



DRONE BASE STATION

Algı KÜÇÜKYAVUZ, Nihan YILMAZ, Rabia KAPAN

{algikucukyavuz, nihanyilmaz, rabiakpn17}@hacettepe.edu.tr

Supervisor: Prof. Dr. Cenk TOKER



INTRODUCTION

This project presents a base station mounted on a drone which is a communication system considering the many opportunities offered by drone base stations. It is expected to provide telemetry data to the ground users such as energy consumption of the system, the vibration of the drone, the variation of the path loss with altitude and the loss due to fading and shadowing when the drone flies behind a tree or a building.



APPLICATION AREAS

The use of flying platforms such as drones, is very popular nowadays. In particular, with their inherent attributes such as mobility, flexibility, adaptive altitude, and affordability, Drones admit several key potential applications in wireless systems. The terrestrial communication networks are sometimes interrupted by extreme circumstances due to disasters such as flood or earthquake. In such cases, communication networks can be ensured by drones which have high altitudes and move along any trajectory constrained only by their aeronautical characteristics so they can reach to disaster areas that enables safety for rescue crews.

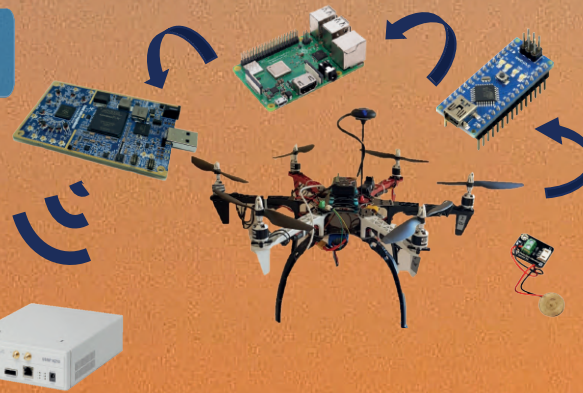


SPECIFICATIONS AND DESIGN REQUIREMENTS

UAV	EMAX F550 HEXACOPTER
Transmitter	LimeSDR
Receiver	USRP
Computer that runs SDR platform and sensors	Raspberry Pi 3 Laptop for Ground Station to run USRP
Sensors	Current, Voltage, Vibration sensors

The components used in the design can be seen in the second column.

The Project Diagram



SOLUTION METHODOLOGY

The telemetry data is sent to the ground station by using software define radio platforms which are LimeSDR and USRP. LimeSDR is mounted on the drone and USRP works as the ground station. Telemetry data is taken from Pixhawk and stored inside the computer on the drone which is Raspberry Pi, then the data is sent to the ground station by using digital modulation.

GNURadio is used to program the software define radio platforms which are LimeSDR and USRP. Since its use is easy and it has the flexibility to provide many modulation techniques for the communication systems by using only the software, GNURadio is mostly preferred in the literature. Python and Putty are used in the design to program and control Raspberry Pi remotely.

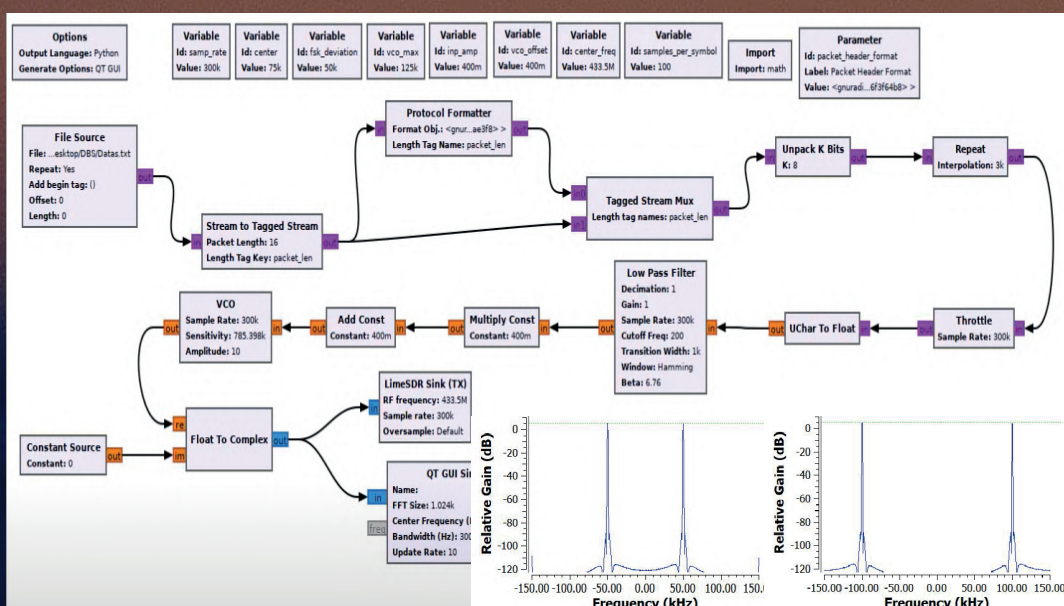


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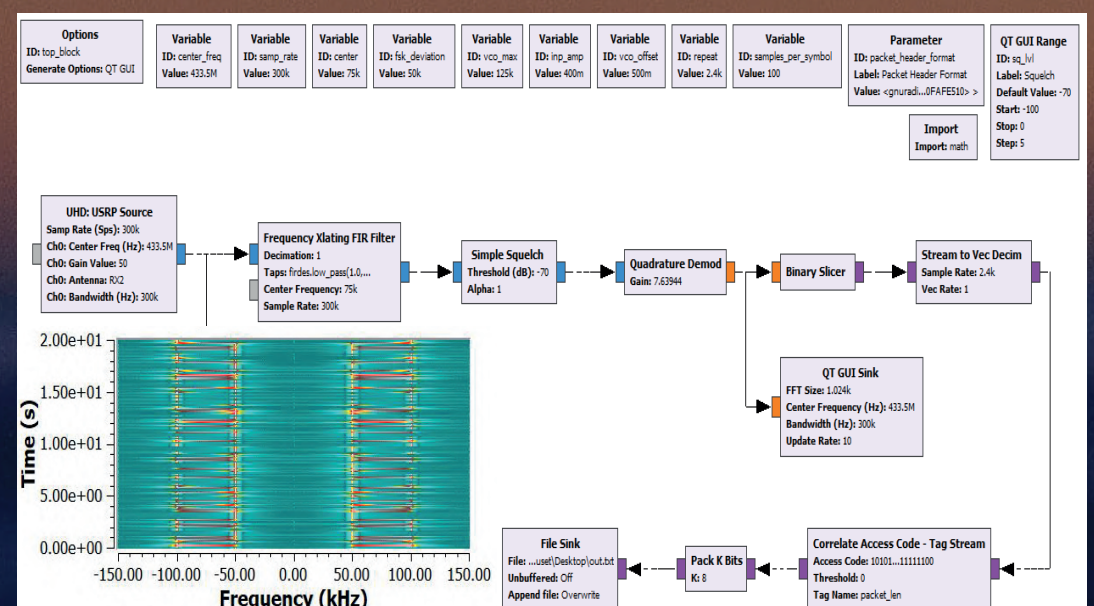
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RESULTS



TX Signal Flow Graph and Frequency Displays at 50 KHz and 100 KHz



RX Signal Flow Graph Waterfall Display at 50 KHz and 100 KHz