## **Chassis**

The following tables and justifications are the basis for the decision making process of selecting a suitable chassis for Roadie.

### **Items Under Consideration**

The following items have been considered for use as a chassis on Roadie. Each item has a unique product ID as well as the vendor and a short description of the product, as depicted in *Table 1*

|  |  |  |  |
| --- | --- | --- | --- |
| Item ID | Item Name | Vendor | Description |
| ROB-12866 | Magician Chassis | Sparkfun | Acrylic chassis with two gearmotors, two 65mm wheels and a rear caster. Pre-drilled mounting holes. An AA battery holder with barrel plug termination is included. |
| KIT660 | Build Your First Robot Chassis Kit | Budgetrobotics.com | Dual level chassis with wheel well cutouts for drive wheels. Includes mounts for two servos. |
| DG012 | DG012-Tank | Hobbyking | Square chassis made out of aluminum. It come with two 48:1 geared motors, an AA battery holder and pre-drilled mounting points. |
| Custom | Custom Chassis | N/A | Constructed to resemble a cargo container crane. Room for four drive motors. Attachment point for arm mounted high on chassis. |

Table 1: Chassis under consideration for Roadie

## **Decision Matrix**

The decision matrix used to select a chassis for Roadie is depicted in Table 2. The decision matrix weighs the. The highlighted row is the chassis selected for use on Roadie.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Factor | Surface Area | Adaptability | Availability | Cost | Total |
| Weight | 0.3 | 0.4 | 0.1 | 0.2 |  |
| ROB-12866 | 2 | 1 | 1 | 5 | 2.1 |
| KIT660 | 5 | 2 | 1 | 4 | 3.2 |
| DG012 | 3 | 1 | 1 | 1 | 1.6 |
| Custom | 5 | 5 | 5 | 2 | 4.4 |

Table 2: Decision matrix for chassis

The weighted matrix, or the matrix computed by multiplying the score in each category by its weight is show in Table 3. The total score for each item in the decision matrix (Table 2) is calculated by summing the values for each row in the weighted value matrix.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Factor | Surface Area | Adaptability | Availability | Cost |
| ROB-12866 | 0.6 | 0.4 | 0.1 | 1 |
| KIT660 | 1.5 | 0.8 | 0.1 | 0.8 |
| DG012 | 0.9 | 0.4 | 0.1 | 0.2 |
| Custom | 1.5 | 2 | 0.5 | 0.4 |

Table 3: Weighted value matrix. It is comprised of the score for each category multiplied by the weight for the category.

The weightings for the decision matrix were created by using the data in Table 4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Factor | Surface Area | Adaptability | Availability | Cost |
| ROB-12866 | 110 x 174 mm | Not very | In stock | $14.95 |
| KIT660 | 177.8 x 127 mm per deck (2 decks) | Moderately | In stock | $16.95 |
| DG012 | 157 x 149mm | Not very | In stock | $44.96 |
| Custom | Variable | Very | Available |  |

Table 4 Quantitative and qualitative values of the chassis under consideration that led to the decision matrix.

### **Justifications**

The following section represents the reasoning behind each category and how their weights were determined.

#### **Surface Area**

The surface area of the chassis is how much surface will be available to mount components to Roadie. Since there will be many circuit boards, wires, and other sorts of devices, having an abundance of surface area will be to our advantage. Chassis with the highest surface area, KIT660, received a score of five. The custom chassis received a score of five because its surface area will be greater than or equal to that of KIT660. DG012 had a surface area approximately half of KIT660, therefore its score is half of KIT600’s score rounded up. ROB-12866’s surface area was close to that of DG012, earning it a two, one less point than DG012.

Surface area was given a weight of 30% because the more surface area Roadie has, the more space will be available for mounting of critical systems. Mounting systems to a chassis with little surface area will prove difficult as space would become a premium with larger items.

#### **Adaptability**

Adaptability of the chassis pertains to how well the chassis will be able to cope with our design changes. Currently, Roadie is still in the prototyping process. As such, we are not sure how well our system design will function. This means that the chassis of Roadie will need to be able to easily change as our design changes. Chassis that provide the ability to move components around without major modifications received a score of five and a chassis that would essentially require the building or purchase of another received a score of one. Both the ROB-12866 and the DG012 scored ones because they are designed to work with certain motors and wheels. Therefore, these chassis are not very adaptable. The KIT660 scored a two because while it does not come with any servos or motors, the wheel well cutouts limit the wheels that can be used. The custom chassis is very adaptable since it can be easily modified as the system design changes.

Adaptability was given a weight of 40% since the adaptability of the chassis directly correlates to the ability to rapid prototype. A chassis that is designed with particular wheels and motors in mind is not as adaptable to change as a chassis that is built independent of wheels and motors.

#### **Availability**

The availability score for each item was obtained by scoring items on hand as a five, and items that need to be purchased as a one.

Availability was given a weight of 10% as it directly relates to the ability to prototype Roadie.

#### **Cost**

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Cost was given a weight of 20% as the cost of items are a very important factor in any budget, but not the most important consideration for this item.

<http://www.hobbyking.com/hobbyking/store/__44607__DG012_Tank_SV_Standard_Version_Multi_Chassis_Kit_with_Two_Rubber_Tracks.html>

<http://www.budgetrobotics.com/category/Chassis-Kits-161>

<https://www.sparkfun.com/products/12866>