

Group 3

3.5 Background Invariant Laser-spot Detection and Tracking for Embedded Systems, PI: L. Gupta, SIUC

Background Invariant Laser-spot Detection and Tracking for Embedded Systems

PI: Lalit Gupta, Ph.D

Professor, ECE, SIUC

Students: Yang Bai, Ph.D student, SIUC

Ahmed Fadhil, Ph.D, SIUC

Raghuveer Kanneganti, Ph.D student, SIUC

Matthew M. Wilding & Steven E. Koenck
Rockwell Collins

Project Overview and Description

Develop a methodology to:

- Accurately detect laser-spots in low-resolution images
- Track the laser-spot in varying background and illumination conditions.
- Applications:
 - Smart Munitions: Targeting, Guiding, Counter-measure
 - Robotics: Navigation



<http://www.popularmechanics.com/technology/military/research/8-laser-weapon-systems>

Approach

- Detection
 - Filtering
 - Segmentation
 - Feature extraction – shape, color, intensity
 - Classification
- Tracking
 - Background subtraction, Kalman filter, Particle filter

Initial Focus: Detect laser-spots in static and simple backgrounds.

Subsequent Efforts: Dynamic, complex, and noisy backgrounds.

Final goal: Embed the detection and tracking strategy into a multi-core processing architecture

Project Status

Progress to date (new project)

- Acquired laser spots in varying backgrounds
- Developed Intensity based segmentation
- Implemented Kalman Filter



Project Tasks/ Deliverables

	Description	Date	Status
1	Study characteristics of laser-spots in varying backgrounds		Ongoing
2	Develop laser-spot detection algorithms		Ongoing
3	Develop laser-tracking algorithms		Ongoing
4	Test detection and tracking algorithms in simple backgrounds		Ongoing
5	Test detection and tracking algorithms in complex backgrounds including missing objects in frames		
6	Embed the detection and tracking strategy into a multi-core processing architecture		



Executive Summary

- Develop method to
 - Detect and track laser-spots
- Applications
 - Military
 - Robotics
 - New applications



<http://www.fastcompany.com/welcome.html?destination=http://www.fastcompany.com/1823017/darpa-unveils-drone-slaying-war-laser>

