IUCRC - Cooperative Center Concept and Benefits to Industry

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

- NSF program encourages collaborative research
- Focus on pre-competitive research
- Driven by Industry to efficiently utilize the talents and resources of a university
- The NSF appoints an evaluator to ensure quality control
- Accomplishes research at a fraction of the cost
- Provides an avenue to investigate topics of common interest
- Allows industry to efficiently utilize the talents and resources of academic institutions
- Provides an excellent recruiting tool
- Leveraging: A nominal membership fee, when combined with cost-sharing and NSF money, gives members access to over $1M per year of research and associated intellectual property

Industrial Advisory Board (IAB)

- The IAB consists of one representative from each industrial member. The IAB consists of one representative (two for multiple memberships) from each industrial member
- The board is responsible for evaluating current research thrusts, suggesting new opportunities, evaluating center operations, and matching center capabilities with unfilled research needs
- The IAB holds 2 meetings each year

Pre-Competitive Research Paradigm

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

Example SVC Sponsored Projects

- **Interfacial Mechanisms**
  - Development of Interfacial Force Sensing Systems using Experimental and Computational Methods
  - Characterization of Vehicle Subframes
  - Analysis of Automotive System Isolators
  - Inverse Identification Methods Applied to Radiator Mounts
  - Dynamic Friction Characterization of Icy Road Surfaces

- **Vibration, Noise, and Motion Control**
  - Ultrasonic Friction Control
  - Non-Contact Measurement, Visualization, and Analysis of a Smart Dynamic System
  - Hybrid Modeling Methods for Vehicle Subframes
  - Active and Passive Methods for Powertrain Vibration Control and Reduction of Noise Radiated from Shells
  - Morphing Panels for Aerodynamic Performance
  - Multifunctional Magnetostrictive Systems: Experiments and Computer Simulation

- **Machine and Material Diagnostics**
  - Characterization and Modeling of Rubber Bushings
  - Smart Condition Detection and Monitoring
  - Stress Field Development During Load Transfer in Functionally Graded Metal Matrix Composite Macro Interfaces

- **Manufacturing and System Integration**
  - Electro-Hydrostatic Actuation and Sensing (E-HAS)
  - Ultrasonically-Assisted Metal Forming
  - Characterization and Modeling of Hydraulic Bushings
  - Thermally Invariant Smart Composites
  - Mechanoluminescent Paintable Light Sources in Automotive Lighting Systems
  - Additive Manufacturing for Automotive Structures
  - Magnetic Gearing

Smart Vehicle Concepts Center (SVC) History

- The Smart Vehicle Concepts Center was officially launched in July 2007 with support from NSF and industrial members
- Phase I: 2007 - 2012
- Texas A&M University joined SVC as an academic partner from summer 2008 to spring 2013
- SVC was renewed for another 5 years (Phase II: 2012 – 2017) effective July 1, 2012 as a single-site center
- SVC was renewed for another 5 years (Phase III: 2017 – 2022) effective August 1, 2017
SVC Faculty & Research Staff

Marcelo Dapino
Honda R&D Americas Chair; Professor; Director of SVC

Leon Headings
Senior Research Associate

Hanna Cho
Assistant Professor

David Hoelzle
Assistant Professor

Vicky Doan-Nguyen
Research Assistant Professor

Scott Noll
Research Assistant Professor

Luke Fredette
Post-Doctoral Researcher

Raj Singh
Emeritus Professor

Bryant Gingerich
Research Associate

Soheil Soghrati
Assistant Professor

Ryan Hame
Assistant Professor

Vishnu Sundaresan
Associate Professor

SVC Mission
- Conduct basic and applied research on ground and aerospace vehicle components and systems
- 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 SVC Offer?
- Comparative evaluation of existing materials or concepts
- Development of new sensors, actuators, and control algorithms
- New (revolutionary) design paradigms using smart materials
- Better understanding of vehicle constraints and environments
- New vehicle components and sub-systems
- New analytical and computational models
- Tools to improve vehicle development cycles and understand the limits of existing components

SVC Companies

| American Axle & Manufacturing | Former Member |
| Advanced Numerical Solutions | Former Member |
| Army Research Laboratory | Former Member |
| Battelle Memorial Institute | Current Member |
| BorgWarner | Former Affiliate |
| Bridgestone Americas Tire Operations, LLC | Former Member |
| Eaton Innovation Center | Former Member |
| Edison Welding Institute | Former Member |
| Ford Motor Company | Current Member |
| Ftech R&D* | Former Member |
| Goodyear Tire & Rubber | Former Member |
| Honda R&D Americas Inc.* | Former Member |
| Hyundai-Kia Motors* | Former Member |
| LMS Software | Former Member |
| MIT Lincoln Laboratory | Former Member |
| Moog Inc. | Current Member |
| MSC Software | Invited Observer |
| NASA Glenn Research Center | Current Member |
| Owens Corning | Former Member |
| Parker Hannifin | Current Member |
| REL, Inc. | Former Member |
| Romax | Invited Observer |
| Solidica | Former Member |
| Tenneco, Inc. | Former Member |
| The Boeing Corporation | Former Member |
| Tokai Rubber | Former Member |
| Toyota Research Institute, N.A. | Current Member |
| Transportation Research Center, Inc.* | Current Member |
| YUSA | Current Member |

*Indicates 2 or more memberships

SVC Memberships

<table>
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<tr>
<th>Membership Type</th>
<th>Money per Year</th>
<th>Project Decisions</th>
<th>Vote</th>
<th>IP Access</th>
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SVC Website
Please visit us online:
http://smartvehiclecenter.org/
https://svc.osu.edu

NSF Fact Sheet on the SVC:
http://www.iucrc.org/center/smart-vehicle-concepts

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Contact Information
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Information on the semi-annual and annual SVC meetings is posted here:
https://svc.osu.edu/meetings

Membership Fee Structure

For membership details, visit our page at
https://svc.osu.edu/membership

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Combined Expertise: Smart materials and structures; High power ultrasonics; Additive manufacturing, structural acoustics; Vibration energy harvesting; Nonlinear dynamics; Structural dynamics; Jointed assemblies; Inverse methods; Noise & vibration control; Dynamic simulation; DSP; Advanced FEM; Modeling multiscale response of advanced/bio-materials and structures; Piezoelectric materials; Active polymers; Bio-derived materials; Magnetostrictive materials; Electromechanical signal processing and sensing; Synthesis, in-situ structural characterization; Nonlinear NEMS/MEMS; AFM cantilever dynamics