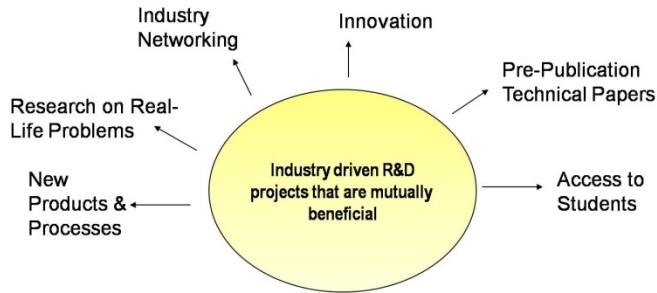




Smart Vehicle Concepts Center (SVC)

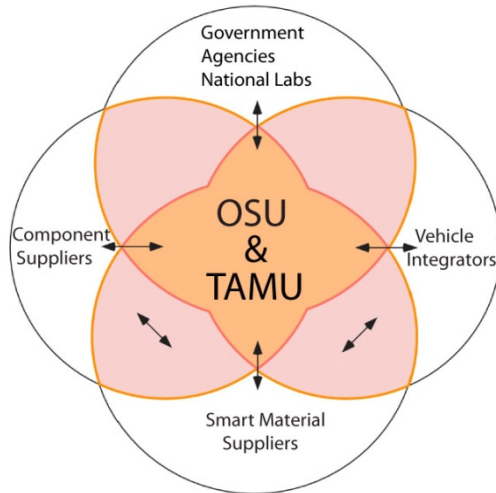
National Science Foundation - Industry/University Cooperative Research Center

Cooperative Center Concept - I/UCRC



The National Science Foundation (NSF) Industry/University Cooperative Research Center (I/UCRC) program provides industry, government, and other organizations the means to leverage research and development (R&D) investments with multi-university centers renowned for their innovative research capabilities.

- The NSF I/UCRC program encourages collaborative research
- Focuses on **pre-competitive** research
- Driven by Industry
- The NSF appoints an evaluator to ensure quality control



Smart Vehicle Concepts Center (SVC)

- **Lead Institution** – The Ohio State University (OSU)
- **Academic Partner** – Texas A&M University (TAMU)

Membership Fee Structure

The Ohio State University

- \$40K/year - Full Membership (One vote per full membership)
- \$10K/year - Affiliates (access to one ongoing project; no voting or intellectual property rights)

Texas A&M University

- \$50K/year - Full Membership (One vote per full membership)
- \$10K/year - Affiliates (access to one ongoing project; no voting or intellectual property rights)

Recent SVC Members

Advanced Numerical Solutions
 Army Research Laboratory
 The Boeing Company
 Goodyear Tire and Rubber Co.
 Moog Inc.
 Solidica
 Tokai Rubber, Inc.
 Transportation Research Center, Inc.

American Axle & Mfg.
 BorgWarner, Inc.
 Edison Welding Institute
 Honda R&D Americas Inc.
 NASA Glenn Research Center
 Space Engineering Institute

Industrial Advisory Board

- IAB will consist of one representative from each member company. The board is responsible for evaluating current research thrusts, suggesting new opportunities, evaluating center operations, and matching center capabilities with unfilled research needs.
- IAB holds two meetings throughout the year during the SVC review meetings.

SVC Mission

- Conduct basic and applied research
- Build an unmatched base of research, engineering education, and technology transfer with emphasis on improved vehicle performance;
- Develop well-trained engineers and researchers (at the undergraduate, MS, and PhD levels) with both experimental and theoretical viewpoints.

What Does the SVC Offer?

- Characterization of smart materials (using generic components)
- Comparative evaluation of existing materials or concepts
- Development of new sensors, actuators, and control algorithms
- New (revolutionary) design paradigms using smart materials
- Enhancement in functionality and performance
- Better understanding of vehicle constraints and environments
- New vehicle components and sub-systems
- Improved vehicle design and integration methods
- New or improved models for static, dynamic, or thermal responses
- Multi-domain/multi-physics modeling
- Tools to improve the vehicle developmental cycles
- Tools to understand the limits of existing components
- Explore technologies for new applications or markets
- Generation of scientific knowledge

Contact Information

Prof. Rajendra Singh Center Director
 Tel: 614-292-9044 <singh.3@osu.edu>
Prof. Dimitris Lagoudas TAMU Site Director
 Tel: 979-845-1604 <lagoudas@aeromail.tamu.edu>
Caterina Runyon-Spears OSU Office Associate
 Tel: 614-292-9044 <runyon-spears.1@osu.edu>





Research Thrusts at OSU and Some Sponsored Projects

Thrust A: Interfacial Mechanisms

- Electro-Hydrostatic Actuation and Sensing (E-HAS)
- Comparative Design Tool for Examining the Feasibility and Performance of Smart Engine Mounts
- Development of Interfacial Force Sensing Systems using Experimental and Computational Methods
- Adaptive Seat Belt System Using Smart Material Technologies
- Joining of Shape Memory Alloys and Structural Materials

Thrust B: Adaptive NVH

- Multifunctional Composites with Embedded Actuators, Sensors, and Stiffness Control
- Smart Material Database Compilation and Material Selection Tool Development (with Focus on Elastomers)
- Critical Assessment of Active Noise and Vibration Technology for Rotorcraft Gearboxes and Airframes
- Micro-Sensors for Sound Measurement

Thrust C: Safety

- New projects to be defined

Thrust D: Energy

- New projects to be defined

Research Thrusts at TAMU and Some Sponsored Projects

Thrust 1: Shape Memory Alloy Design and Processing

- Processing and Characterization of NiTiPd and NiTiPd-X Shape Memory Alloys for Aerospace and Space Exploration

Thrust 2: Shape Memory Alloy Material Characterization and Model Development

- Ni-rich Shape Memory Alloy Fatigue Testing and Modeling

Thrust 3: Engineering Application Design and Performance Evaluation of Shape Memory Alloys

- High Torque Shape Memory Alloy Motors

Pre-Competitive Research

- Overcomes basic obstacles that prevent a technology from being used in commercial applications
- Provides an understanding of the characteristics of new technologies or materials
- Is aimed at providing the tools, information, and data that enables others to develop future products and services
- Offers equal benefit to all competitors
- Develops industry standards and test procedures where no precedents exist

Benefits to Industry:

- Accomplish research at a fraction of the cost
- An avenue to investigate a topic of common interest
- Allow an industry to efficiently utilize the talents and resources of a university
- Platform for changing the university culture and inject ideas for relevant research
- Provide an excellent recruiting tool
- Leveraging: Nominal membership fee, when combined with cost-sharing and NSF money, gives members access to over **\$750K** of research



Key Project Leaders



Raj Singh

singh.3@osu.edu
(Donald D. Glower Chair in Engineering and Professor, Director of SVC)

Expertise: Noise & vibration control, geared systems, nonlinear dynamics, DSP



Marcelo Dapino

Dapino.1@osu.edu
(Assoc. Professor, OSU)

Expertise: Smart materials, nonlinear coupled systems, design, control



Greg Washington

Washington.88@osu.edu
(Interim Dean of Eng and Professor, OSU)

Expertise: Active material systems, vibration control, mechatronics



Dimitris Lagoudas

lagoudas@aeromail.tamu.edu
(John and Bea Slattery Chair of Aerospace Engineering and Professor, TAMU Site Director)

Expertise: Micromechanics of active materials and smart structures; shape memory alloys (SMA)



Ibrahim Karaman

ikaraman@tamu.edu
(Professor, TAMU)

Expertise: Micromechanical constitutive modeling; Twinning and martensitic phase transformation in metallic materials



Jim Boyd

jboyd@aero.tamu.edu
(Assoc. Professor, TAMU)

Expertise: Structural applications of multi-functional materials; nano and microelectromechanical systems; micro and nano scale electro-mechanics

SVC History

- In October 2005, the National Science Foundation awarded a planning grant to The Ohio State University to develop the Smart Vehicle Concepts Center.
- The Ohio State University held a planning conference in October 2006, after which it prepared proposals and signed-up members.
- The Smart Vehicle Concepts Center was officially launched in July 2007 with support from National Science Foundation and industrial members.
- Texas A&M University submitted a successful proposal to the National Science Foundation in early 2008 and joined SVC as an academic partner in summer 2008.

SVC Website

Please visit us online:

<http://smartvehiclecenter.org>

NSF Fact Sheet on the SVC:

www.nsf.gov/eng/iip/iucr/directory/svc.jsp

