Aviator Design Document

David Thoe, Joshua Kim, Zeke Ulrich, Juan Vargas

September 18, 2025

GTA: Zixiao Ma
Professor: Ryan Beasley

Figure 0.0.1: [Caption]

Contents

List of Figures

List of Tables

Revision Log

Date	Revision	Changes
5/3/2024	v0.1	Initial Release
[Copy]	[and]	[Replace]

Table 1: Revision Log

Glossary

- **3D audio technology** Simulation that creates the illusion of sound sources placed anywhere in 3 dimensional space, including behind, above or below the listener.
- **API** Application Programming Interface.

1 Introduction

1.1 Executive Description

Retro nearby flight information display.

1.2 User Stories

User Story 1 – The Long-Time Aviation Hobbyist As a long-time aviation hobbyist who has spent years tracking flights through phone apps, I'm tired of paying for subscriptions just to unlock basic features. I want a device that gives me real-time flight information without hidden costs, while also providing a tactile, nostalgic experience that reminds me of classic aviation boards. By having the Aviator on my desk, I can finally stay connected to the aviation world without feeling like I'm paying a premium for something that should be standard and accessible. User Story 2 – The Casual Aviation Enthusiast As someone with a general interest in aviation, I don't need a full cockpit-level tracker, but I do want something that feels engaging and easy to use. Standard apps are flat, cluttered, and frankly too much for a novice like myself, but the Aviator project makes flight tracking simple, physical, and fun. I can glance at the board, see arrivals and departures, and feel connected to the aviation scene effortlessly. The setup process was simply plug and play. Additionally, I don't have to pay a dime for the product. For me, it's about accessibility and enjoying aviation in a personal,low-effort, high-impact way. User Story 3 – The Purdue ECE Student As a Purdue ECE student, I'm drawn to the Aviator not only as a hobby project that I can tinker with, but also as a nod to Purdue's deep aviation legacy. It's inspiring to own a piece of tech that bridges my academic interests in circuits and embedded systems with Purdue's reputation in aerospace. I want a tracker that feels hands-on, customizable, and personal—something that makes me feel part of both my field of study and Purdue's aviation history every time I glance at it. Given the nature of the project and its ability to be completed by an individual excites me, as it gives me the stepping stone I needed to start tracking flights.

2 Design Requirements

2.1 Requirements

1. The display must not interfere with user's well-being by, for example, displaying at excessive luminosity, updating rapidly in a distracting manner, or being excessively bulky.
2. The device must not infringe on any person's reasonable expectation of privacy.
3. The device must be language-agnostic wherever possible.
4. Once assembled, the device cannot presuppose experience with electrical or computer engineering. The device must be responsive and intuitive.
5. The physical device should be easily replicated with widely available parts.
6. The code for the device must be open-source and well-documented.
7. The device should be as durable and environmentally friendly as possible so as not to contribute to e-waste.
8. The device must not contribute to noise or visual pollution of any space.
9. The device must be energy-efficient.
10. The device must minimize construction and recurring costs.
11. The device must not infringe on right to repair.

2.2 Factors Influencing Requirements

2.2.1 Public Health, Safety, and Welfare

1. User well-being
2. Privacy

2.2.2 Cultural Factors

1. Language differences
2. Ease of use

2.2.3 Social Factors

1. Ease of replication
2. Open-source and documentation

2.2.4 Environmental Factors

1. Environmental friendliness and e-waste
2. Noise and visual pollution
3. Energy efficiency

2.2.5 Economic Factors

1. Cost
2. Repairability

3 System Overview

3.1 System Block Diagram

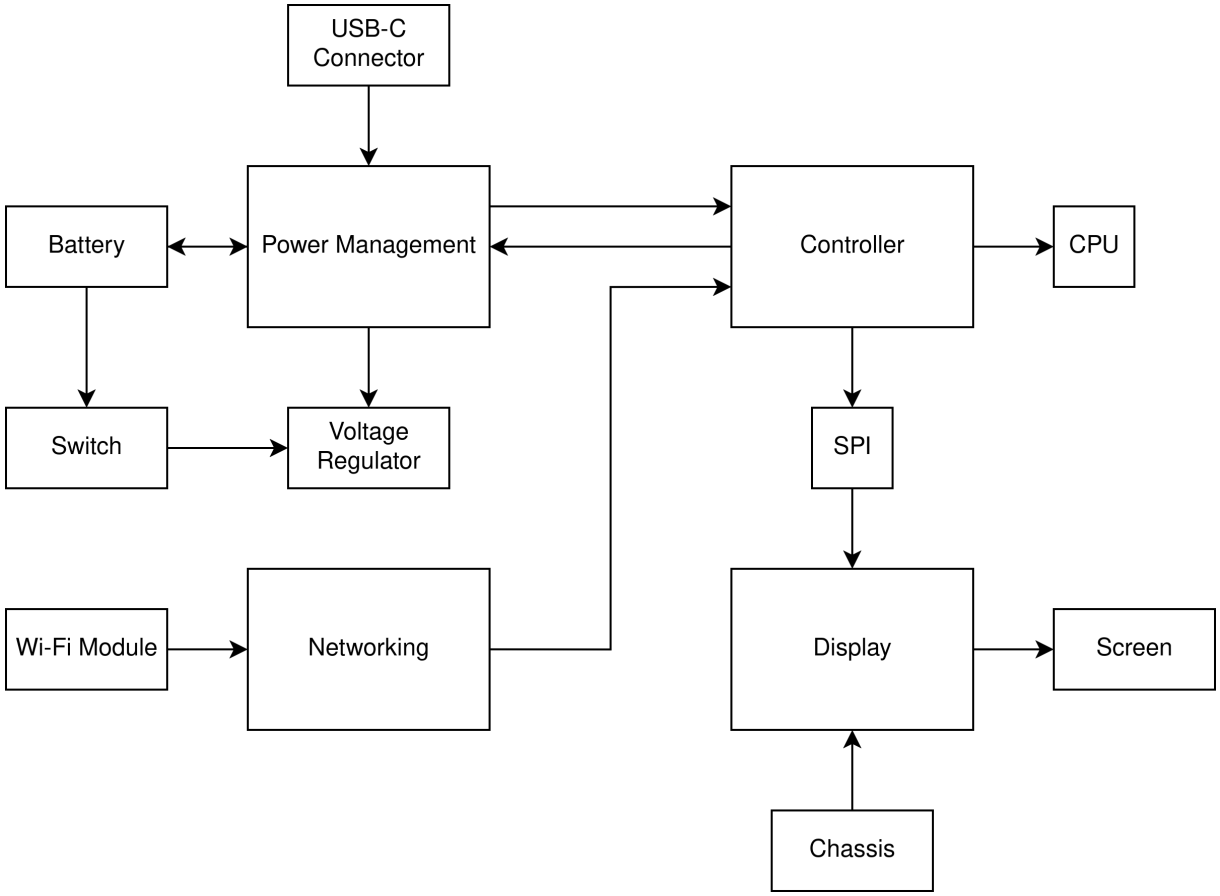

Figure 3.1.1: System Block Diagram

3.2 System Activity Diagram

[**DD1+**]

Figure 3.2.1: System Activity Diagram

3.3 System Mechanical Design (Extra Credit)

[**DD3+**]

Figure 3.3.1: System Mechanical Design

3.4 Integration Approach

[**DD3+**] [Theory behind the system design, with reference to subsystem integration within your system – i.e., explain how it is supposed to work, but not whether it did actually work] [Type here]

3.5 System Photographs

[**DD3+**] [Photograph of assembled system, intended to highlight user interaction / controls. If system is split into multiple parts, show a composite of more than one photograph with all key user interactions / controls.]

Figure 3.5.1: [Photo Name]

4 Subsystems

4.1 Subsystem 1: [Subsystem Name]

4.1.1 Subsystem Diagrams

[**DD1+**]

4.1.2 Specifications

1. [Type here **DD1+**]

4.1.3 Subsystem Interactions

[Type here **DD1+**]

4.1.4 Core ECE Design Tasks

[**DD1+** Write tasks and course that helps accomplish that task]

- **ECE xxxxx**: [Type the relationship here.]

4.1.5 Schematics

[Type here **DD2+**]

4.1.6 Parts

- [Type here **DD1+**]

4.1.7 Algorithm

[Type here **DD1+**]

4.1.8 Theory of Operation

[Type here **DD2+**]

4.1.9 Specifications Measurement

[**DD3+** Every specification here should match the specification above.]

1. [Copy specification here.]
   [Explain the specification here. Add photoes if necessary.]

4.1.10 Standards

[**DD1+**]

- [**Standard Name**]: [Describe the standards and explain the connection]

Figure 4.1.1: Subsystem Block Diagram

Figure 4.1.2: [Schematic Name]

4.2 Subsystem 2: [Subsystem Name]

4.2.1 Subsystem Diagrams

[**DD1+**]

4.2.2 Specifications

1. [Type here **DD1+**]

4.2.3 Subsystem Interactions

[Type here **DD1+**]

4.2.4 Core ECE Design Tasks

[**DD1+** Write tasks and course that helps accomplish that task]

- **ECE xxxxx**: [Type the relationship here.]

4.2.5 Schematics

[Type here **DD2+**]

4.2.6 Parts

- [Type here **DD1+**]

4.2.7 Algorithm

[Type here **DD1+**]

4.2.8 Theory of Operation

[Type here **DD2+**]

4.2.9 Specifications Measurement

[**DD3+** Every specification here should match the specification above.]

1. [Copy specification here.]
   [Explain the specification here. Add photoes if necessary.]

4.2.10 Standards

[**DD1+**]

- [**Standard Name**]: [Describe the standards and explain the connection]

Figure 4.2.1: Subsystem Block Diagram

Figure 4.2.2: [Schematic Name]

4.3 Subsystem 3: [Subsystem Name]

4.3.1 Subsystem Diagrams

[**DD1+**]

4.3.2 Specifications

1. [Type here **DD1+**]

4.3.3 Subsystem Interactions

[Type here **DD1+**]

4.3.4 Core ECE Design Tasks

[**DD1+** Write tasks and course that helps accomplish that task]

- **ECE xxxxx**: [Type the relationship here.]

4.3.5 Schematics

[Type here **DD2+**]

4.3.6 Parts

- [Type here **DD1+**]

4.3.7 Algorithm

[Type here **DD1+**]

4.3.8 Theory of Operation

[Type here **DD2+**]

4.3.9 Specifications Measurement

[**DD3+** Every specification here should match the specification above.]

1. [Copy specification here.]
   [Explain the specification here. Add photoes if necessary.]

4.3.10 Standards

[**DD1+**]

- [**Standard Name**]: [Describe the standards and explain the connection]

Figure 4.3.1: Subsystem Block Diagram

Figure 4.3.2: [Schematic Name]

4.4 Subsystem 4: [Subsystem Name]

4.4.1 Subsystem Diagrams

[**DD1+**]

4.4.2 Specifications

1. [Type here **DD1+**]

4.4.3 Subsystem Interactions

[Type here **DD1+**]

4.4.4 Core ECE Design Tasks

[**DD1+** Write tasks and course that helps accomplish that task]

- **ECE xxxxx**: [Type the relationship here.]

4.4.5 Schematics

[Type here **DD2+**]

4.4.6 Parts

- [Type here **DD1+**]

4.4.7 Algorithm

[Type here **DD1+**]

4.4.8 Theory of Operation

[Type here **DD2+**]

4.4.9 Specifications Measurement

[**DD3+** Every specification here should match the specification above.]

1. [Copy specification here.]
   [Explain the specification here. Add photoes if necessary.]

4.4.10 Standards

[**DD1+**]

- [**Standard Name**]: [Describe the standards and explain the connection]

Figure 4.4.1: Subsystem Block Diagram

Figure 4.4.2: [Schematic Name]

5 PCB Design

5.1 PCB Schematics

[**DD3+**]

Figure 5.1.1: PCB Schematic

5.2 PCB Layout

[**DD3+**]

Figure 5.2.1: PCB Layout

6 Final Status of Requirements

[**DD3+**] [If met, give a detailed explanation of the requirement. If partially met, mention what has been met and a reason for why the complete requirement couldn't be achieved. If not met, give an explanation for why the requirement couldn't be met in the product. Add as many requirements as you had in your earlier design documents here.]

1. Requirement 1: [Copy your requirement above here]
   Met: [Explanation]

2. Requirement 2: [Copy your requirement above here]
   Partially Met: [Explanation]

3. Requirement 3: [Copy your requirement above here]
   Not Met: [Explanation]

7 Team Structure

[**DD1+**]

7.1 Team Member 1

[Name Here]
Major: [FILL IN]
Contact: [user]@purdue.edu
Team Role: [Technical and Professional Roles in the team]
Bio: [Short Introduction here]

7.2 Team Member 2

[Name Here]
Major: [FILL IN]
Contact: [user]@purdue.edu
Team Role: [Technical and Professional Roles in the team]
Bio: [Short Introduction here]

7.3 Team Member 3

[Name Here]
Major: [FILL IN]
Contact: [user]@purdue.edu
Team Role: [Technical and Professional Roles in the team]
Bio: [Short Introduction here]

7.4 Team Member 4

[Name Here]
Major: [FILL IN]
Contact: [user]@purdue.edu
Team Role: [Technical and Professional Roles in the team]
Bio: [Short Introduction here]

8 Bibliography

[Here are some examples. IEEE format can be found on Purdue OWL.]

References

[1] "Data Platform - Open Power System data," Apr. 15, 2020. https://data.open-power-system-data.org/household_data/

[2] Author,"Title," *Journal*,volume,number, page range, month year, DOI.

[3] Author. "Page."Website. URL(accessed month day,year)

9 Appendices

[This section is mainly designed for code. You can directly generate a somewhat decent display of your code file or psuedo code by using the template provided below. You can have as many appendix as you want. In the document, you can refer to the code posted here instead of pasting the whole code in the body.]