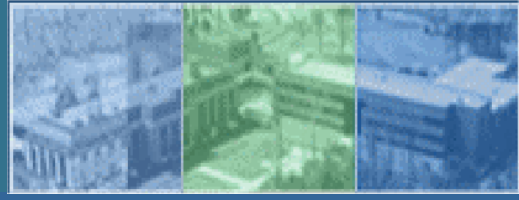
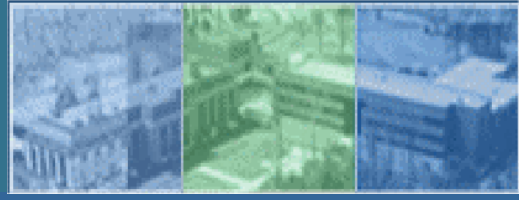


# Exploratory Advanced Research Program

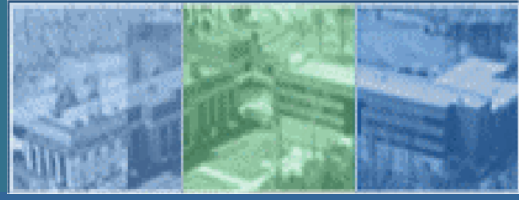
Bob Ferlis
Office of Operations R&D

*January 16, 2008*



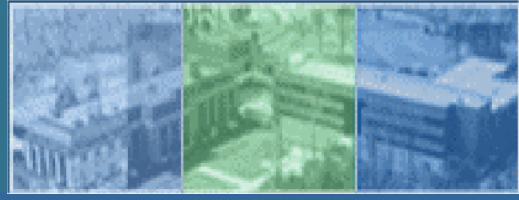
# Outline

- Program overview
- Program solicitation
- Project selection
- ITS-related projects



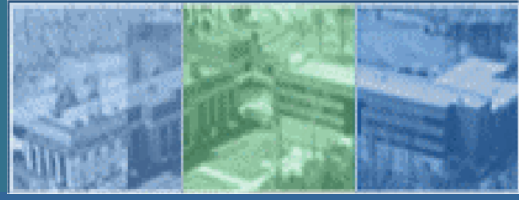
# Program Objective

- R&D that could lead to revolutionary advances (not incremental research)
- Risky to undertake
- Program established under U.S. transportation law SAFETEA-LU



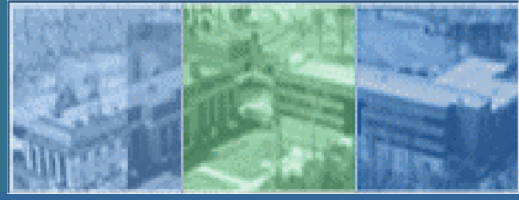
# Program Details

- Approximately $20 M over 3 years
- Includes 3 components
  - Scanning & convening
  - Projects
  - In-house research
- Projects require 50% matching funds



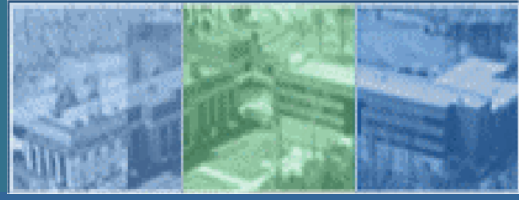
# Project Solicitation

- Broad Agency Announcement (BAA) in January 2007
- Suggested program areas
  - Highway safety
  - Planning and environment
  - Transportation policy
  - Traffic congestion reduction
  - Infrastructure solutions
  - Cross-cutting



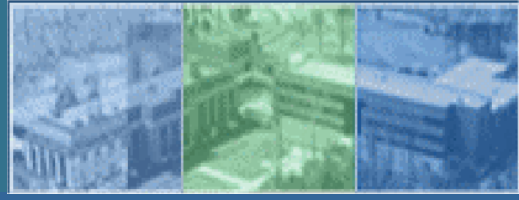
# Project Solicitation (continued)

- Nearly 400 pre-proposals received in April 2007
- 75 reviewers and 16 review panels
- Approx. 70 full proposals received in July 2007
- 11 projects selected for award
- Next year's solicitation strategy is being discussed



# ITS-Related Projects

- 7 of the 11 projects are ITS-Related
- The following slides highlight 6 of these projects
  - The 7th has not been awarded yet



# Project 1
# Intelligent Multi-Sensor for Vehicles

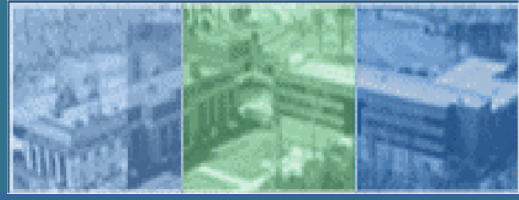
**Full Title:** Intelligent Multi-Sensor Measurements to Enhance Vehicle Navigation and Safety Systems

**Research Question:** How can we improve both lane detection systems and vehicle positioning to achieve near 100% availability?

**Objective:** Develop an accurate, robust, and reliable vehicle positioning system capable of high-update rate lane-level measurements for future vehicle navigation and safety systems. Integrated sensor fusion approach including lane departure warning (LDW) cameras, MEMS inertial sensors from vehicle ESC system, LIDARS for collision avoidance, and High Accuracy Nationwide Differential GPS (HA-NDGPS). The system will be tested on test track vehicles.



**Organization/Budget:** Auburn University ($640K)



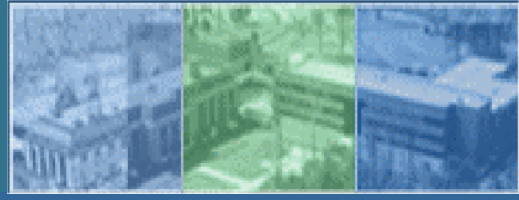
# Project 2
# Autonomous Vehicle Intersection Control

Full Title: Intersection Control for Autonomous Vehicles

Research Question: To what extent and how can an intersection control mechanism take advantage of autonomous vehicles to improve safety and efficiency?

Objective: Study the impacts of an intersection control "space-time reservation" system for autonomous vehicles. Through V2I communications, vehicles request and receive time slots for intersection traversal. Vehicle automation allows accurate delivery of vehicles at reserved time slot. This concept will be studied through simulation, physical robots, and a full size vehicle.

Organization/Budget: University of Texas at Austin ($2M)



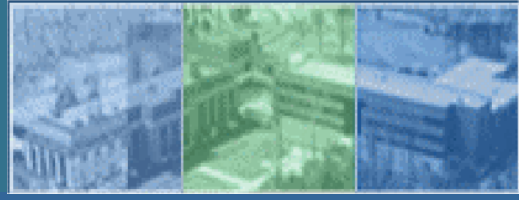
# Project 3
# Next Generation Smart Traffic Signals

**Full Title**: Next Generation of Smart Traffic Signals

**Research Question**: Can a *self*-adaptive traffic control system be an effective approach for large scale adoption of adaptive traffic control systems?

**Objective**: Develop and test a next generation traffic adaptive control system that is self-learning; eliminating the need for traffic signal operators to collect the data needed to set control parameters. Simulation analysis and limited field testing will be conducted; VII-enabled enhancements will be developed and tested.

**Organization/Budget**: University of Arizona ATLAS Center ($800K)



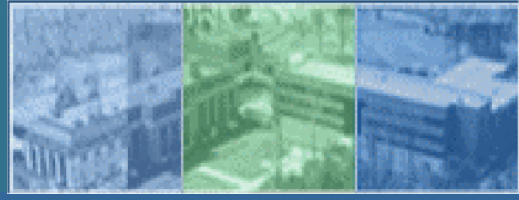
# Project 4
# Mobility Applications for VII

Full Title: Development and Evaluation of Selected Mobility Applications for VII

Research Question: Can VII-enabled applications be used to improve traffic flow on freeways, including heavy truck operations?

Objective: Develop and test VII-enabled applications to: 1) provide probe vehicle-derived speed advisories to drivers; 2) provide probe vehicle-derived adjustment commands to cooperative adaptive cruise control systems; and 3) enable heavy trucks to operate in close-formation automated platoons based on V2V communications. Each of these approaches will be modeled, designed, and prototype tested.

Organization/Budget: University of California PATH Program ($3M)



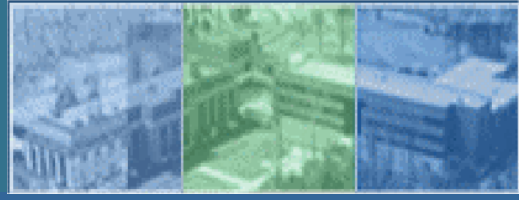
# Project 5
# Object Recognition for Pedestrian Sensing

Full Title: Layered Object Recognition System for Pedestrian Collision Sensing

Research Question: Can a vehicle-based pedestrian detection system be developed that can detect moving or stationary pedestrians with high accuracy and low false alarm rate?

Objective: Develop and test a vehicle-based pedestrian detection system that uses a vision-based layered processing framework. The system will include a collision prediction model that can be used in a collision warning system. Laboratory and real-time in-vehicle demonstrations will be included. Testing will be performed in the lab and on a real-time in-vehicle platform.

Organization/Budget: Sarnoff Corporation ($2M)



# Project 6
# Driver Visibility Requirements

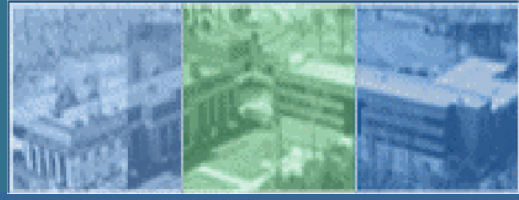
Full Title: Increased Understanding of Driver Visibility Requirements

Research Question: What visual information is needed, by either human drivers or automated systems, to navigate the road safely?

Objective: Compare the control theory for the sensory and driving capability of a robotic vehicle, developed as the 4D/RCS model, to the corresponding sensory requirements and driving performance of humans. Conduct laboratory tests for the scenario of nighttime road departure crashes on curves. Use the results to better understand the requirements of both automated control and effective human driving behaviors. Assess the visual requirements, for robots and humans, with respect to pavement markings, markers, and signs.



Organizations/Budget: Science Applications International



# For Additional Information

Bob Ferlis
FHWA Office of Operations R&D
202-493-3268
robert.ferlis@fhwa.dot.gov