# Airborne Autonomous Wi-Fi Detection System

Problem Statement

Unauthorized or rogue Wi-Fi access points pose significant security risks in sensitive environments, potentially compromising network security and data integrity. Existing detection solutions are typically static, expensive, and lack flexibility for dynamic environments or large outdoor campuses. There is a critical need for a cost effective, mobile, and autonomous system capable of rapidly identifying and locating rogue Wi-Fi access points.

SSID	MAC	RSSI	Latitude	Longitude
AP_1	00:11:22:33:44:55	-37	33.415507	-111.831922
AP_2	66:77:88:99:aa:bb	-46	33.415658	-111.831595
AP_3	cc:dd:ee:ff:00:11	-55	33.415201	-111.832208
AP_4	22:33:44:55:66:77	-65	33.415366	-111.831522
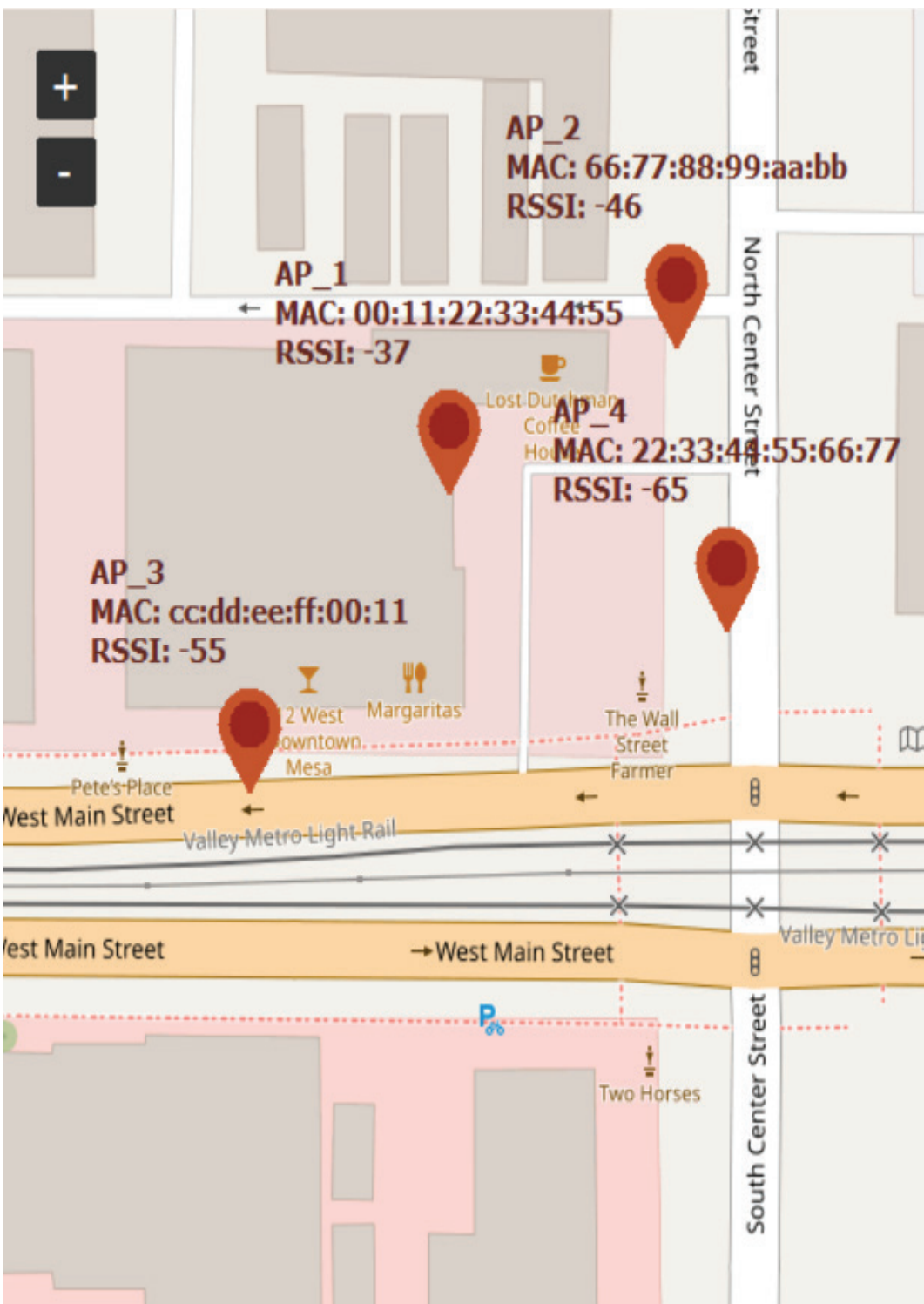
Fundamental Concepts

To effectively detect and locate rogue Wi-Fi access points, the system must address the following needs:

Mobility: Ability to dynamically search large, variable environments.
Real Time Detection: Instantaneous scanning and reporting of Wi-Fi signals
Autonomy: Minimize operator workload by automated search patterns
Accurate Location: Combine signal strength and GPS data for precise location estimation
Cost Effectiveness: Use commercially available components for affordability and maintainability
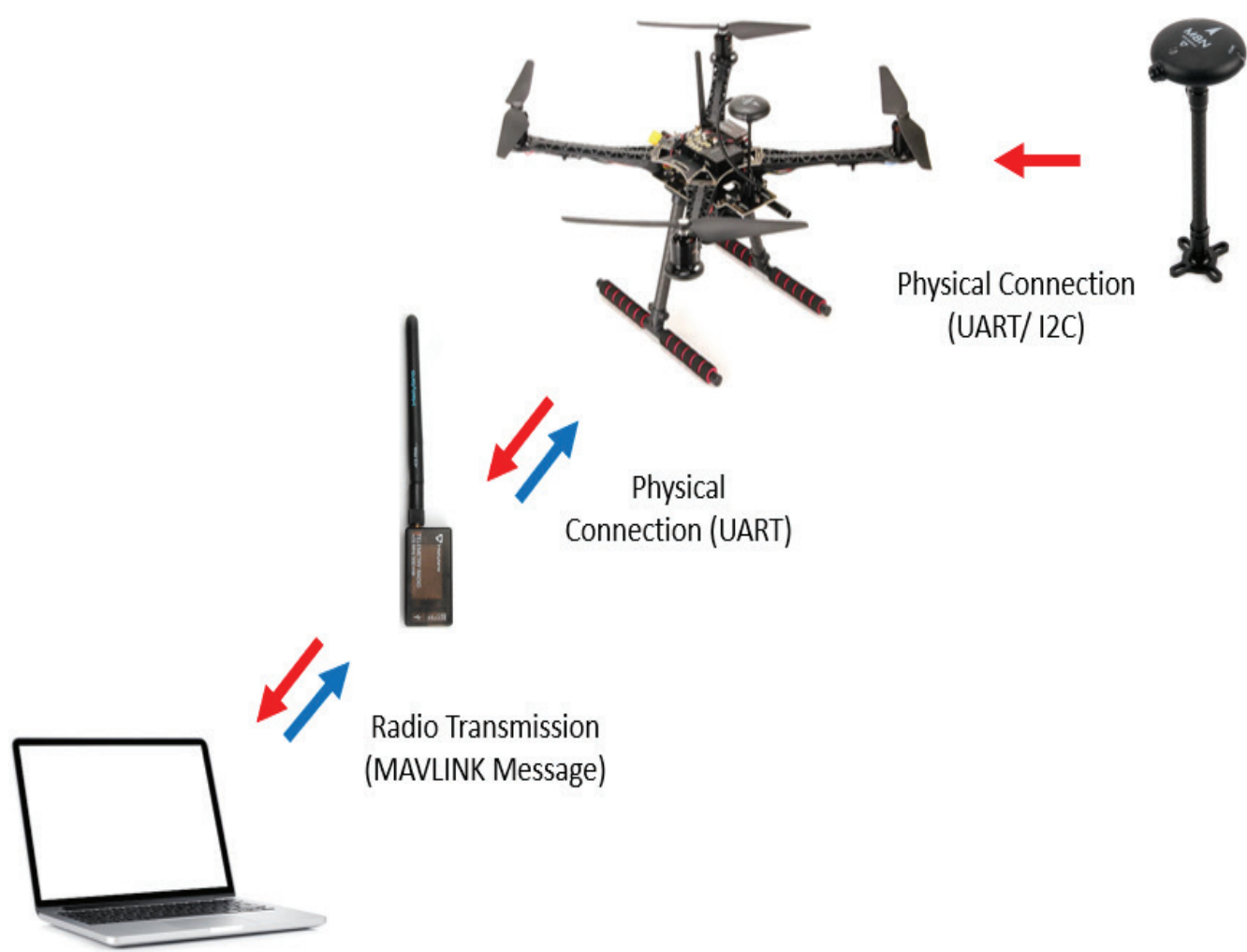
Data Path

The communication and data flow between components are structured as follows:

-Wi-Fi Sniffer (ESP32) scans and identifies Wi-Fi signals
-Data transmitted via serial communication to the Pixhawk 6.
-Pixhawk 6C integrates the received Wi-Fi data with real time GPS coordinates and encapsulates it into MAVLink messages
-MAVLink telemetry stream transmitted via 915 MHz telemetry radio to the Ground Control Station
-Ground Control Station parses the MAVLink data stream, extracting Wi-Fi information and drone coordinates
-Collected data visualized on an interactive GUI, providing immediate feedback on detected Wi-Fi access points
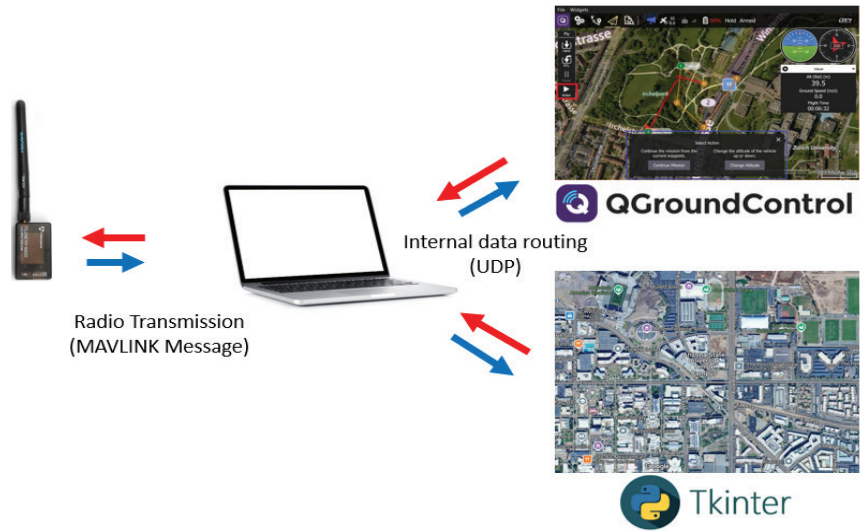
Results

-Successfully established a reliable, real time data pipeline from drone to Ground Control Station
-Autonomous flight patterns validated in both simulation and initial outdoor flight tests, confirming system robustness and reliability
-Wi-Fi sniffer accurately identifies and reports multiple access points in real time, providing rough location estimations
-Custom Ground Control Station GUI effectively visualizes Wi-Fi data for customer reference

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