A Modern Approach to MIT's Coffee Can Radar

Progress Report

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1 Summary

During the months of December and January the main accomplishments includes meetings with various sponsors. This includes Randy Lee of Naval Junior ROTC programs, Carl Lewis of the Air and Space Force Association, Adam Lueken of Vernon Hills High School, and Tadd Scarpelli of Field Theory. In addition we have two new members to the team: John Bilkey and Josh Dontchenko. Field Theory has agreed to develop the antennas and the learning materials related. Randy Lee is adopting the system to be used in the classroom at Marquette University based summer camp for NJROTC Cadets. Carl Lewis and his STEM nonprofit has given a grant of $600 to develop the system.

2 Milestones and Current Stage

Our current stage is stage one with the goal of ordering all components for version one being partly met. A Bill of Materials has been formed and is ready for purchase. The delay was planned to allow meetings with various sponsors after the Christmas break to determine where we would obtain our funding. Purchase of all components is expected at the latest early next week.

3 Simulations

Our simulations were originally created in octave with the first necessary component needed was a chirp signal, frequency sweep. Later a MatLab license was obtained and we switched to Simulink. The high frequency simulations in the GHz range proved to be difficult due to the required Nyquist sampling. An SDR shall be purchased that performs the high frequency generation and data collection.
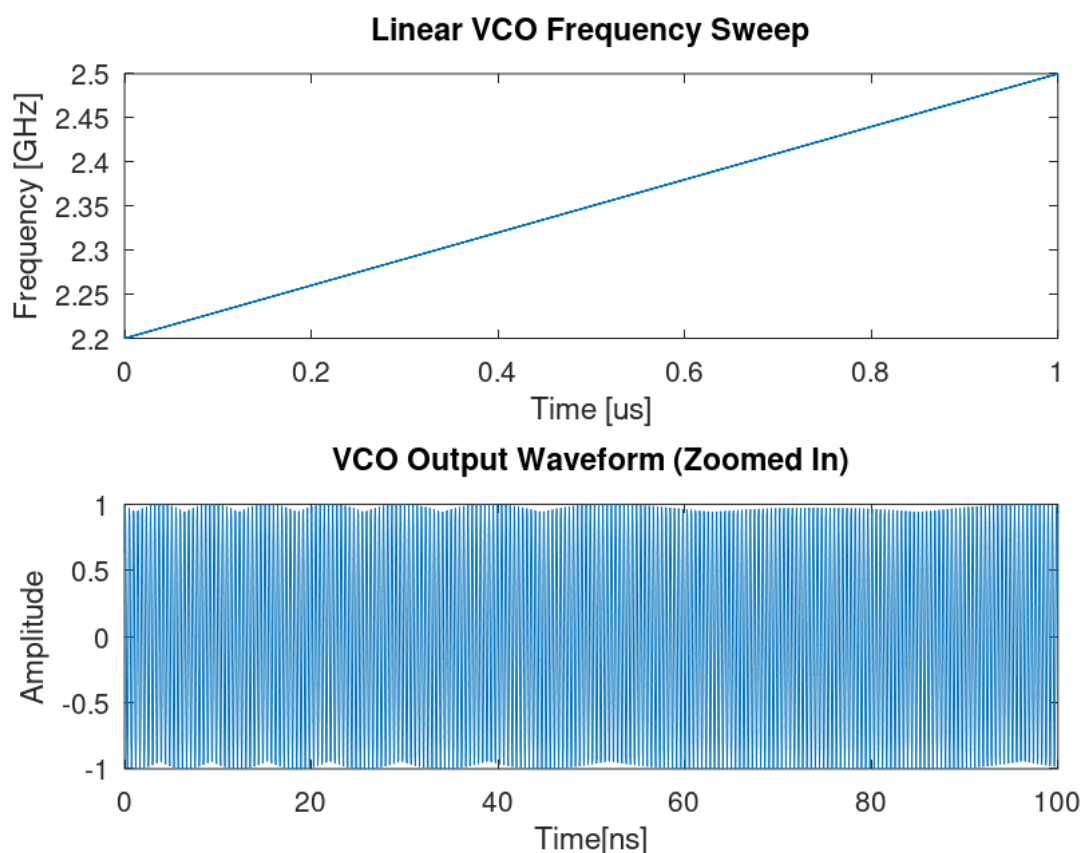

Figure 1: VCO Frequency sweep

In Figure 1 the Voltage Controlled Oscillator is simulated by a linear frequency sweep from 2.2GHz to 2.5GHz.

4 Bill of Materials

During the creation of the Bill of Materials it was determined that many of the original components used in the MIT Radar system are either obsolete or have skyrocketed in price. Replacement components for the function generator, VCO, and Amplifiers were determined. A mostly one to one replacement has been found with exception for the XR2066 function generator which will be replaced by a PLL such as the TI 74HCT7046 due to similar analog generators not being produced anymore. Our current BOM meets the $150 requirement with a purchase order of around $300, two kits, to allow for redundancy while developing the kit.

5 Change Requests

After meeting with Field Theory it was asked of us to add a SMD soldering component to the kit. This will more than likely be incorporated in the PLL based ramp generator or the video amplifier where DIP and TSOT packages are available allowing for more advanced users to solder and less to use a breadboard.