

# Capstone Project: Interrupter Blade Surveying System

**Project Purpose:** To develop a new, more efficient surveying system for the 746 TS, to be used for surveying the high speed test track before guidance missions. The system implements a combination of a laser radar system and a reference cart equipped with a switching device which locates reference points on the track, known as interrupter blades. The software collects the data and outputs the distances between each reference point. These reference points are important for data analysis of the missions, as they allow the analysts to calculate times and velocities. The track must be surveyed before each mission because the reference points change slightly after each mission due to factors such as vibrations from the sled. The current system, though accurate, is extremely inefficient. The accuracy of the new system must be equal to or exceed that of the current system, and also allow for faster, more efficient surveys.

## Project Schedule:

- Begin fall 2009
- Expected demonstration date -- November 2009
- Project end date – December 2009

## Funding Sources:

- 746 TS will provide funding for the project

## Disciplines Required:

- Optics (Laser system)
- Power
- Electronics (Sensors and support electronics)
- Systems Engineering (Requirements, test, evaluation, verification, project control)

## Project Constraints:

- Safety
- Size constraints (Must fit on the test track rails)

## Number of Students Desired

- 3 to 5 ECE students, each specializing in one of the above disciplines.
- Students must be United States citizens

**Faculty Sponsor:** Dr. David Voelz

## Methodology:

1. Student team will need to determine appropriate project requirements and

constraints in order to satisfy the objective.

2. Student team will need to develop detailed project requirements and project success criteria
3. Student team will need to develop subsystem concepts and associated subsystem requirements
4. Students will need to produce a design that addresses electrical and mechanical safety issues, collects appropriate data, and transmits the data to a user interface.
5. Student team will need to develop an engineering prototype system to determine hardware and software specifics, develop assembly and test procedures, and run simulated data acquisition experiments
6. Student team will need to assemble and validate a working field prototype.

**Project deliverables:**

1. Mission statement
2. Acceptance criteria
3. Requirements document and verification matrix
4. Software and hardware design details (analysis, schematics/drawings, parts list)
5. Working prototype by CDR
6. Assembly procedures
7. Test procedures
8. Working field unit by project demonstration date

**Project Reviews:**

1. System Concept Review
2. Preliminary Design Review
3. Critical Design Review
4. Demonstration Readiness Review
5. Final Review (at end of fall semester)

**Outreach Requirements:**

1. Student team will be required to present the project to at least one precollege group/visit
2. Students will need to make a 5-minute (maximum) video describing the project and demonstrating that the system works.