EDD 104 – Engineering Communications II – Spring 2020

Section 42

Project 8: Mr. Roboto

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**Evaluation Matrix**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Design Candidate 1** | | **…** | **Design Candidate n** | |
| **Criteria** | **Weighting Factor** | **Numerical Value** | **Weighted Value** | **…** | **Numerical Value** | **Weighted Value** |
| Versatility | 0.20 |  |  | … |  |  |
| Manufacturability | 0.20 |  |  | … |  |  |
| Maintainability | 0.20 |  |  | … |  |  |
| Portability | 0.15 |  |  | … |  |  |
| Safety | 0.10 |  |  | … |  |  |
| Appearance | 0.10 |  |  | … |  |  |
| Cost | 0.05 |  |  | … |  |  |
| **Total** | 1.0 |  |  |  |  |  |

**Justifications for Evaluation Criteria**

…

**Requirements Structure**

**Project Requirements**

**Definitions**

**EDD:** Engineering Design Division

**Self-contained:** Is not connected to anything during normal use.

**Z-turn:** A turn with a zero-centimeter turn radius (turn about the Z-axis).

**Regular maintenance:** Electrical component failure.

**Switchable power source:** A power source that can be connected and disconnected.

**System Requirements**

[BOT 1.1] The robot shall be able to move unassisted across a linoleum floor

[BOT 1.2] The robot shall be **self-contained**

[BOT 1.3] The robot shall be rechargeable

[BOT 1.4] The robot shall be modular

[BOT 1.5] The robot shall use an Arduino

[BOT 1.6] The design of the robot shall use only existing tools in the **EDD**.

**Subsystem Requirements**

[FUN 2.1] The robot shall be capable of a **Z-turn**. {BOT 1.1}

The robot needs to navigate various mazes; therefore, it may be necessary to perform the tightest turn possible.

[FUN 2.2] The robot shall have variable speed control. {BOT 1.1}

To perform certain maneuvers, the ability to control the speed of the robot is critical.

[FUN 2.3] The robot shall be able to run for more than 2 hours when fully charged. {BOT 1.2}

The robot will need to function without being recharged for the duration of a 2-hour **EDD** lab.

[FUN 2.4] The robot shall be able to employ at least 3 different types of sensors. {BOT 1.4}

To complete different challenges, the robot will need different types of sensors.

[MAIN 2.1] The robot shall be assembled using standard hand tools. {BOT 1.6}

Standard hand tools are readily available in the **EDD**.

[MAIN 2.2] The robot shall be disassembled using standard hand tools. {BOT 1.6}

Standard hand tools are readily available in the **EDD**.

[MAIN 2.3] **Regular maintenance** shall be accomplished without the use of tools. {BOT 1.6}

To minimize the impact of robot maintenance.

[STR 2.1] The robot shall fit inside a 16x16x16 cm cube. {BOT 1.2}

This size criterion is needed due to storage, portability and maze size restrictions.

[STR 2.2] The robot shall provide secure mounting points for sensors. {BOT 1.4}

The sensors need to be secured to prevent interference or erroneous readings.

[STR 2.3] The robot shall protect onboard electronics. {BOT 1.5}

The possibility of current spikes needs to be considered when designing the robot.

[STR 2.4] All robot custom parts shall be 3D printable using a desktop FDM 3D printer. {BOT 1.6}

Any custom parts for the robot need to be created within the **EDD**.

[UI 2.1] The robot shall have a **switchable power source**. {BOT 1.3}

This is necessary to protect the power storage and extend the run time of the robot.

[UI 2.2] The robot shall allow for user input. {BOT 1.5}

To allow the user more control over the robot.

[UI 2.3] The robot shall allow the user to update the software without disassembly. {BOT 1.5}

To minimize the impact of robot software changes.