Microcontroller

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

|  |  |  |
| --- | --- | --- |
| Item ID | Vendor | Description |
| UDOO Quad | UDOO |  |
|  |  |  |
|  |  |  |
| B009SQQF9C |  |  |

Decision Matrix

The microcontroller is one of the most essential part of any system, since the microcontroller is the brain of Roadie. The decision matrix used to select a microcontroller for Roadie is depicted in Table 2. The decision matrix weighs the processing power, RAM, cost, the community support for the microcontroller, the power consumption of the microcontroller, memory, size, Wi-Fi, and availability.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Factor | Processing Power | Memory | Cost | Community | Power Consumption | Ports | Wi-Fi | Availability | Total |
| Weight | 0.2 | 0.2 | 0.1 | 0.15 | 0.05 | 0.15 | 0.05 | 0.1 |  |
| UDOO Quad | 5 | 5 | 1 | 4 | 3 | 5 | 5 | 5 | 4.35 |
| BeagelBone Black Rev C | 5 | 5 | 3 | 2 | 4 | 4 | 1 | 1 | 3.55 |
| Arduino MEGA 2560 R-3 | 2 | 1 | 5 | 5 | 2 | 2 | 1 | 1 | 2.4 |
| Raspberry Pie Model B | 4 | 3 | 4 | 4 | 4 | 3 | 1 | 1 | 3.2 |

Justifications

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

Processing Power

The processing power of a microcontroller decides how long it will take for Roadie to decipher and react to certain events that happen during the competition. Since some of the challenges require to respond in a certain amount of time the microcontroller must have enough processing power to react in time.

|  |  |  |  |
| --- | --- | --- | --- |
| Factor | Clock Speed | Cores | RAM |
| UDOO Quad | 1 GHz | 4 | 4 GB |
| BeagelBone Black Rev C | 1 GHz | 1 | 4 GB |
| Arduino MEGA 2560 R-3 | 258 MHz | 1 | 128 kB |
| Raspberry Pie Model B | 700 MHz | 1 | 512 MB |

Processing Power was given a weight of 20% because the processing power is one of the most of the important parts of a microcontroller.

Memory

Memory is the combination of random access memory (RAM) and the on board memory that the microcontroller can store on board.

Cost

The values for cost for the microcontroller were based off the most expensive item being given a score of 1 and the least expensive item being given a score of 5. If the price of an item fell between $10 more or less of an item it will be given the same score as the item it fell between.

Cost was given a weight of 10% as the cost of items are a very import factor in any budget, but not the most important consideration for this item.

Community

The community score was based on the support of the community has towards example code online of different parts working with the microcontroller and insight the community members hold towards working with the microcontroller

The community was given a weight of 15% as it relates to how much help we will have when we run into problems or learn how to operate a piece of equipment with the microcontroller.

Power Consumption

The power consumption score for each item was obtained by taking the lowest recommend voltage the microcontroller should be powered as. So the higher the voltage need to run the microcontroller the lower the score it will receive.

Power consumption was given a weight of 5% as it relates to how many volts and amperage Roadie will need to run, but the power supply can be change relatively easily the power consumption was not weighted that high.

Wi-Fi

The Wi-Fi score for each item was obtained by if the microcontroller has Wi-Fi it was given a 5, and if the microcontroller did not have Wi-Fi it was given a 1.

Wi-Fi was given a weight of 5% as Wi-Fi is not required for Roadie to work, but would be nice to have for debugging purposes

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.

Ports

The Ports score for item was obtained by how many digital input and output pins the microcontroller has and how many other ports the microcontroller has, this could be HDMI, USB, Camera, SATA, or Ethernet ports.

Ports was given a weight of 15% as it directly relates to what hardware components we can use with Roadie.