Electronic Countermeasures for Radar

Preliminary Design Review

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Project Overview

- Develop a radar and an ECM module
- Small-scale, low-cost radar and ECM experimentation
- Designed for hobbyists and educators
- Cost: $805
Technical Objectives

- Low-cost implementations
- Build MIT Cantenna Radar
- Program and test countermeasure
- Real-time radar imaging
Current Status

- Built and tested functioning radar prototype
- In process of programming ECM
- In process of programming real-time imaging
Design Approach
• Frequency Modulated Continuous Wave Radar
• Operates in the 2.4 Ghz range
• Max Range ~ 1Km for 10dBsm
• Data and signal processing in MATLAB
Modulator

- Modulates the Vtune pin of the Oscillator.
- Vtune pin is proportional to the transmit frequency of the oscillator.
- Linear ramping of Vtune causes the oscillator to produce a linear FM chirp.
- Also connected to left audio input channel to produce a trigger signal synchronized with transmit
Video Amplifier

- Consists of Gain Stage and 4th order low pass filter.
- Takes output of mixer; amplifies it.
- Passed through LPF to remove noise and make it compatible with audio port input of computer.
Gain Stage
Ranging and Doppler
Receive Antenna Characterization
Transmit Antenna Characterization
Range without Jamming
Range with Jamming

RTI with 2-pulse cancelor clutter rejection

Range (m) vs. time (s)
Future Work

- ECM Module Completion
  3/28/13

- GUI Development and Testing
  4/01/13

- Comprehensive ECM and Radar Test
  4/15/13
Questions?