



Arduino Based Frequency Modulated Continuous Wave (FMCW) Radar

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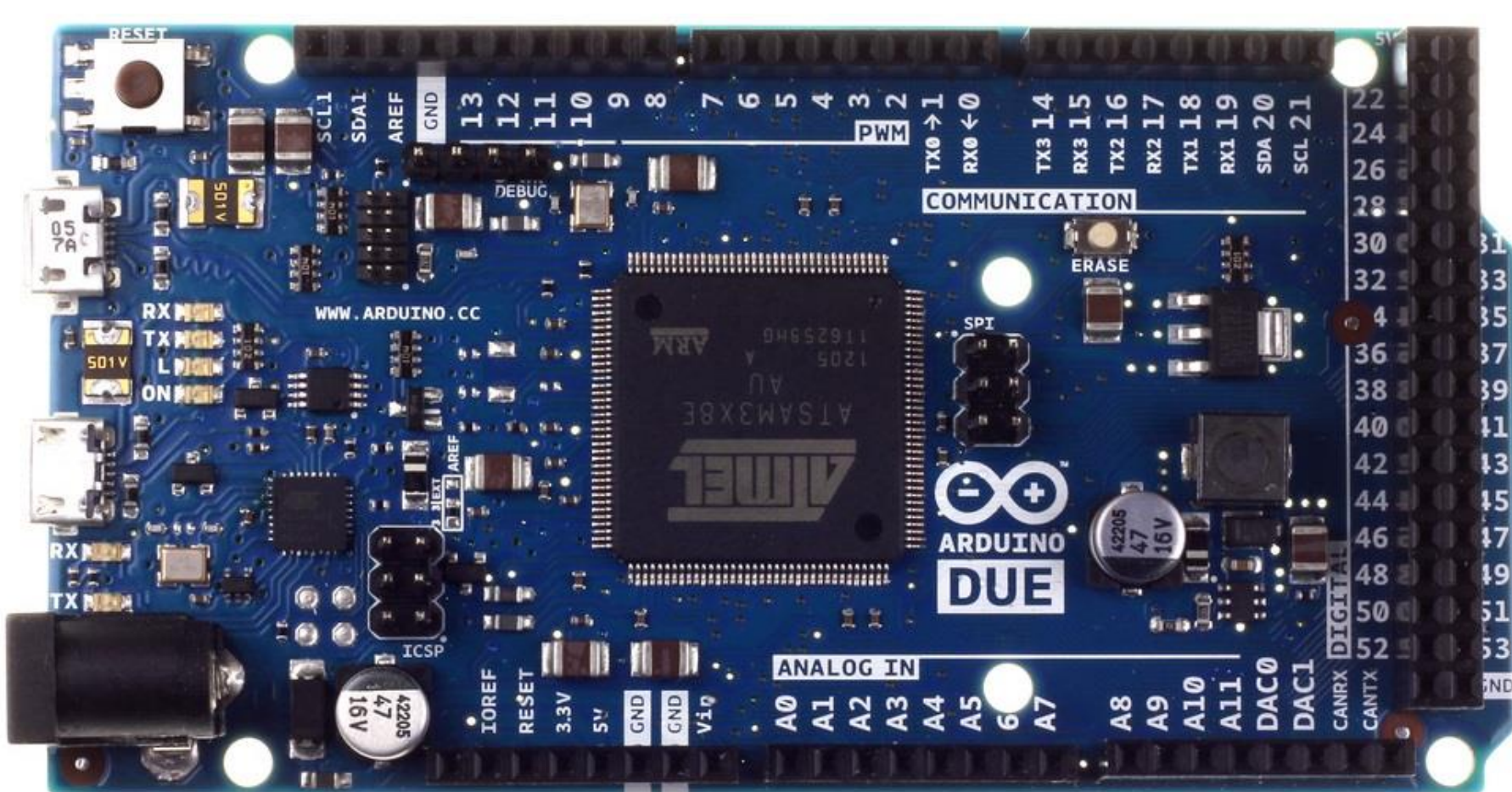
EEEC193, Spring 2014



Abstract

A high frequency tone is generated and swept from 2.1GHz–2.8GHz and in reverse continuously. The tone is amplified and at a certain time leaves the unit. When the tone is reflected back and arrives back to the unit it is mixed down to a low Δf frequency. This Δf signal then goes through filtering and digitization for signal processing. Once Δf is digitized correctly distance can be extracted using a relationship of distance to Δf .

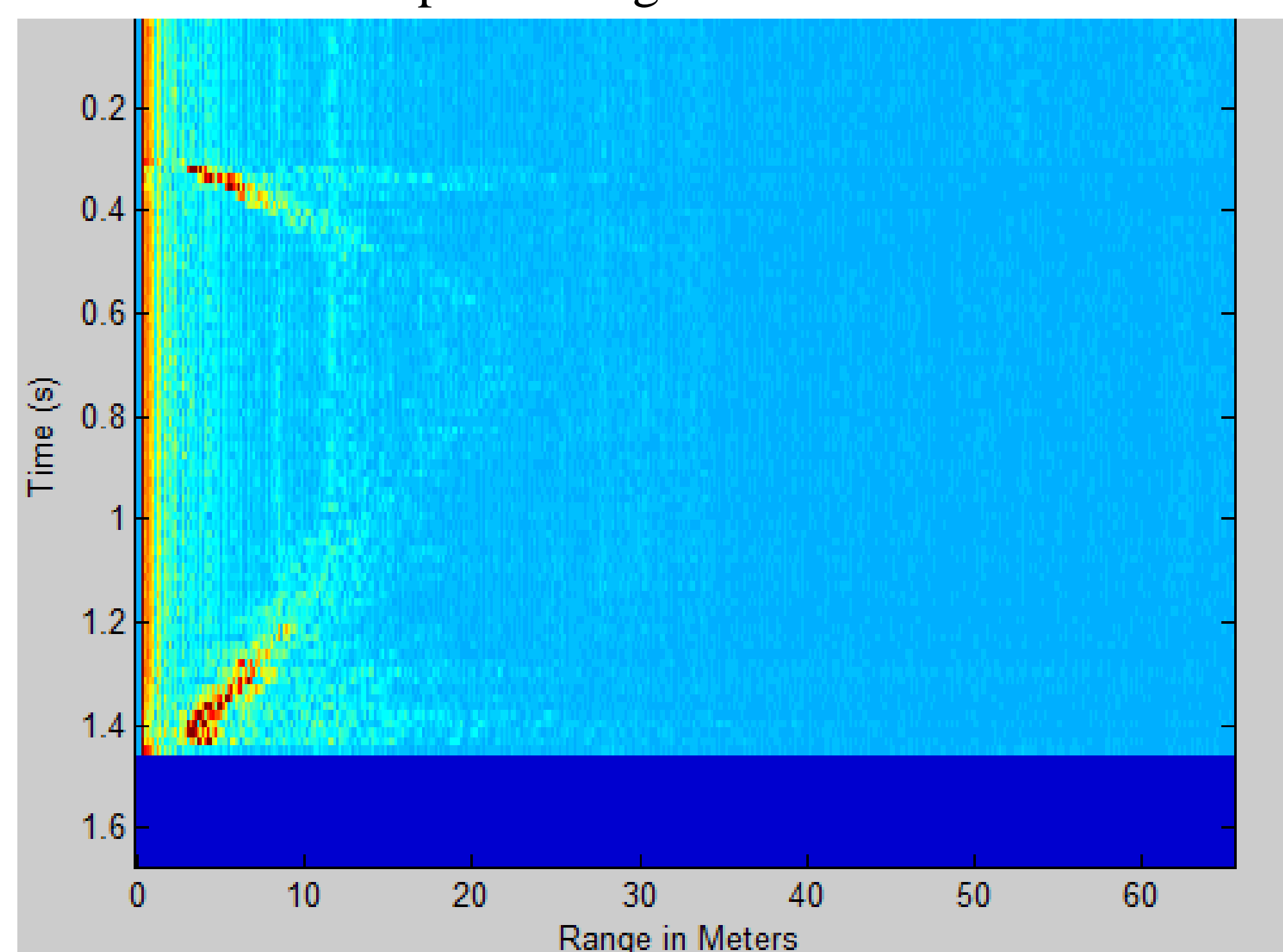
Arduino DUE (DSP)



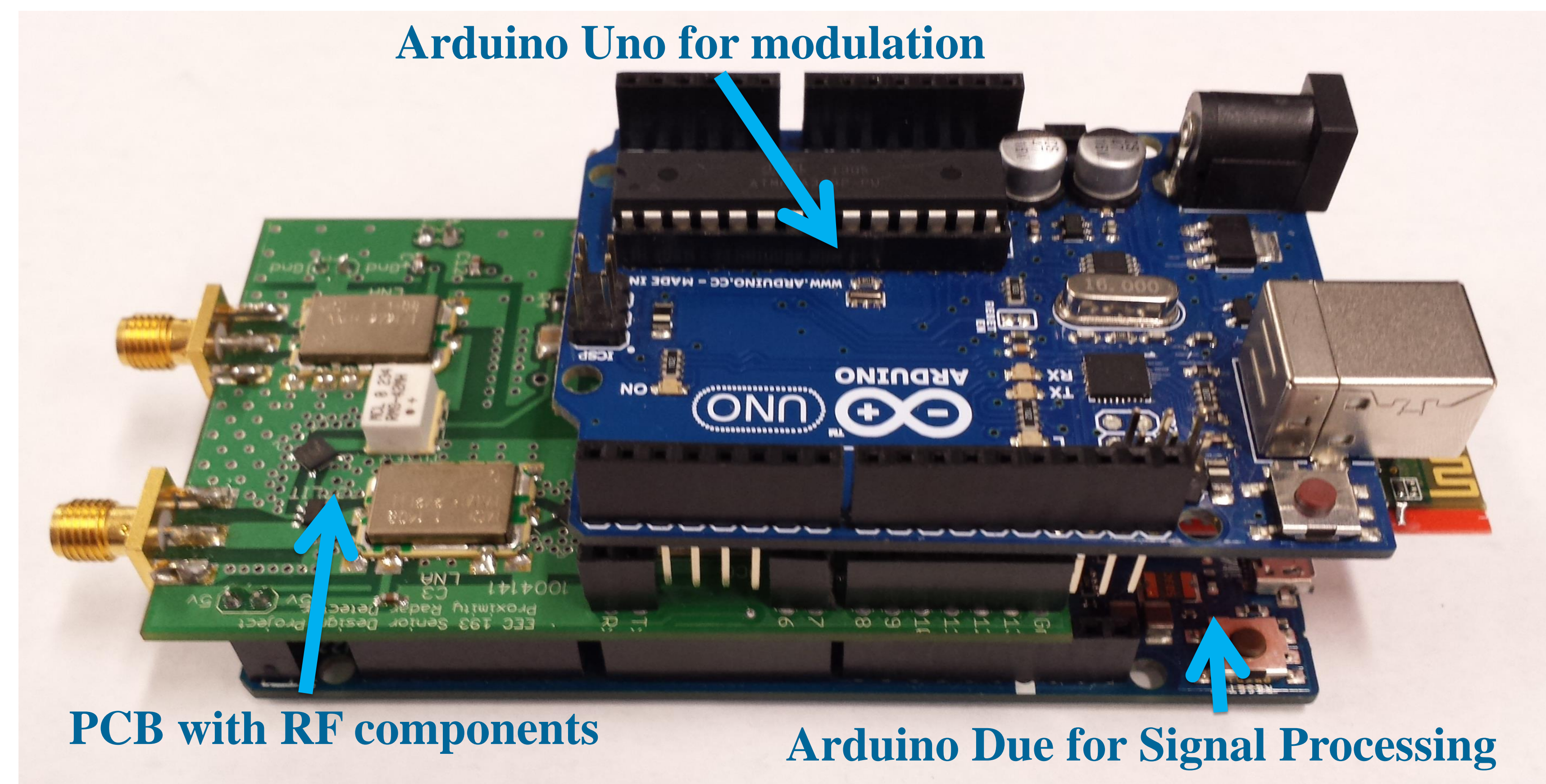
- Samples signals at 25kHz with 16-bit resolution
- Communicates with Bluetooth modules for wireless communication

Range vs Time Intensity

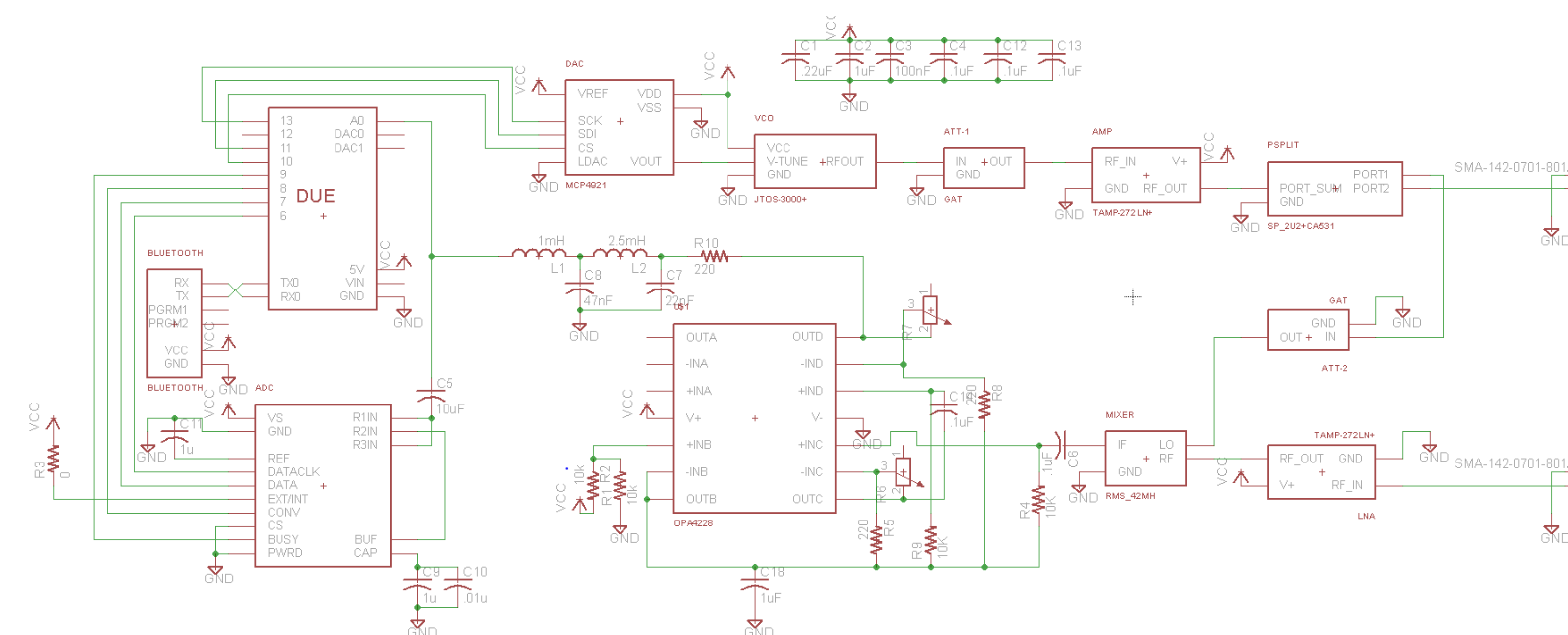
plot of target detection



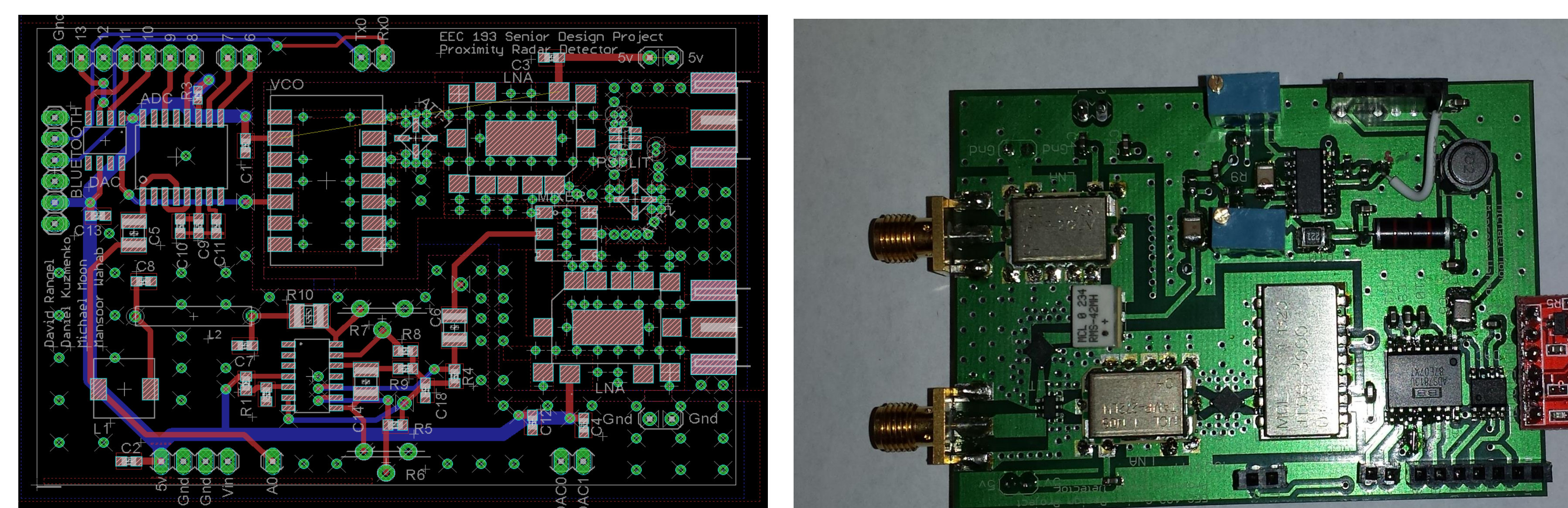
RADAR System Stack



Schematic



Printed Circuit Board (PCB) with RF front End



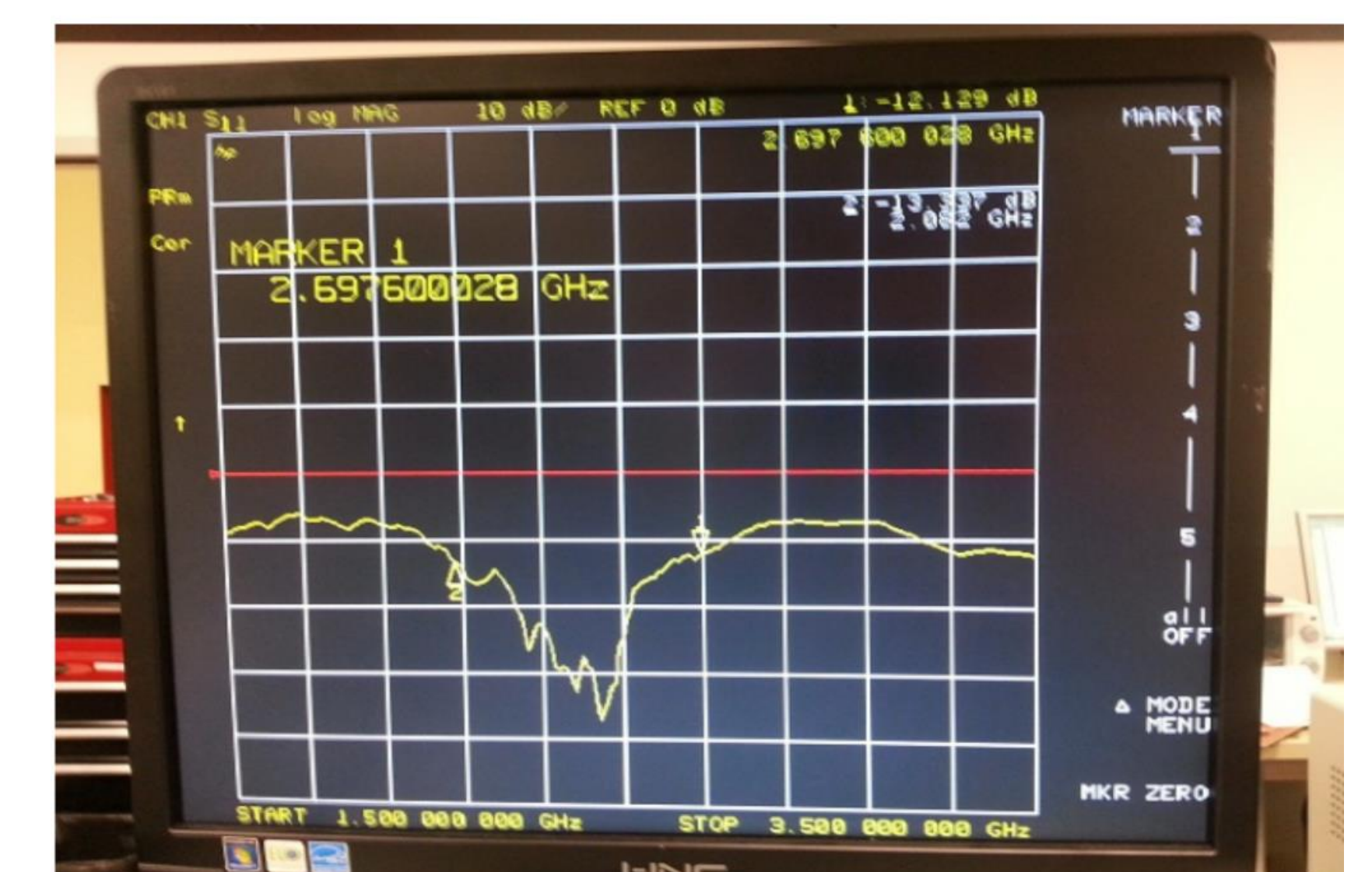
Description

- The unit consists of Arduino Uno, Arduino Due and a custom pcb that has the RF components and LP filter.
- Arduino Uno controls a VCO located on the pcb that sweeps a tone 2.1-2.8GHz .
- Arduino Due samples the LP filtered signal at 40kHz and extracts the distance.
- The Bluetooth module takes the Due's processed result and sends it to a user's device (computer, phone)

CPW Slot Antenna



Spectrum Results of the Antenna



Acknowledgements

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