ECE 411
Andrew Greenberg
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Team 5 Make a Decision Assignment

Bucanan Howard, Daniyil Kashkan, Demetrius Van Sickle, Mohammed Alreshoud, and Wallace McKenzie

1. To choose a proper display for our project design, we use the Decision Matrix and Analytical Hierarchy Process (AHP) methodologies as tools to make a final decision based on the types of displays and desired characteristics.

2. Decision Matrix:

The matrix in **Figure 1** shows the comparison of five display options across six criteria: Brand Name, Cost, Safety, Design, Power Consumption, and Ease of Coding. Each option is rated and weighted to produce a final score.

		Medium 16x32 RGB LED matrix panel - 6mm Pitch (*Adafruit)*	**0.91 inch OLED I2C SSD1306 LED DC Display (*Arduino)***	**2.8" SPI TFT LCD Display Touch Panel ILI9341 240x320 (*XIITIA)***	**10x 8x8 LED matrix display (*EC Buying)***	**I2C IIC 1602 LCD Display Module 16x02 (*Hosyond)***
Brand-name	**1**	5	5	2	4	3
Cost	**3**	1	5	2	3	4
Safety	**2**	4	3	3	4	3
Design	**5**	4	3	4	4	4
Power Consumption	**4**	3	1	1	5	1
Ease of Coding	**5**	5	1	1	5	1
Score		73	50	43	86	50

Figure 1. Decision Matrix.

3. AHP:

The table in **Figure 2** shows pairwise comparisons among criteria to establish their relative importance, resulting in weights that reflect each criterion's priority in the decision process.

	Brand-name	Cost	Safety	Design	Power Consumption	Ease of Coding	Mean	Weight
Brand-name	1	7	1/9	2	1/2	1/2	0.9	0.12
Cost	1/7	1	2	2	1	1/9	0.6	0.09
Safety	9	1/2	1	2	1/2	2	1.4	0.21
Design	1/2	1/2	1/2	1	1/9	1/5	0.4	0.05
Power Consumption	2	1	2	9	1	1	1.8	0.26
Ease of Coding	2	9	1/2	5	1	1	1.9	0.27
Fraction values are in the Calc sheet								**1.00**

Figure 2. Analytical Hierarchy Process (AHP).

The expanded Decision Matrix in **Figure 3** evaluates each display option under each criterion using AHP pairwise comparisons, generating a ranking based on the weighted criteria.

		Medium 16x32 RGB LED matrix panel - 6mm Pitch (*Adafruit*)	0.91 inch OLED I2C SSD1306 LED DC Display (*Arduino*)	2.8" SPI TFT LCD Display Touch Panel ILI9341 240x320 (*XIITIA*)	10x 8x8 LED matrix display (*EC Buying*)	I2C IIC 1602 LCD Display Module 16x02 (*Hosyond*)
Brand-name	0.12	0.371	0.028	0.054	0.438	0.11
Cost	0.09	0.10	0.38	0.12	0.19	0.21
Safety	0.21	0.21	0.20	0.19	0.21	0.19
Design	0.05	0.22	0.44	0.15	0.09	0.11
Power Consumption	0.26	0.44	0.11	0.22	0.09	0.15
Ease of Coding	0.27	0.15	0.22	0.44	0.11	0.09
Score		**0.26**	**0.19**	**0.24**	**0.17**	**0.14**

Figure 3. Expanded Decision Matrix.

	Medium 16x32 RGB LED matrix panel - 6mm Pitch (*Adafruit)*	0.91 inch OLED I2C SSD1306 LED DC Display (*Arduino)*	2.8" SPI TFT LCD Display Touch Panel ILI9341 240x320 (*XIITIA)*	10x 8x8 LED matrix display (*EC Buying)*	I2C IIC 1602 LCD Display Module 16x02 (*Hosyond)*	Brand name rating
Medium 16x32 RGB LED matrix panel - 6mm Pitch (*Adafruit)*	1	7	5	1	7	0.371
0.91 inch OLED I2C SSD1306 LED DC Display (*Arduino)*	1/7	1.00	1/5	1/7	1/7	0.028
2.8" SPI TFT LCD Display Touch Panel ILI9341 240x320 (*XIITIA)*	1/5	5	1	1/9	1/5	0.054
10x 8x8 LED matrix display (*EC Buying)*	1	7	9	1	9	0.438
I2C IIC 1602 LCD Display Module 16x02 (*Hosyond)*	1/7	7	5	1/9	1	0.11

Figure 4. Finalized AHP based on the display options.

4. The results from the Decision Matrix and finalized AHP show that the **10x 8x8 LED matrix display (EC Buying)** is the preferred display option for our project. Thus, we got the same result from both the Decision Matrix and the AHP methodologies.

In evaluating the display options, we focused on six key criteria: Brand Name, Cost, Safety, Design, Power Consumption, and Ease of Coding, each weighted to fit our technical and project needs. **Brand Name** was considered for reliability and ease of support, but it held less weight than direct performance factors. **Cost** had a moderate weight, allowing us to stay within budget without sacrificing essential features. **Safety** took into account factors like durability and electrical protection, scoring higher for displays with added resilience. **Design** influenced the display's usability and fit within the project, with considerations for screen clarity, size, and ease of physical integration. **Power Consumption** was highly prioritized, as efficient power usage is essential for battery-operated projects, and alternatives were scored based on current draw and power-saving capabilities. **Ease of Coding** was weighted heavily, as it affects development time and integration reliability, so displays that offered robust libraries and compatibility with our programming environment scored higher. This balance of criteria helped us pick a display that meets both our technical requirements and practical constraints.

To come up with the tables, we followed the recommendations to use Google Sheets and insert the tables into a Google Doc. The Google Sheet tables can be found by following this link: https://docs.google.com/spreadsheets/d/1eQpPgmgjUxQAnvneXPUD6lUV1ERm-a3i-iPEuT672x0/edit?gid=0#gid=0.