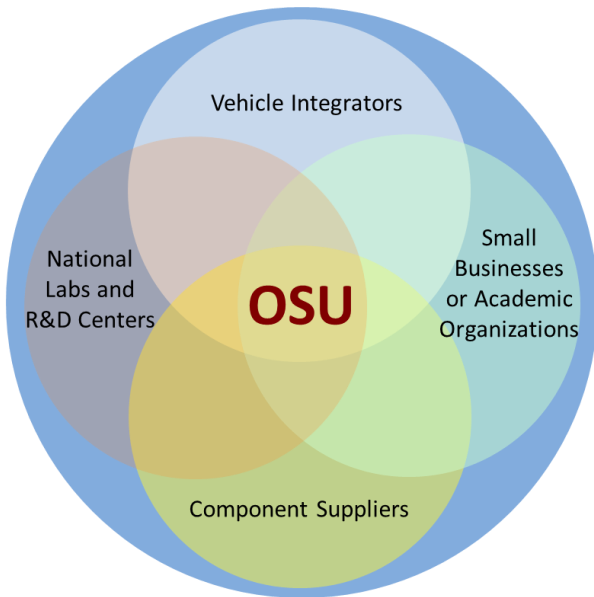


Smart Vehicle Concepts Center (SVC)

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



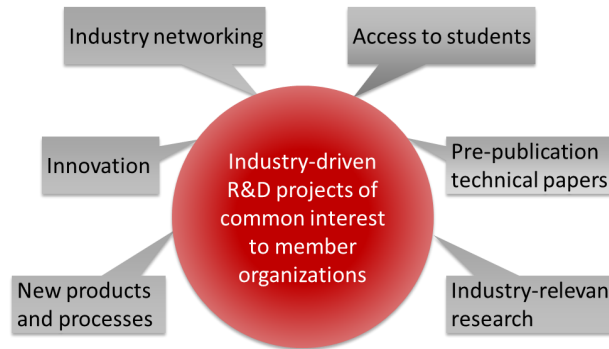
The Ohio State University

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 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: Characterization, Constitutive Modeling, System Integration (Sensors, Actuators, Dynamic Simulation)

- Characterization and modeling of rubber bushings
- Analysis of automotive system isolators
- Inverse identification method for radiator mounts
- Multiscale finite element simulation of the mechanical behavior of fiberglass insulation
- Dynamic friction characterization of icy road surfaces

Safety, Comfort, and Health Monitoring: Machine and Material Diagnostics, Human-Machine Interface, Strain Energy Management

- Smart condition detection and monitoring
- Mechanoluminescent paintable light sources in automotive lighting systems
- Embedded fiber optic sensors for structural health monitoring
- Architecture for mechanoluminescent structural sensors and sensing platforms
- Multifunctional structural panels with electroluminescence
- Distributed programmable actuation platforms
- Dynamic self-reforming lithium/solid electrolyte interface for solid-state battery

Adaptive Noise, Vibration, and Harshness (NVH): Active Noise and Vibration Control, Adaptive Structures, System Integration

- Morphing panels for aerodynamic performance
- Multifunctional magnetostrictive systems: experiments and computer simulation
- Multifunctional structural polymer composites for vehicle electrification
- Flexible piezoelectric sensors for vehicle applications

Emerging Vehicle Technologies: Vehicle Electrification, Autonomous Vehicles, Lightweighting

- Vibration damping and energy harvesting
- Effect of ultrasonic additive manufacturing (UAM) process on manufactured parts
- Ultrasonic additive manufacturing: process modeling, structural reinforcement, multi-material joining reinforced polymers
- Magnetic gears and geared drives
- Smart restraints for autonomous vehicles

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



Ardeshir Contractor
Professor of Practice
 Expertise: Solar energy; Smart grids; Electric mobility; Renewable energy storage; Materials for energy



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



Sheng Dong
Research Assistant Professor
 Expertise: Ultrasonic lubrication; Dynamic system modeling; Structural health monitoring



David Hoelzle
Associate Professor
 Expertise: Learning/adaptive control systems; Additive manufacturing processes; Microsystems for



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



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



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

SVC Companies

American Axle and Manufacturing	Former Member
Advanced Numerical Solutions	Former Member
Army Research Laboratory	Former Member
Autoliv	Committed 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	Former 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, Inc.*	Current Member
Transportation Research Center, Inc.*	Former Member
YUSA	Former Affiliate

*Indicates multiple memberships **Invited Observer

Status

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



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			
Solo Guaranteed Project	Membership Fee +Project Fee +Admin Fee	Project is guaranteed	1 per membership (limit 2)	Yes
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:
<https://svc.osu.edu>

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