

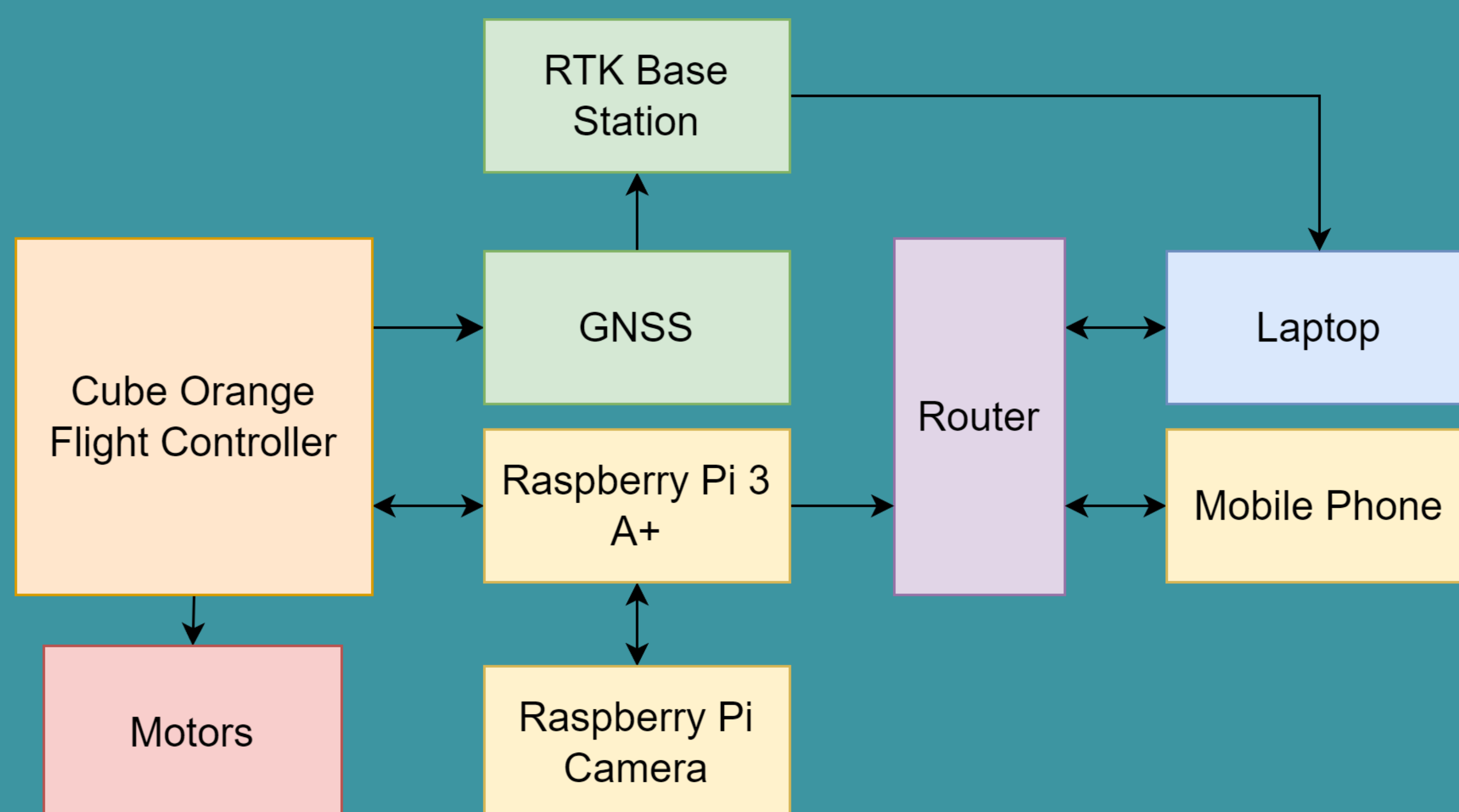
## Background

In a combat environment, information is critical for any activity. For dangerous and difficult to navigate areas, humans must risk themselves to gain information of surrounding areas or potential threats. To address this, we made *PIGS*: Personal Information Gathering System, a network of semi-autonomous drones.

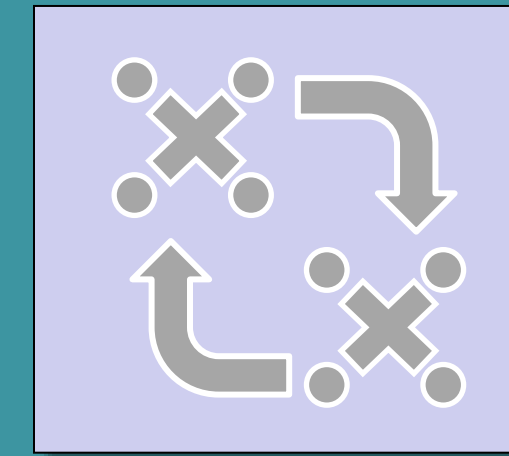
## Overview

Through a network of drones, a user can send commands for various modes to perform information gathering related tasks. This is controlled by a ground operator who interfaces with the drones through a mobile app in a custom wireless environment, while the drones autonomously stream video to the operator. User control is abstracted to several high-level commands, while the drones are intelligently dispatched to tasks and maneuver accordingly.

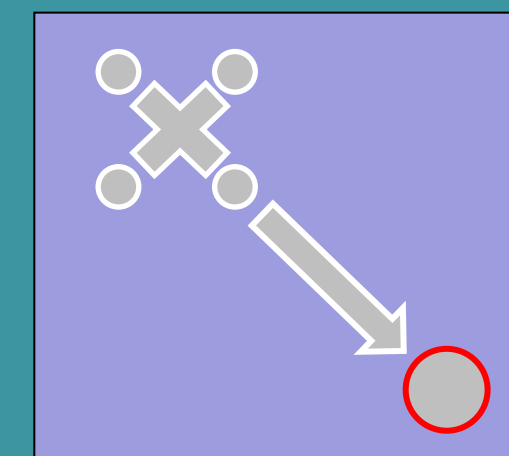
## Block Diagram



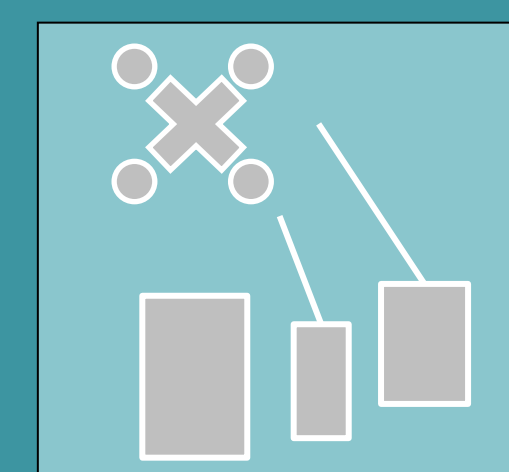
## Functionality



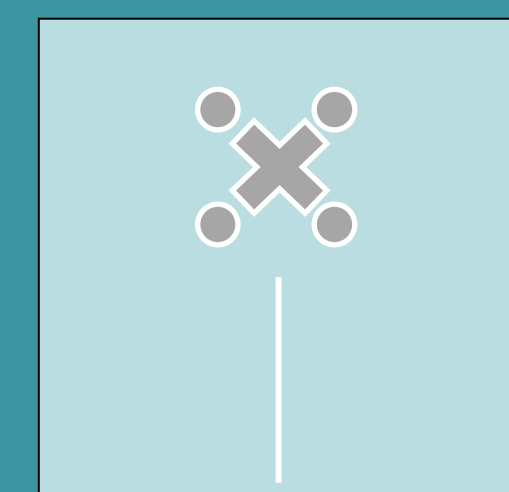
**Orbit mode** revolves around the target, while streaming video from the drones of the nearby surroundings to the app.



**Explore mode** dispatches a drone to sweep over a target location, which then streams the footage back.



**Radar mode** has the drones utilize a computer vision model to detect objects and to display them on the screen.



**Bird's-Eye mode** elevates one drone to a high altitude to get a visual sweep of the surrounding areas.

## Hardware



### Flight Controller

The Cube Orange is used to handle the low-level control of the drone, along with streaming telemetry.

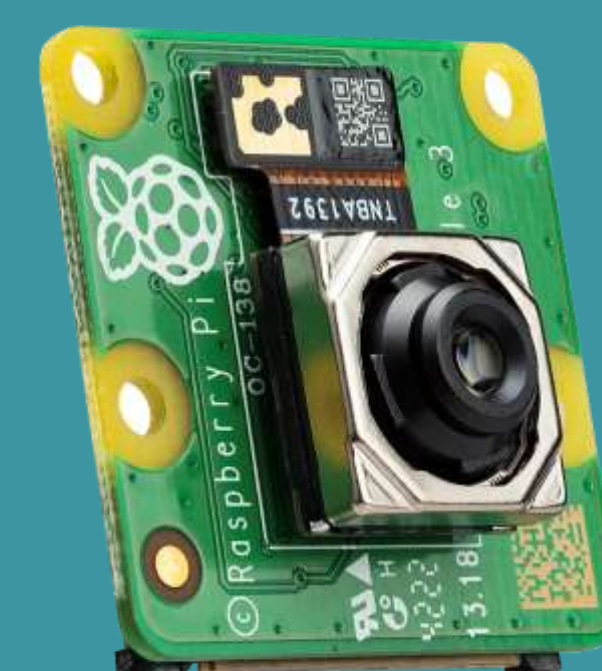
### Onboard Processor

A Raspberry Pi 3 model A+ is used as an interface to the drone itself, while also handling networking and video.



### Camera

The Raspberry Pi Camera captures video from the drone for computer vision on the laptop for object detection.

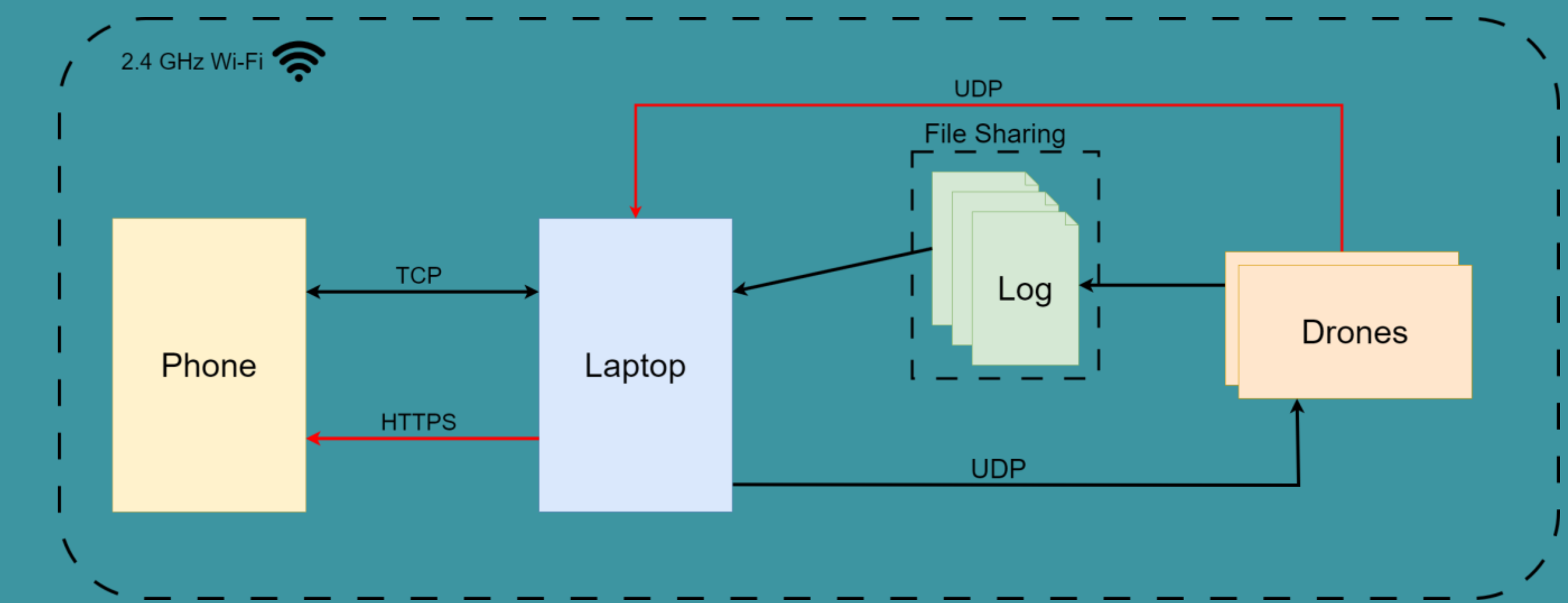


### RTK Positioning

RTK offers tight precision, high refresh rate position updates relative to a moving base station.



## Communication



## Mobile Application



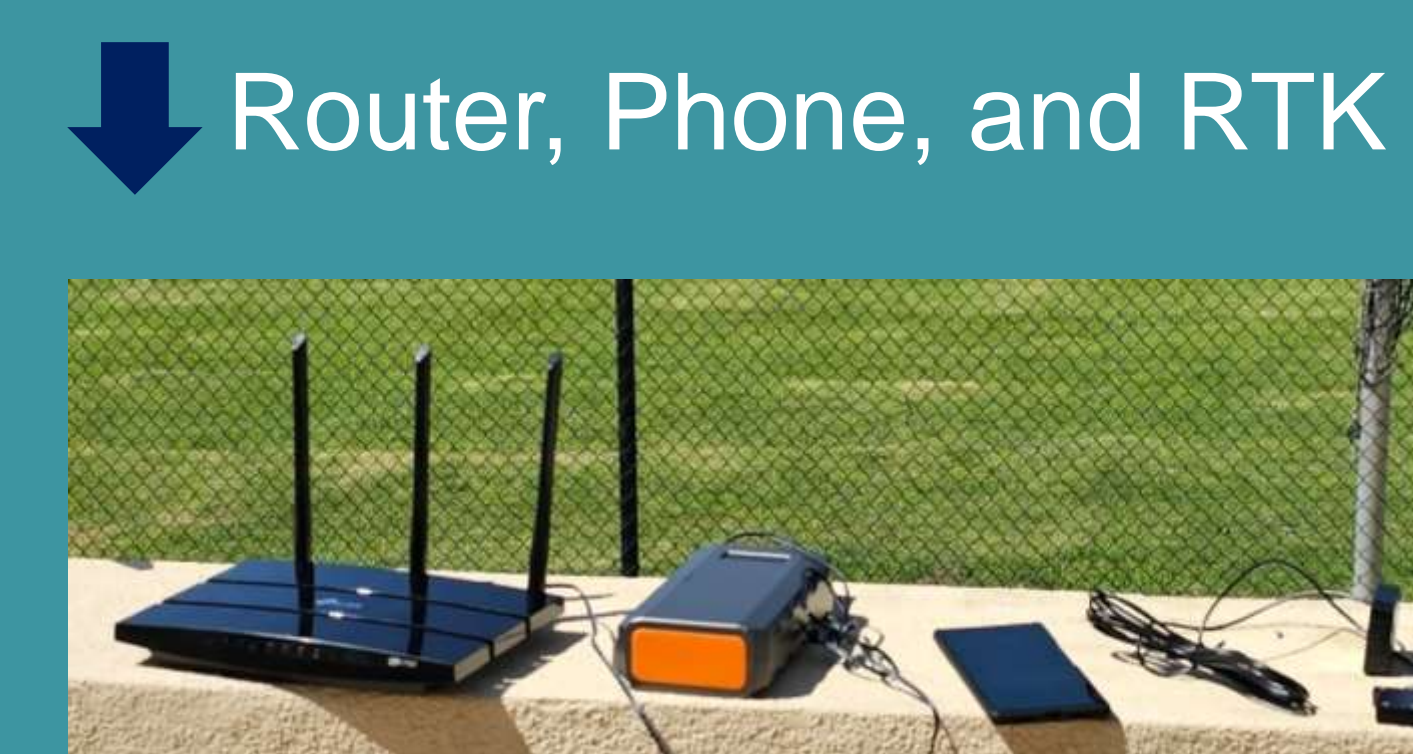
- Map indicating the location of user and drones
- Autofocusing on drones or user
- Camera view from drones
- Video streaming with Object Detection in radar mode
- Drone information monitoring
- Abstracted high-level commands for drone
- Recorded Flight Data from each flight

## Final Product



← Drone 2 in Orbit Mode

↓ Drone 1 on ground



↓ Router, Phone, and RTK

