**PROJECT DELIVERABLE C:**

**DESIGN CRITERIA AND TARGET SPECIFICATIONS**

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**Introduction:**

 This document outlines design specifications for the JAMZ drone theft detection module, based on a list of client needs and their associated criteria which was developed in the previous deliverable. Technical benchmarking analysis was conducted and summarized. Based on the design criteria and benchmarking data target specifications were developed.

**Prioritized Client Needs:**

A table of previously identified client needs, and their associated design criteria.

**Table 1 - Interpreted client needs and their associated design criteria:**

|  |  |  |
| --- | --- | --- |
| **Rank** | **Interpreted Client Need** | **Design Criteria**  |
| **5** | Reporting of any deviation between the flight plan and the actual path | The module must be able to detect when the drone is deviating from the path and enter a state of alert |
| **4** | Location of the stolen/ Missing drone | GPS signal attached to the drone transmitting a direct signal to the operator |
| **5** | An alert system to notify others the drone has crashed/ is in the process of getting stolen  | A speaker, and lights to make it prominent the drone is not supposed to be in that position, whether it is crashed or getting stolen |
| **3** | Visual feedback for the operator  | A camera to allow the operator to understand the circumstances/ state of the drone  |
| **4** | Accurate data of the situation | Allow access to provide data back and forth between the operator and the drone. |
| **2** | User does not want to spend too much money on the device | The device is inexpensive |

**Benchmarking:**

After reviewing the client's needs, the group found multiple online webpages to find similar products to compare design features and user reactions. From the reviews, some features are more favourable than others by users. This data is taken into account for the overall design of the add on and future deliverables.

**Benchmarking of Other Designs:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Company** | **Sabre** | **Motorola** | **CNXIN** | **Bemagnificar** | **EMacros** |
| **Type of Alarm/Siren** | Handheld chain siren | Bolt WiFi Smart Safe with Remote Open Security Monitoring and Siren | HOT! 120db Power Cut Failure Outage Automatic Alarm Warn Siren LED Indicator | Solar Dummy Car Alarm LED Light, Simulated Imitation Security System Anti-Theft Flashing Blinking Lam | 1/2 Mile Solar Driveway Alarm System Wireless Long Range Outdoor Weather Resistant Motion Sensor & Detector- Driveway Alarms Wireless Outside Monitor & Protect |
| **Cost** | $8.43 | $179.00 | $20.99 | $13.88 | $149.99 |
| **Weight/Size** | 79.4mm x 25.4 mm x 12.7mm | * 2.89 lbs
 | * 10 x 5.3 x 2.5 cm
 | * 7.62 x 5.59 x 1.52 cm;
* 18 Grams
 | * 24.31 x 13.49 x 13.11 cm;
* 830 Grams
 |
| **Assembly Required** | No | No | No | No | Batteries required (included) |
| **Resistant** | Water-Resistant | Not fire resistant | Water-Resistant | Not fire or water-resistant | Slightly water resistant |
| **Activation****Requirements** | Pull chain | Proximity Alarm | Proximity Alarm, Power Cut | Solar Power, constant activation | A receiver, and sensor |
| **Lights** | No | No | Yes | Yes | Yes |
| **Noise** | Yes | Yes | Yes | No | Yes |
| **Can be modified to suit user’s needs** | Yes | Yes | Yes | Yes | Yes |
| **User Feedback/****Reviews** | Most customers are happy with the purchase as “Nice and loud to attract attention” - home depot customer. Many users also say that they “love the product” because it’s portable and gets the task done. | Hit or Miss. Customers either hate or love the product. One user from Amazon said “In 70 yrs this is the biggest piece of crap I’ve ever seen they should be ashamed to call it a safe.” while another stated “Great product, worth the money.” Many users like SOME features but have many difficulties operating it. | Many users like the product, but for some, it simply did not work. One Amazon user said “This doesn’t work. Garbage” while another said “Alarm is very loud.. GOOD !!” among many others. Users liked that the product was loud and had the capability to get a lot of attention but some users simply could not charge the product. | Most customers don’t think the product has good durability. The alarm is not an actual alarm, but rather a simulated LED light that makes it appear that there is one. Super bright, and makes people keep their distance when it is working.  | Many users have used this product in large properties, and report that the product fulfils it’s intended use well. It detects people at the range specified (half a mile), and is capable of detecting many different objects or persons. |

**User Perception:**

The expensive alarm systems are priced over a hundred dollars, tend to have more mixed results. They show that high prices of these products tended to cause more scrutiny from the customers. Along with this, the more expensive products tend to have more high tech and somewhat more experimental devices. The motion sensors can be quite faulty at times because of false activation or not working at all. However, they tend to be extremely effective in being able to sense unwanted company from a distance away.

The solar-powered LED alarm is bright, but it does not emit sound and is fragile. Additional concerns for the drone using this type of alarm is that the bright lights can be activated outside and may cause some traffic issues. The CNXIN has both lights and sound that it emits, which could cause some complexities with hooking it up to the drone properly. Finally, the Sabre alarm is most well-liked, with very few complaints, while it is simple, it is loud and portable.

**Target Specifications:**

Based on the findings, the team has finalized the following target specifications:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Target Specifications**  | **Relation** | **Value** | **Units** | **Verification Method** |
| **Rank** | **Functional Requirements** |  |  |  |  |
| 1 | Path deviation Detection System | = | yes | N/A | Test |
| 5 | Emergency Lights | = | yes | N/A | Test |
| 4 | Emergency Speaker System  | = | yes | N/A | Test |
| 3 | Operator Interface | = | yes | N/A | Test  |
| 3 | Automated Alert Activation | = | yes | N/A | Test |
| 6 | Security From Outside Interference | = | yes | N/A | Test |
| 2 | Ability to Transfer Data to Drone and Operator | = | yes | N/A | Test |
|  | **Constraints**  |  |  |  |  |
| 1 | Weight  | < | 1000 | Grams (g) | Analysis |
| 3 | Cost  | < | 35 | CAD | Estimate, Analysis |
| 2 | Size (LxWxH in) | < | 8x6x4 | Inches(In) | Analysis |
| 4 | Operating Altitude | > | 1000 | ft | Analysis |
| 5 | Operating Temperature | > | 0 | ℃ | Test |
| 6 | Operating Humidity | < | 99 | % Humidity | Test  |
|  | **Non-Functional Requirements**  |  |  |  |  |
| 3 | Easily Swapped | < | 5 | Time (minutes) | Analysis, Test  |
| 1 | Easily Accessible | < | 1 | Time (minutes) | Analysis, Test  |
| 2 | Easily Manufactured | < | 1 | Time (Days) | Analysis, Test  |

**References:**

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MOTOROLA Bolt WiFi Smart Safe with Remote Open Security Monitoring and Siren. (n.d). Retrieved January 31, 2021, from <https://www.homedepot.ca/product/motorola-bolt-wifi-smart-safe-with-remote-open-security-monitoring-and-siren-black/1001529749>

CNXIN Hot! Power Cut Failure Outage Automatic Alarm Warn Siren LED Indicator. (n.d). Retrieved January 31, 2021, from <https://www.newegg.ca/p/0ZK-08UH-0FY52?Description=siren&cm_re=siren-_-9SIAN8UC9B5464-_-Product>

1/2 mile long range Solar Wireless Driveway ALARM outdoor weather Resistant motion sensor & DETECTOR-NO Diy security alert SYSTEM-MONITOR & PROTECT OUTSIDE Property, No need to replace the battery. (n.d.). Retrieved February 07, 2021, from <https://www.amazon.ca/Wireless-Resistant-Detector-NO-System-Monitor-Property%C2%A3%C2%ACNo/dp/B07L3TFM2G?th=1>

Fake solar car Alarm Lamp security system Warning Theft FLASH BLINKING Anti-theft CAUTION led Light 1PCS Red (Blue), alarm systems - Amazon Canada. (n.d.). Retrieved February 07, 2021, from <https://www.amazon.ca/Security-Warning-Blinking-Anti-Theft-Caution/dp/B07JVLFH1R>

**Appendix**:

Figure 1 - Wrike Schedule

