Ground Control Station for Uncrewed Swarms and Teams

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Motivation

- Currently no software for teams
  - Available options only support one vehicle at a time
- Need for in house software
  - Easy to interface with internal packages
  - Availability and licensing
- Light weight software that supports linux and windows

Core Features

- Multiple Connections
- Path Planning via UI and Automation
- Ability to Design, Save, and Execute Maneuvers
- Telemetry Visualization
- Live Sensor Data Display
- Direct Control of Connected Vehicles

Technical Details

- GUST will be a react and electron application with a python FastAPI backend
- It will communicate with the vehicles using the open source MAVLink Library
- PostgreSQL will be used to store and manage data (SQLAlchemy ORM)
- The application will be built for Linux and Windows

Dev Environment

- Docker Ubuntu 22.04.5LTS Image
  - Standardized development OS
  - Portable and relatively easy to get going
- Conda Environment
  - Standardized python environment
  - Automatically track dependencies
  - Ability to export environments to different machines

Related Apps

- Mission Planner
  - Made by ArduPilot
  - Only supports single connections
  - Supports Windows and Linux
  - Open Source
- QGroundControl
  - Difficult for non-developers to setup/install
  - No feedback before plan is uploaded to vehicle

High Priority Challenges

- UI design and planning
  - The UI planner will use satellite images and an interactive "drop pin" system to plan paths
  - Integration of live streaming custom sensor data over MAVLink
- Direct flight control
  - UI interaction with actual flight and potential lag time
  - Prioritize vehicle in emergency state