**3.3 Requirements Specification**

Specifications are precise, unambiguous, measurable statements about what the product will do. They contain a metric and a value, and they specify behaviors, functions or attributes. They are the targets that the product must satisfy.

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| Marketing Requirements | Engineering Requirements | Justification |
| 1. | The battery should not drain faster than 1% per minute | Despite relatively short periods of use, the user should not experience a quick depletion of their battery while using this application. |
| 2. | The app should not take up more than 256MB of space on the hardware device. | The program will be designed to store most data on the hardware device, but will limit the space it takes up so that the user is not inconvenienced due to the large space demands of this program. |
| 3. | The processor of the hardware device should not be overly taxed by the program. | This is tied in with the battery use and the desire not to inconvenience the user with the application use. The program should not be developed in inefficient manners which are unkind to the user’s hardware. |
| 4. | The software should incorporate a drop down menu for room selection. | The user needs to be able to quickly and efficiently choose where they want to go. |
| 5. | The software should allow for change to the drop down menu through a csv file | The ability to rename the rooms they frequent regularly is an important function for ease of use. It is convenient to be able to rename rooms based on what you remember them for, rather than what their actual titles are. |
| 6. | The software needs to provide directions to the user using the “augmented reality” style. | This is the fundamental of the program. The program needs to show the user where they need to go and how to get there. The easiest method for the user is to show them the world and which direction they need to go through the camera. |
| 7. | Image referencing | The bare minimum software system using images to determine location and arrow directions. |
| 8. | Map Reference | The program needs to show the user a top down map of the area and the directions they will be taking. |
| 9. | Starting Location | The program uses a specific starting location to determine where the program sends the user. |
| 10. | Schedule Implementation\* | The schedule can optionally be implemented for the program to determine where the user needs to go and when they need to go there to create better ease of use. |
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| Marketing Requirements | Engineering Requirements | Justification |
| 1 | 1. The light wand length should be 30 – 50 cm. | Based on eye tests, a person with 100/20 vision can read something 363mm from 50m |
| 3 | 1. The whole product together should weigh less than 30 pounds. | The product needs to be relatively light. Something over 30 pounds is hard to lift over the head. |
| 1 | 1. There should be at least 30 LEDs on the wand | The image should be clearly read and understood, more detailed |
| 2 | 1. The product should have 1 hr run time and 4 months down time charge storage | A requirement given by the client |
| 4 | 1. The product should be able to run in temp. 30 -120 F. | The product should be operational within normal weather constraints. |
| 1 | 1. Max amount of rotational wiggle room < 1cm | The product should not be blurry or unstable because of wobbling |
| 1 | 1. The diameter of rotating arm should be from 40 - 45cm | The ratio of width to height should be 16:9 |
| 1-5 | 1. Production cost should not exceed $250 | Required by the client. |
| 3 | 1. The size of the disassembled product should not take up more than 30cm by 30 cm by 20cm. | The product should easily fit in a trunk of a car. Cars usually have at least 30cm height and 50cm by 50cm area in their trunk. |

Table 3.1 Marketing requirements

**Marketing Requirements:**

1. The device should generate an image that can be seen far away.

2. The device should provide adequate run time and charge storage capabilities.

3. The device should be moderately easy to carry and fit in a car trunk.

4. The device should be able to operate in typical outdoor temperatures.

**Discussion:**

The product’s engineering specifications are developed from the marketing requirements. They are attempts to fulfill the requirements using measurable values and justifiable, scientific reasons.

The first engineering requirement deals with creating a light wand that is big enough for the average person to see at 50 meters. There was research done into peoples’ eyesight and what defines a clear image.

The second engineering requirement has to do with the portability issue of weight. The weight value of 30 lbs is strictly an estimation of what someone is comfortable to carry a short distance or have to lift over their head.

The third engineering requirement pertains to creating an image with a high enough resolution to distinctly represent one character from another. A light wand with 30 LEDs is a good base number and can be improved fairly easily.

Engineering requirement 4 and 5 are constraints set by the client and both can be realistically achieved. The motor needed to rotate the armature does not need much torque and the rotational speed is reasonable. The temperature range requirement is reasonable for standard usage conditions.

For engineering requirement 6, the max rotational wiggle room of less than 1 cm is an educated guess. It is expected that there will be some uncertainty with each rotational motion being identical to the previous one.

Engineering requirement 7 deals with a desire to create an image with a 16:9 ratio. This would make it more pleasing to the eye and is what people are used to seeing.

For Engineering requirement 8 the budget was set by the client and all marketing requirements can be tied to staying within budget.

Engineering requirement 9 deals with the portability of the product and its ability to fit in the average car trunk in the disassembled state. These are not strict restrictions but should be understood that a small change in one dimension can make the difference between fitting in the trunk or not.

drop down menu