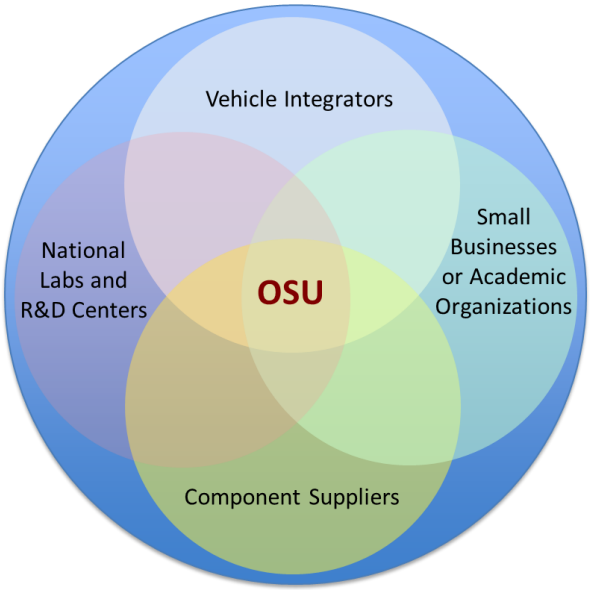
THE OHIO STATE UNIVERSITY

Smart Vehicle Concepts Center (SVC)

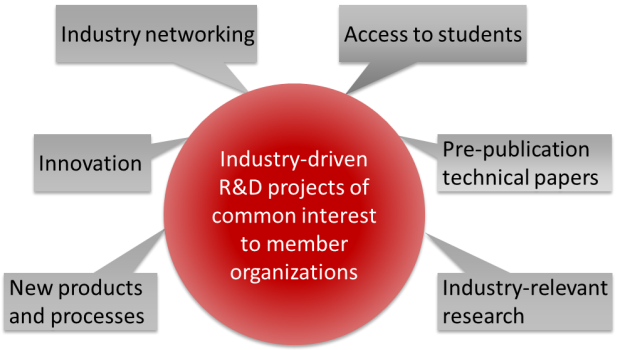
National Science Foundation Industry-University Cooperative Research Center (est. 2007)



The Ohio State University

Phase I: 2007 – 2012
Phase II: 2012 – 2017
Phase III: 2017 – 2022

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 re-sources 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 Core Faculty

Marcelo Dapino
Honda R&D Americas Designated Chair Professor; Director of SVC
Expertise: Smart materials; Nonlinear coupled systems; Design; Control

J.P.Chen
Associate Professor
Expertise: Computational fluid dynamics; CFD simulation and coding; Turbulence modeling; Turbomachinery

Hanna Cho
Assistant Professor
Expertise: Nonlinear NEMS/MEMS; AFM cantilever dynamics; Multi-functional ferroelectric material energy

Vicky Doan-Nguyen
Assistant Professor
Expertise: Synthesis; In-situ structural characterization; Smart materials; Advanced materials for energy storage/ conversion

Ryan Harne
Assistant Professor
Expertise: Structural acoustics; Vibration energy harvesting; Nonlinear dynamics

David Hoelzle
Assistant Professor
Expertise: Learning/adaptive control systems; Additive manufacturing processes; Microsystems for mechanobiology research; Dynamics systems analysis

Raj Singh
Emeritus Professor
Expertise: Noise & vibration control; Geared systems; Nonlinear dynamics; DSP

Soheil Soghrati
Assistant Professor
Expertise: Advanced FEM; Modeling multiple response of advanced/bio-materials and structures

Vishnu Sundaresan
Associate Professor
Expertise: Piezoelectric materials; Active polymers; Bio-derived materials

SVC Affiliated Faculty and Research Staff

V. Siva C. Chillara
Postdoctoral Associate

Luke Fredette
Postdoctoral Associate

M. Bryant Gingerich
Research Associate

Leon Headings
Senior Research Associate

Nicholas Mastricola
Postdoctoral Associate

Scott Noll
Research Assistant Professor

Prasant Vijayaraghavan
Postdoctoral Associate

SVC Companies	Status
American Axle and 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**
F.tech R&D*	Former Member
Goodyear Tire & Rubber	Former Member
Honda R&D Americas Inc.*	**Current Member**
Hyundai-Kia Motors*	Former Member
LMS Software	Invited Observer
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	Former Affiliate

**Indicates 2 or more memberships*

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
- Explore technologies for new applications or markets

www.SmartVehicleCenter.org

Contact Information

Prof. Marcelo Dapino
Center Director
E-mail: dapino.1@osu.edu

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

Membership Type	Money per Year	Project Decisions	Vote	IP Access
Member	Per Membership Fee Schedule		1 per membership (limit 2)	Yes
Solo Guaranteed Project	Membership Fee +Project Fee +Admin Fee	Project is guaranteed		
Umbrella Project	Membership Fee +Admin Fee	Made by the IAB		
Affiliate	Same as Project Fee	No Say	0	Limited to one project only
Invited Observer	In-kind ($10K+)	No Say	0	No
Observer	In-kind (<$10K)	No Say	0	No

Center Year	2017	2018	2019	2020	2021-22
Membership Fee (a)	$40K	$40K	$40K	$40K	$40K
Project Fee (b)	$12K	$14K	$16K	$18K	$20K
Admin Fee (c)	$5.2K	$5.4K	$5.6K	$5.8K	$6K
Cost of Solo Membership (a + b + c)	$57.2K	$59.4K	$61.6K	$63.8K	$66K

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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