Tyler Hight

2/19/24

3182284344

[highttyler@gmail.com](mailto:highttyler@gmail.com)

Project Repository:

<https://github.com/TylerHight/Que-Device/tree/main>

**Que Kickoff Summary and Discussion**

**Introduction**

This document outlines initial concerns and considerations for the Que Aromatherapy Project. It covers various aspects of the project, including a general project plan, responsibilities, goals, documentation, new design ideas, and proof-of-concept for the pendant size.

**Project Phases and Responsibilities**

1. **Initial Research and Planning**

* **Planning:** Define project scope, goals, and requirements.
  + Is a remote necessary, or will there only be an app for a means of control?
  + Buttons and LED on pendant?
  + Look into HIPPA and data gathering with app?
* **Research:** Research and identify the best parts to start with by contacting engineering salespeople. Ensure that parts are safe and comply with appropriate regulations and standards.
  + Use decision matrices to assist with comparing parts
* **Ordering:** Order initial components.

1. **Initial Prototype Design and Development**

* **Iterative Prototyping:** Conduct iterative prototyping and testing of pendant components.
  + Use Arduino Nano BLE to finalize electrical components, then transfer to PCB in second prototyping stage.
* **Initial PCB Consultation:** Obtain initial information about the PCB necessary for early prototyping steps.
  + Estimate power draw from the PCB
  + Estimate form factor of PCB
  + Determine firmware language
* **Initial Pendant Design:** Design aesthetically pleasing, durable, protective, and manufacturable pendant enclosures.
  + Design emission structures and choose battery before shaping PCB.
* **Manufacturability:** Preliminary consultation with manufacturers to optimize design for cost-effective production.
* **Order PCB:** After completing all the previous steps, order the plans for the PCB and get a few produced.

1. **Advanced Prototype Design and Development**

* **Advanced Pendant Prototyping:** Assemble pendant with all components, including PCB. Make iterative design revisions as necessary.
  + Ensure safety and compliance with regulations and standards.
* **Firmware:** Develop and test firmware for device control and communication.
* **Mobile App:** Develop and test mobile app for user settings and control.
  + Incorporate unit and regression testing during app development.

1. **Comprehensive Testing**
   * **Finalize Prototype:** After some finalizing iterative design revisions of the pendant with the PCB, consult with manufacturers with a prototype nearing completion prior to final rigorous testing.
   * **Statistical Testing:** Establish meticulous testing methodology based on statistical analysis to ensure product reliability.
   * **Mobile app testing:** Conduct thorough automated and user testing of mobile app to ensure ease-of-use and reliability.
   * **User feedback:** Incorporate feedback from multiple users to improve the design of device and app.
2. **Manufacturing and Production**

* **Finalize prototype:** Consult with manufacturers with an advanced prototype to finalize design for cost-effective production.
* **Manufacture device:** Create/obtain files necessary for manufacturing and get the device professionally manufactured.
* **Testing:** Thoroughly test the manufactured device.

1. **Deployment and Support**
   * **Beta testing:** Distribute the device and app to a small number of users.
   * **Support and maintenance:** Provide support and maintenance services for initial users of the device.
   * **Performance monitoring and improvement:** Record issues and make necessary improvements to the device and app.
2. **Wide-scale deployment**
   * Perform necessary measures to bring the product to market.

**Documentation**

* All documents and code will be regularly uploaded to GitHub.
* Plans and past progress will be recorded in regular A3 reports, with a minimum frequency of 2 weeks.
* Purchases will be kept on an Excel sheet and receipts will be recorded.
* A design document will be regularly updated with the most current design.

**New Design Ideas**

* TPU cover for child pendant (non-toxic, flexible, and durable; may withstand chewing)

A hand holding a black water bottle

Description automatically generated

* Non-electric valves/flaps/etc that open from air pressure generated by pump/fan/etc
* Custom form-factor PCB

**Proof-of-concept**

This layout is non-functional and only to prove that the required components for the pendant can fit within a relatively small enclosure. For the pendant to be functional, additional size would not be required; instead, merely a rearrangement and improvement of the internal structures, including the addition of support brackets and better isolation of the wick enclosures to prevent scent leakage. Moving the wick drawers to the side would prevent overlapping with the battery. This pendant has an approximate height of 1.5”, length of 3.4”, and width of 0.8”. The Arduino Nano is for early prototyping purposes only and is larger than what the actual PCB will be. Depending on the future power requirements of the device, the battery may also be reduced in size.

A black device with white text

Description automatically generated with medium confidence

A black device with numbers and lines

Description automatically generated with medium confidence

A screen shot of a computer

Description automatically generated

**Estimate of Expenses**

Below is an estimate of expenses for the project. Note that this estimate lacks a high level of accuracy because some expenses require consultation for a more accurate price. The price for professional manufacturing for a small batch of the final prototype is also left blank.

|  |  |
| --- | --- |
|  | Cost ($) |
| PCB Design | 400 |
| PCB Fabrication (10) (estimate) | 250 |
| Manufacturability Consultation (2) (estimate) | 400 |
| Other prototype parts | 500 |
| Small batch manufacturing of device |  |
| Factor of Safety | 1000 |
| Total | 2550 |