PX4 Simulation Project Documentation Proposal

1. Introduction

This project focuses on designing and testing a GPS failure failsafe mechanism for a quadrotor. Using PX4 SITL, Gazebo Classic, and ROS 2, the simulation replicates real-world GPS failure scenarios to develop reliable recovery strategies.

2. Objectives

- Develop a failsafe system to detect and respond to GPS failure in a PX4-based quadrotor.
- Simulate GPS failure conditions within PX4 SITL and Gazebo Classic.
- Implement flight control strategies to maintain stability during GPS loss.
- Analyze flight data and telemetry to evaluate the effectiveness of the failsafe mechanism.

3. Feasibility

The project is feasible as PX4 SITL, Gazebo Classic, and ROS 2 offer a robust simulation environment, eliminating the need for physical hardware. Established GPS failure management techniques will be implemented and tested to validate the failsafe system.

4. Timeline

Week	Task
Week	Research and study necessary tools
Week	Set up the simulation environment
Week	Implement the failsafe mechanism in SITL
Week	Test, analyze, and refine the system

5. Resource Estimation

- **Software:** PX4 Autopilot, Gazebo Classic (Gazebo 11), ROS 2, QGroundControl
- **Hardware:** A high-performance Ubuntu-based computer for simulation

6. Conclusion

This proposal outlines a structured plan to develop a GPS failure failsafe system for a PX4-based quadrotor. With a well-defined timeline and resource allocation, the project aims to enhance quadrotor performance in GPS-denied environments through systematic simulation and testing.