Cellular Signal Amplifier

Oscar Contreras, Rafael Lopez, Yukun Sui, Kenny Tat, JD Ingal
Professor Lee Swindlehurst
Department of Electrical Engineering and Computer Science
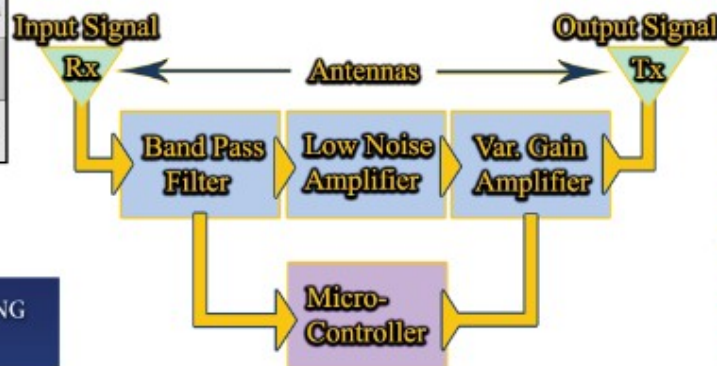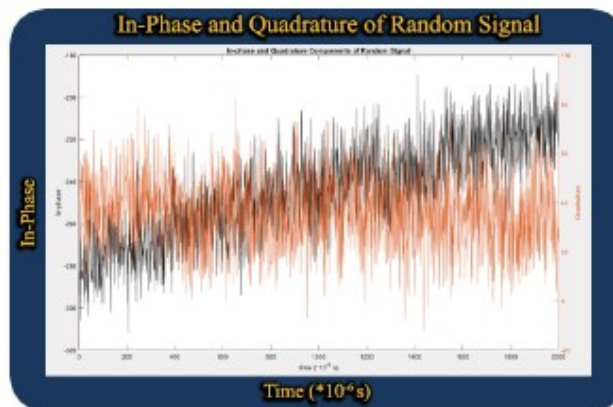
"Can you hear me now?"

Objective

- To effectively receive a cellular signal from a nearby base station and calculate the RSSI of said signal.
- To pass said signal through a bandpass filter and a transceiver.
- To transmit and amplify said signal in the direction of an area with low and/or spotty cellular reception.

Team Organization

Team Member	Assigned Responsibility
Oscar Contreras (EE)	Antenna, Hardware
Rafael Lopez (EE)	Antenna, Hardware, Circuit connection
Yukun Sui (EE)	Noise rejector, Radio Frequency Design
Kenny Tat (CpE)	Digital Signal Processing
JD Ingal (CpE)	Digital Signal Storage, Signal Protocol

In-Phase and Quadrature of Random Signal

Input Signal Rx — Antennas — Output Signal Tx

Band Pass Filter → Low Noise Amplifier → Var. Gain Amplifier

Micro-Controller

Approach / Progress

- The incoming signal must be filtered through a bandpass filter to weed out unnecessary noise. With the filtered signal, an RSSI will be calculated to determine the strength of the signal, and amplified the transmitted signal shall be. Once determined, the signal will pass through our transceiver and be transmitted through a directional antenna.
- Constructed and started troubleshooting a 'base station replica' with two arduinos and antennas as a test case
- Studying bladeRF transceiver source code and functionality of the board.

Timeline (Fall 2018)

Week 1 - 2	Finalize senior design topic, establish project goals and requirements, search for project advisor. ✓
Week 3 - 4	Establish team member responsibilities, search for project funding, decide upon needed project components, finalize project advisor. ✓
Week 5 - 6	Purchase necessary parts, begin to establish connections between modules. ✓
Week 7 - 8	Test battery and device power consumption, prepare ABET paper and project poster. ✓
Week 9 - 10	Formalize optimal power schemes, submit project progress and prepare for end of quarter presentation.