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Software Defined Radio & Spectrum: Using Drones to Monitor Cellular Network Jamming

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Abstract

The purpose of this project is to modify a drone to collect spectrum and locate potential cellular jammers. The drone will have the capability to fly around with an antenna operating at 900 MHz, the frequency of cellular networks, and collect spectrum from the area. Pattern variations in the spectrum's graph, along with GPS locations and timestamps, will be anaylzed for network regulation and enforcement.

Background Information

- Software Defined Radio (SDR)
  - Radio via a software implementation rather than hardware
  - Much cheaper and more customizable than hardware radio
- Spectrum Analysis
  - Spectrum is measured in the frequency domain using a signal analyzer.
  - Complex signal are broken down into frequency components, making it easier to measure signal properties. (FFT)
- Mobile Phone Jammer
  - Instrument used to prevent mobile phones from receiving signals from base stations
  - Send various signals at ~900 MHz to interfere with signals of normal cellular communication

Plan/Breakdown

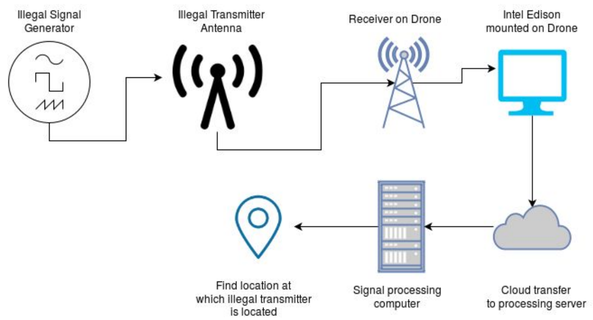

Figure 1: Project Flowchart

Figure 2: The 3DR Solo Drone

Software/Materials

- 3DR Solo Drone
- Intel Edison Board
- Vert900 Antenna
- MATLAB/Octave
- SDR#
- B210 Universal Software Radio Peripheral (USRP)
- ORBIT Grid

Results/Experiments

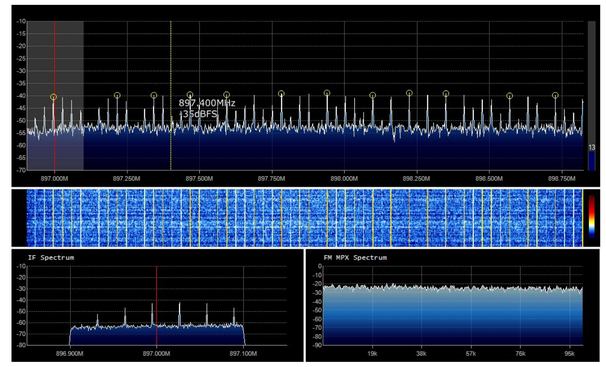

Figure 3: Spectrum from outside of shielded room, at 900 MHz (From SDR#)

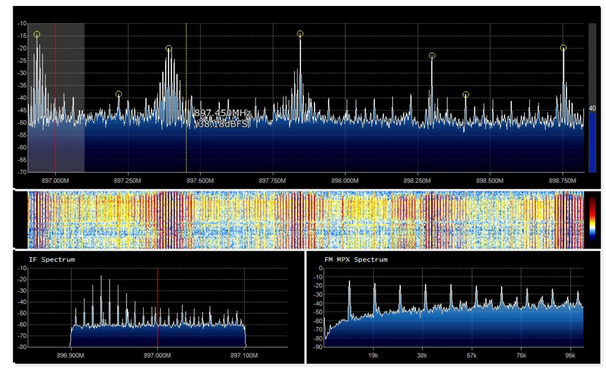

Figure 4: Spectrum from inside of shieled room, under transmitter, at 900 MHz (From SDR#)

Future Goals

- Be able to transmit spectrum data in real time
- Quicker, more efficient method for processing of data

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