**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.

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**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**

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.

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**Vision-based Tracking**

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

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**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.

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**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.