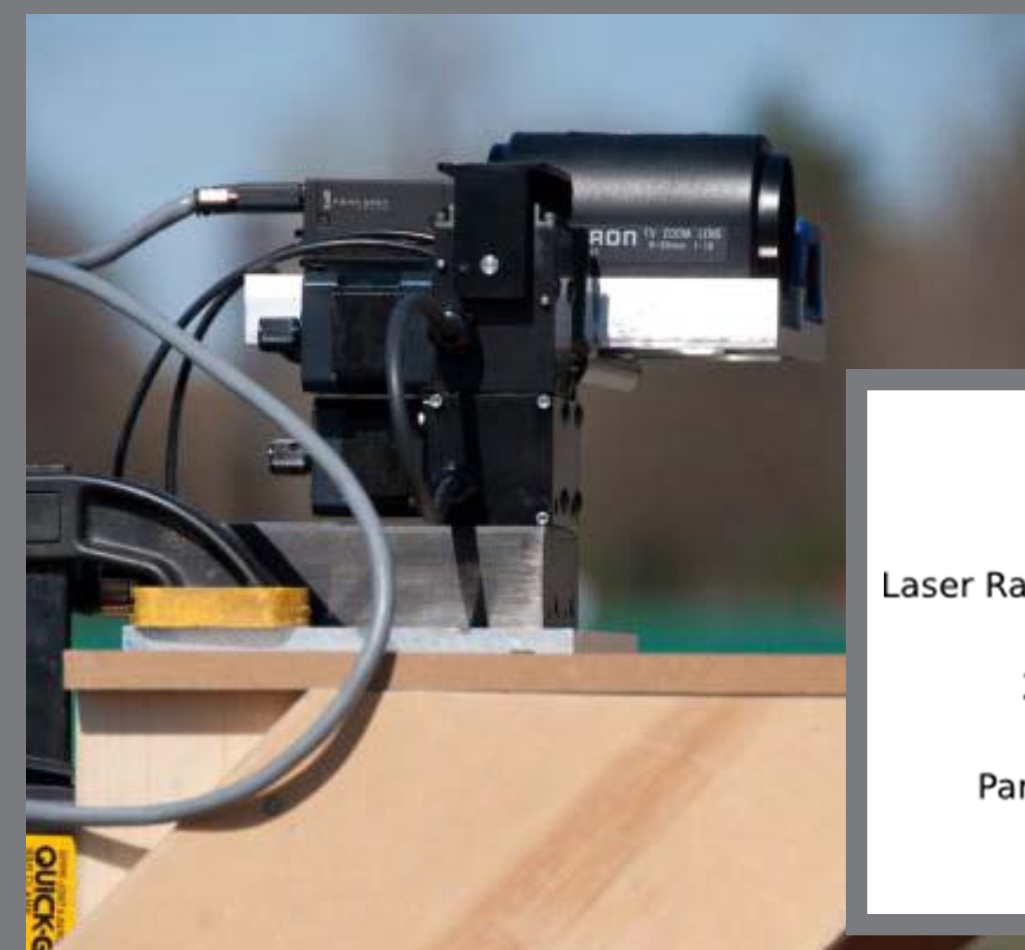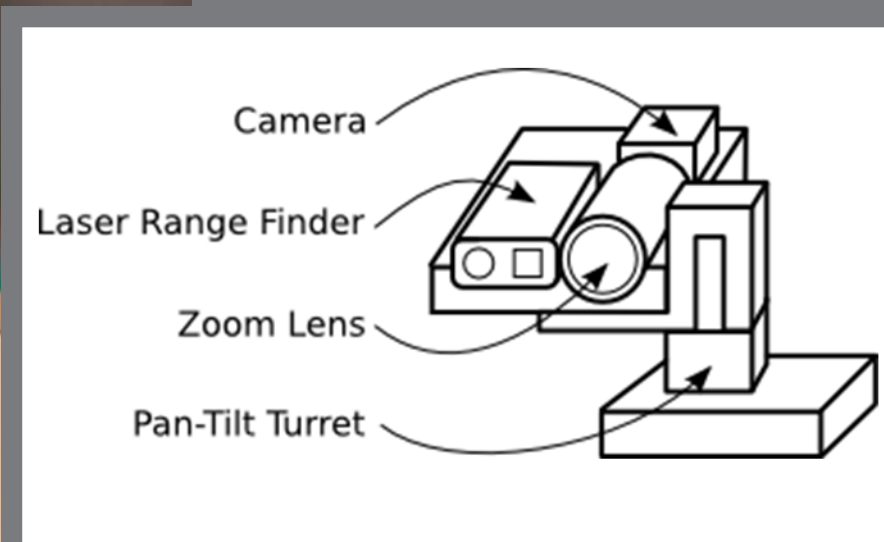## Follower System

It is mounted on a lab bench with a desktop computer. In the photo left, you can see the laser rangefinder and zoom lens.

Left is a side view of the optical pan-tilt mechanism. A camera and laser range finder are mounted onto a pan-tilt head.

High Accuracy Measurement System

Project Background

Unmanned ground robotic systems have replaced humans in performing many hazardous missions in our country's current conflicts. These systems are largely teleoperated today, but will become increasingly autonomous. One possible role for future semi-autonomous ground robots is leading convoys of human-occupied vehicles. Inexpensive and accurate position and orientation detection of the lead craft are desirable to control the semi-autonomous vehicle.

Project Goals

The MIT Lincoln Laboratory SCOPE team will develop an affordable prototype system for the lead and follow vehicles to enable accurate control of an autonomous leader robot. This system will integrate a variety of sensors in order to provide reliable and accurate position and orientation data.

Student Members:
Jennifer Cross
Joshua McCready
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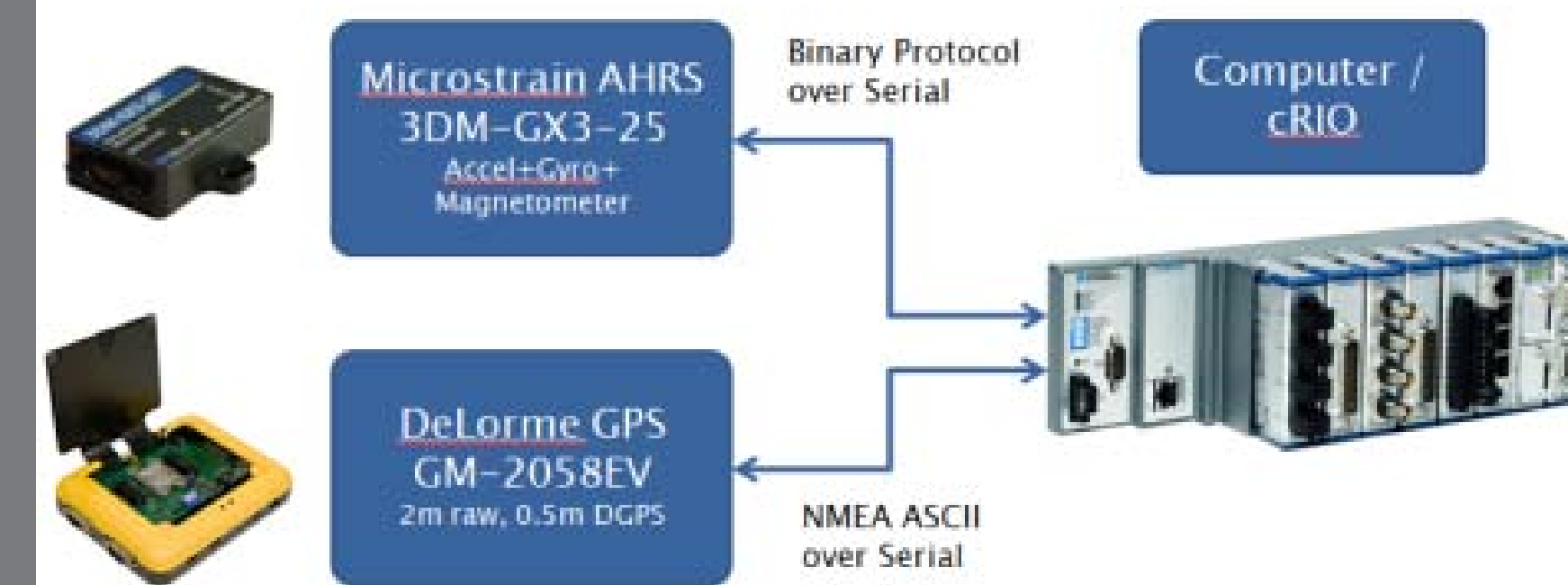**Faculty Advisor:**
Christopher Lee
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Special Thanks to our Sponsor Liaisons:
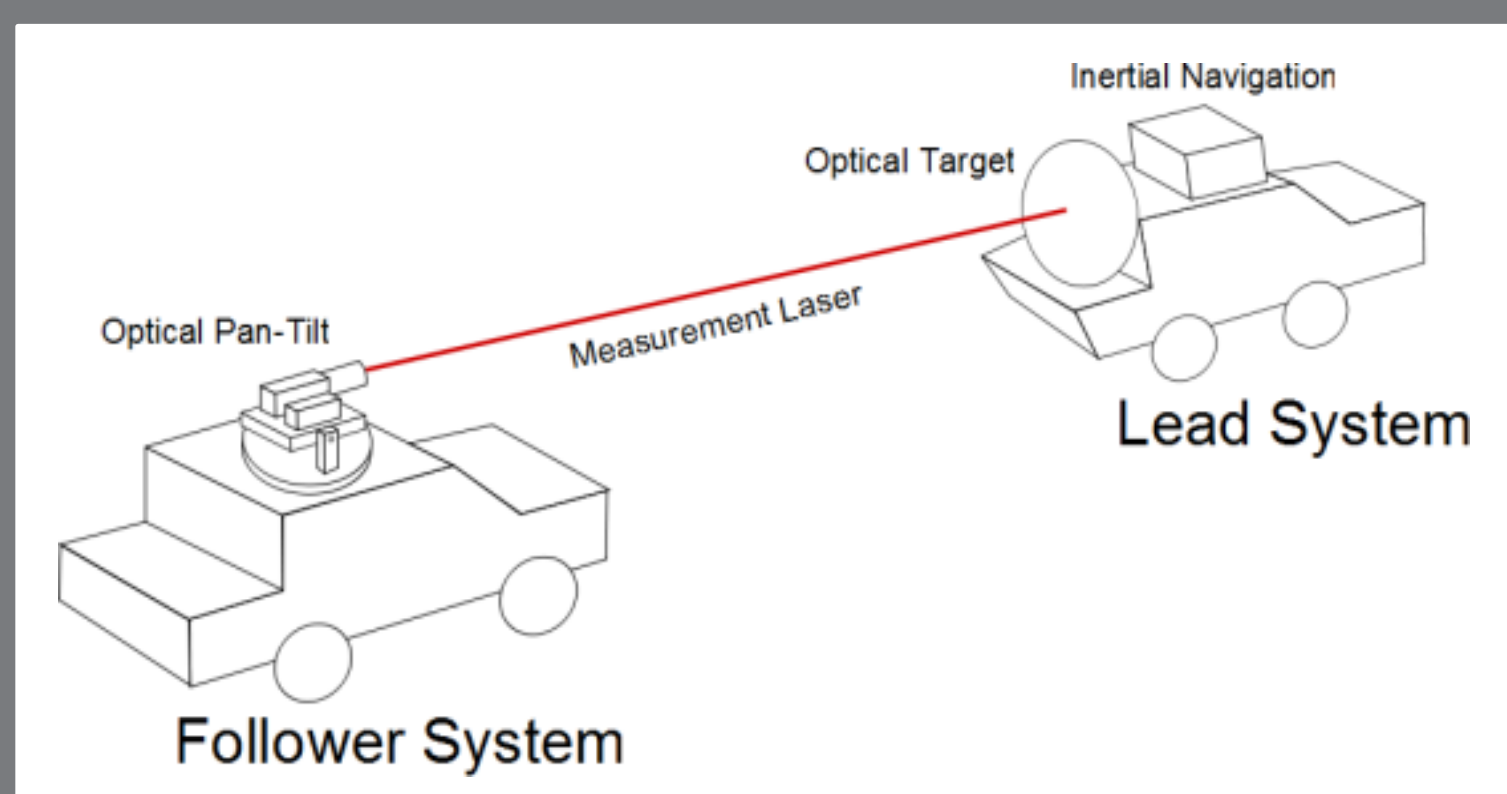Michael Boulet
Byron Stanley

Lead System

It runs off two car batteries and a 2 meter accurate GPS, IMU, and circular vision target. They are all connected to a NI cRIO.
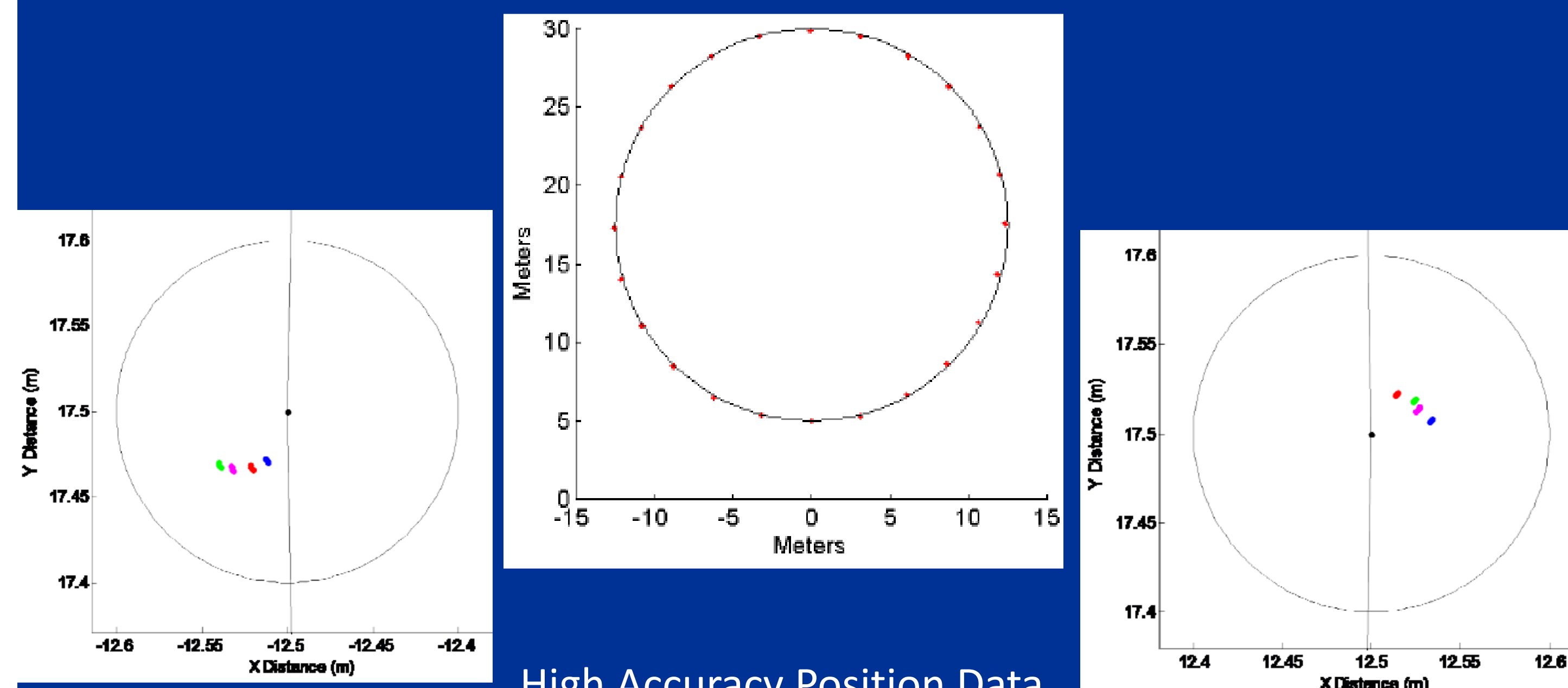
High Update Rate System

AFFORDABLE RELATIVE POSITIONING SENSOR

Overall System

Here the lead system is being pulled between two points on the circle. The follower system tries to keep track of target as it moves back and forth.

Test Results

High Accuracy Position Data

A best-fit circle of the collected data points was 12.4977 m in radius compared to 12.5 m ideal, with individual points averaging within 5 cm of expected values.

Vision-based Tracking

Visual Target

It is a 9 inch wide white circle mounted on a square piece of garolite.