Design Topic for this week: Using a CMOS 555 timer and microwave diode to build a cooperating radar target.

Study materials on the web page:

CMOS 555 Timer data sheet
Microwave Diode data sheet

An introduction to basic antenna theory for modulated scatterers: halfwave dipoles, quarter wave monopoles, reflectors, and a sketch of image theory.

The relationship between size and gain of simple antennas.

Recap of last week’s Brief Lecture
Introduction to two basic techniques:
1. Radar
2. Modulation
Sketch a system to measure sensor position, orientation, velocity...
Sketch marine environment drift sensors

Tasks for this week. The Radar Equation, with working hardware. Relating math on the white board to pieces of stuff connected to batteries. Dividing Instrumentation and Sensing Systems into functional blocks, like LEGO's, and relating overall system performance to design, modification and deployment constraints on each block.

Turning a Radar system for passive targets into a short-range assymetrical system for wireless transmission of information. Modulated scatterers. System geometry.

The deployment environment: tracking surface water with oil. Thin oil, thick oil, basic chemistry. Experiments in the kitchen.

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Review course outcomes and evaluation criteria.

This graduate class is a Design Team focused on concept, sketch, design, build, measure, redesign, and deployment of a working system to remotely track the drift of oil on water in the natural environment. The individual tasks are diverse, and will offer multiple opportunities for a highly variable set of contributions, based on individual student interests and capabilities. We have 9 weeks left, and will not spend much of it on traditional exams.