**Project Deliverable C: Design Criteria and Target Specifications**

***GNG1103 [D03] – Professor David Knox***

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# **Introduction**

Based on the list of needs and problem statements that were developed in the previous deliverable Team 13 developed a list of design criteria, metrics, target specifications, and completed benchmarking against similar products. The design criteria, metrics, target specifications, and benchmarking will all aid Team 13 in future in their concept generation for future deliverables, as they provide specific qualifications for a successful product.

# **Design Criteria**

|  |  |  |
| --- | --- | --- |
| **#** | **Need** | **Design Criteria** |
| 1 | Handling Food   * Accelerometer | * Accelerometer to track 6 DoF |
| 2 | Climate sensor   * Temperature monitoring of packaging and surroundings. | * Live sensors relaying back info on the temperature and or humidity of the package(food) to determine if it is going rotten. |
| 3 | Location   * How to get to locations fast and effective | * Give clients real time delivery to see where the drone is. * Organize deliveries where if there are packages to cities close to each other the drone will deliver in an orderly fashion. |
| 4 | Anti-theft system   * System where it prevents damage to drone * To track and prevent theft of the drone. | * Navigation system to ensure that the drone is on course and will alert the headquarters of any tampering or if the drone veers of course. * Beacon to send the last known location of the landed drone. * Monitor unexpected changes in the speed, elevation, and direction of travel of the drone. |
| 5 | Emergency Beacon | * Speakers announce to individuals that this is the property of JAMZ and that it mustn't be touched. * Alerts nearby Operator of the drones last known position and * Relays information about the situation of the drone to headquarters through antenna devices. |

*Table 1: Design Criteria*

# **Metrics**

|  |  |
| --- | --- |
| **Metrics** | **Units** |
| Mass | kg |
| Volume | m3 |
| Temperature sensor(measure climate) | ℃ |
| Cost | Canadian Dollars($CAD) |
| Altimeter(measure altitude) | ft |
| Accelerometer (6 DoF Sensor) | m/s2 |
| Humidity | g.kg^-1 |
| Distance | m |
| Time | Min |
| Speaker for anti-theft system | dB |
| Power | Volts |

*Table 2: Metrics*

# **Target Specifications**

A list of target specifications for the final product was developed based on information gathered from both the requirements and needs identified during the client meeting as well as benchmarking of products with similar applications.

|  |  |  |  |
| --- | --- | --- | --- |
| Metric | Constraint | Value | Units |
| Cost | ≤ | 50 | Canadian $ |
| Time to Complete | ≤ | 47 | Days |
| Mass | ≤ | 1 | kg |
| Temperature Sensor Accuracy | +/- | 1 | Degrees Celcius |
| Humidity Sensor Accuracy | +/- | 1 | Percent |
| Size | ≤ | 4x3x2 | Inches(LxWxH) |
| People for Assembly | = | 1 | Person |
| Maximum Speaker Volume | ~ | 80 | Decibels |
| Required Voltage | = | 5 or 3.3 | Volts |
| Power Draw | < | 5 | Amps |
| Tube Attachment Diameter | = | 25 | Millimeters |
| Operating Altitude | ~ | 200 | Feet |
| Operating Temperature | = | -5 >< 25 | Degrees |
| Cargo Hookup | < | 60 | Seconds |
| Cargo Removal | = | 10 | Seconds |
| Comms Protocol | = | UART | N/A |
| Climate Sensor Location | = | In Payload | N/A |
| Fall Resistance | >= | 200 | Foot fall by Parachute |

*Table 3: Target Specification*

# **Benchmarking**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Company | Drone Delivery Canada | Zipline | Jamz | Prime air |
| Payload Weight | 4.5 kg | 1.75 kg | 10-15 kg | 2.27 kg |
| Delivery Time | 25 min or less | 45 min or less | 15 min or less | 30 min or less |
| Range (distance (km) or time (min)) | 30 km | 80 km | 15 min | 24 km |
| Delivery Fee | Unable to find | $14.27 | Not given | Included with monthly amazon prime subscription |

*Table 4: Benchmarking*

# **Conclusion**

Team 13 developed the design criteria, metrics, benchmarked, and developed target specifications using the needs identification and problem statement that were completed in the previous deliverable. The design criteria, benchmarking, metrics, and target specification will be integral in guiding team 13 in the ideation phase of the project. Team 13 continues to update their Wrike ensuring that it is up to date and has the next 2 weeks planned out.

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