P5RQ	Amazon	$ 4.00	Recieved
3D Printer Filament	Filament for person 3D printer use	Unknown	Amazon	$ 15.00	Unknown
Tinned Copper Wire	Cut to size wire	Unknown	Amazon	$ 13.00	Recieved

Q3)

A: Sensor Name: 2x16 Serial LCD – backlit Vendor Website: https://www.parallax.com/product/parallax-2-x-16-serial-lcd-with-piezospeaker-backlit/ Datasheet: https://components101.com/sites/default/files/component_datasheet/16x2%20LCD%20Datasheet.pdf

Homework 11 – Team   Questions 1-2

Q1)

## Prototype 2 Documentation

For our second prototype, our team made significant progress in both the design and technical components of our project.

- **Circuitry Development:** Aiden worked on the sample circuitry of the project, testing different electronic components to ensure functionality and compatibility with the overall design of the lamp.
- **Mechanical Design:** Jesse collaborated with Dikshant to create a SolidWorks model of the base of the lamp. This model served as a visual and structural foundation for the physical prototype.
- **3D Printing Preparation:** The team made plans to begin 3D printing parts using Aiden's personal 3D printer. This step is crucial in bringing our SolidWorks designs into a tangible form and allows us to refine our parts for better fitting and functionality.
- **Project Evaluation:** As a group, we discussed current limitations of the project, such as structural stability, electronic integration, and material constraints. To tackle these issues effectively, we decided to temporarily divide tasks. Each team member focused on either hypothesizing solutions or gaining proficiency in specific technical areas needed for the project's success.

We will be showcasing Prototype 2 to our instructor and class, highlighting both the progress and challenges faced in the development process.
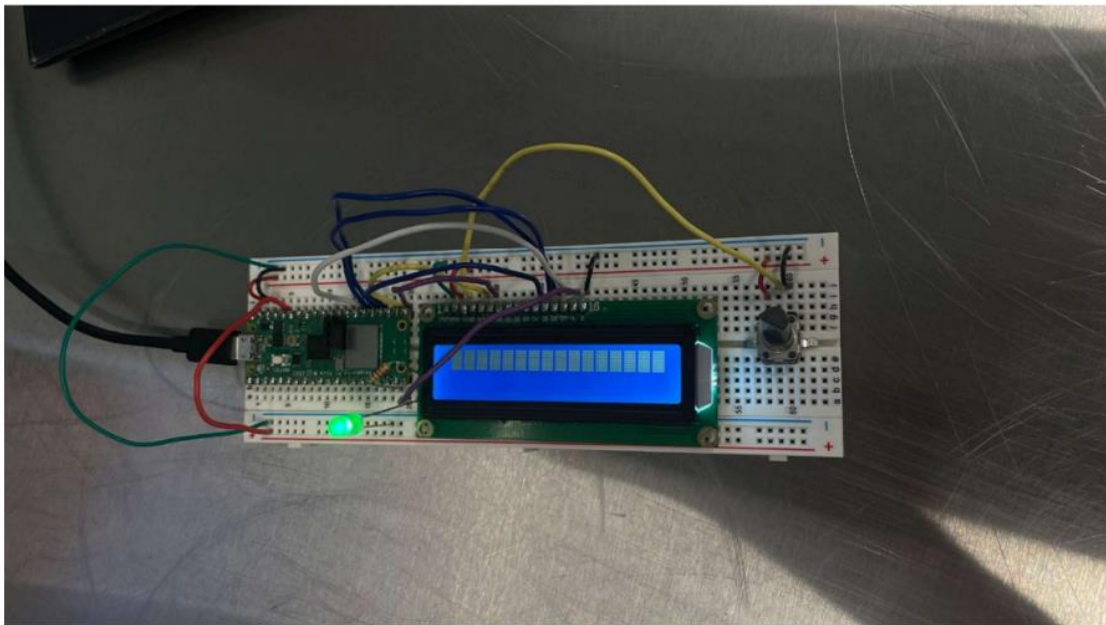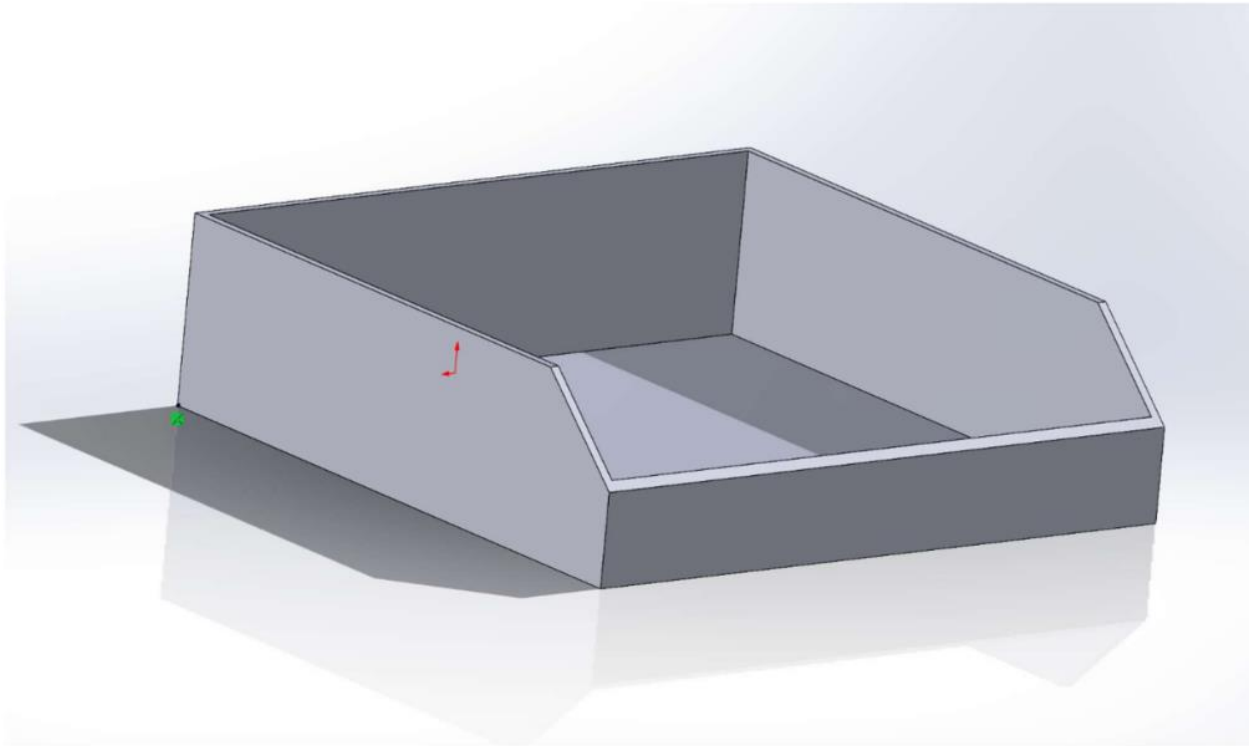
Q2)

- Able to build the base and neck of lamp (Dikshant Lamsal)

- Able to make LCD screen, speaker, switches, Bluetooth connection work as per our need (Aiden Koon)

- Complete design of lamp head and materials for aroma therapy (Jesse Llewellyn)

- Work on aroma therapy and rest of the work (Whole Group)

Homework 12 – Team   Questions 1-2

Q1)

Sensor/Device	Status	Comments
DHT11	b	Programming is completed, not yet implemented
WS2812B – RGB STRIP	b	Device Working, actual prototype doesn't have a place for it yet
Servo	a	Need to test limitations ASAP, program will not be hard.
Serial LCD	d	Programming is hard but works as intended
9V BB Header	d	Implemented and comes w/ USB out

Q2)

I had not used an lcd display in a while and was unsure if it worked or not. The bare minimum to test the lcd display is to just connect it to power, as well as the backlight LED and the contrast wheel. With no data, the display will show a test output of all spaces on the top and all squares on the bottom. This test passed successfully, and I was able to use a potentiometer to adjust the contrast of the lcd and test that the pixels on the display are working as intended

Homework 13 – Team   Questions 1-2

Q1)

Prototype 3 Documentation:

For our third prototype, our team achieved significant milestones in both the mechanical modeling and electronic programming aspects of the project.

- **SolidWorks Modeling Completion:** Jesse and Dikshant successfully completed the SolidWorks model of the lamp base. This finalized model incorporates all the necessary adjustments for stability and design precision, providing a strong structural foundation for the upcoming physical prototype.
- **Circuit Programming:** Aiden focused on advancing the electronic functionality by programming key components:

    o LED Functionality: The LED was successfully programmed, ensuring reliable lighting control according to the project's specifications.

    o Snooze Functionality: We implemented and tested the snooze feature, which allows the lamp to temporarily dim or turn off for a set period.

    o LCD Display: The LCD screen was integrated and programmed to display relevant information, enhancing the interactivity and usability of the lamp.

- **Team Coordination and Progress:** Our team worked collaboratively to ensure that both the mechanical and electrical parts are progressing in harmony. With the base model complete and major programming tasks accomplished, we are now better positioned to begin 3D printing and assembling a fully functional prototype.
- **Challenges and Next Steps:** While we have made great strides, minor challenges remain, particularly in synchronizing all programmed components smoothly. Our next focus will be on integrating the programmed electronics with the 3D-printed parts and performing comprehensive system testing to ensure reliability and durability.
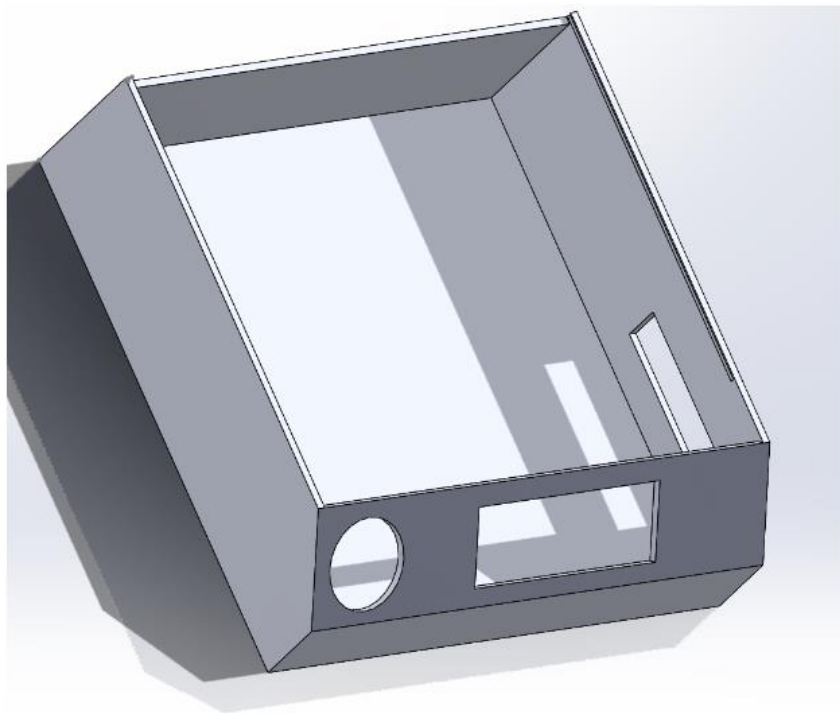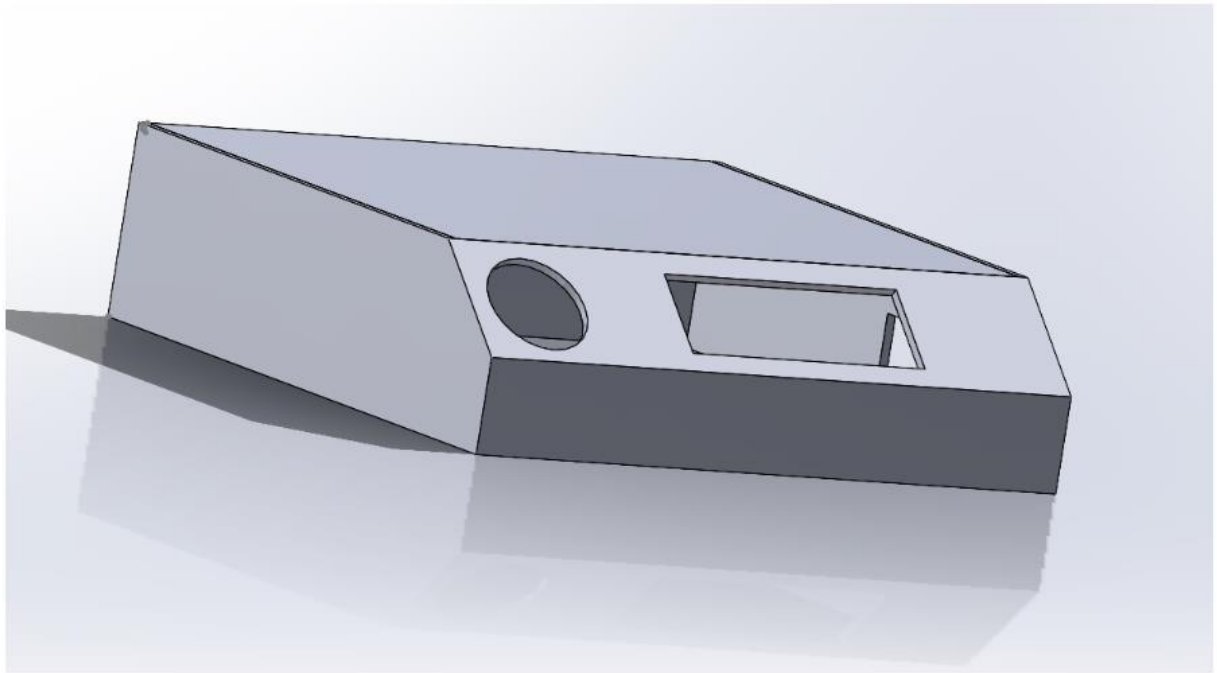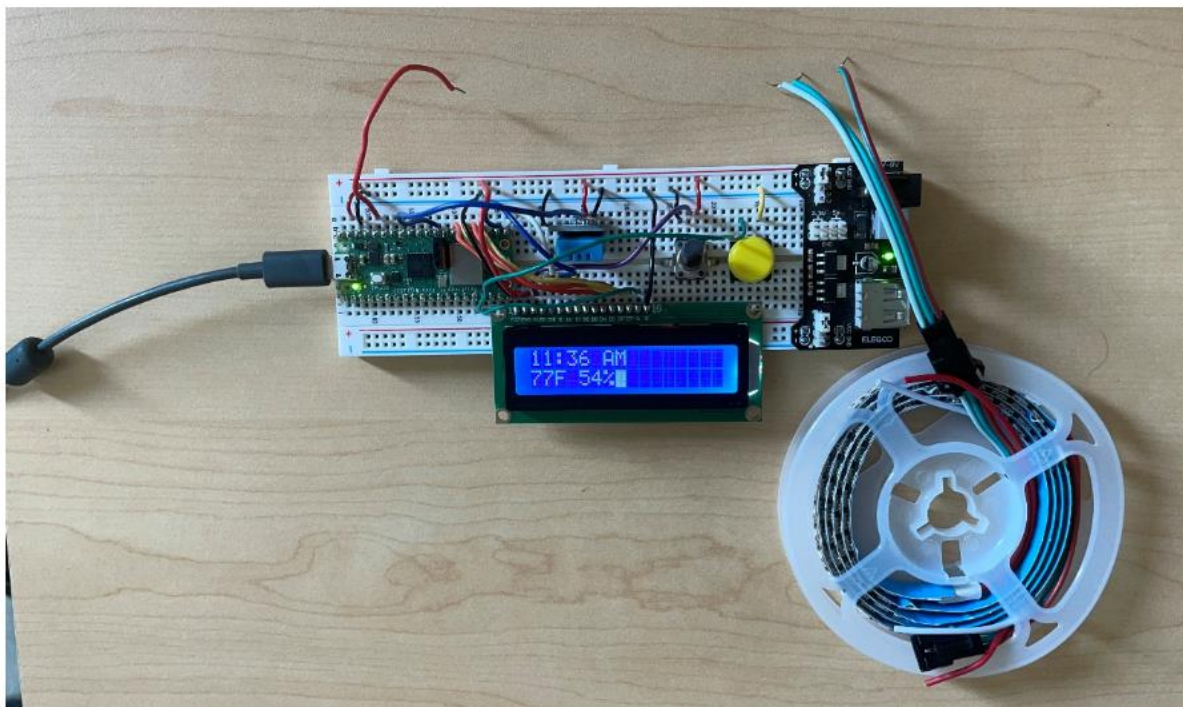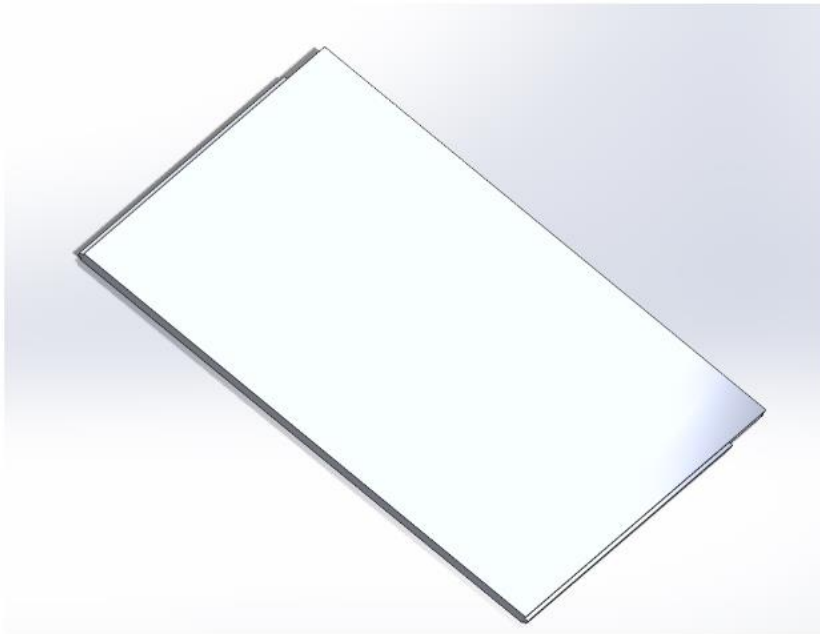
Q2)

The next step for our project is to begin 3D printing the finalized model of the lamp base and to design and develop the neck and head of the lamp. Our circuitry is approximately 80% complete, and the primary focus moving forward is to integrate all components—mechanical and electrical—into a fully functional prototype.

Three Attainable Goals:

1. 3D Print the Base

      o Assigned to: Aiden

2. Design and Model the Neck and Head in SolidWorks

      o Assigned to: Dikshant and Jesse

3. Finalize Circuit Integration and System Testing

      o Assigned to: Aiden

Final Product: