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# Goals

Since the project now pivots towards the use of RTL-SDR, we should learn how the RTL-SDR works internally. In addition, we are interested in finding and designing possible verification blocks to test the correct functionalities of the individual component as well as the whole system.

# Problem

Research on some of the existing localization projects using RTL-SDR; learn the useful functionalities of GNU radio that could be utilized in the project; and research on the possible verifications for the project proposal.

# General approach

Reading the tutorials on RTL-SDR.com, and the tutorial on SDR using MATLAB Simulink and the RTL-SDR.

# Planned Course of Action

Work on the Deliverable part of the proposal to include a comprehensive list of test cases that verify the individual component as well as the whole system. The Kruger paper discusses some of the estimation methods used to verify the results of the experiments. Although these evaluations are based on the Time Difference of Arrival approach, they are still useful methods to evaluate the results. For example, the Kruger paper uses Parabolic, Gaussain, Scoine, Autocorr, and Maximise interpolation methods to evaluate the estimated time of arrival.

# Resources and relevant Forum Posts

# Software\_Defined\_Radio\_using\_MATLAB\_Simulink\_and\_the\_RTL-SDR (PDF)

# <https://www.rtl-sdr.com/>

# <http://ajoo.blog/intro-to-rtl-sdr-part-i-principles-and-hardware.html>

# <https://github.com/tejeez/rtl_coherent>

# <https://www.egr.msu.edu/classes/ece480/capstone/spring14/group02/docs/Application%20Note%20-%20Phase%20George%20Godby%20Team%202.pdf>

# <https://github.com/samwhiting/gnuradio-doa>

# Questions (Dr. Kan)

# Sample rate: spatial sampling at Nyquist means we need to sample every ½ wavelength (for RTL-SDR, it can go up to ~2.56 MHz without dropping samples)?

# Systematic simulation: theoretical vs. empirical, but exactly what they are? Individual simulation: how to determine which ones to have?

# DSP: downconverting to IF before demodulation?

# Worry about sample lost?