

Education

Every year, more than twenty undergraduate students and ten graduate students work side-by-side on a variety of projects related to the research that is conducted at AVDL. The vast majority of these students are employed by our sponsors. This provides an effective way of transferring technology from our laboratory to their organization and provides sponsors with an in-depth evaluation of their recruits.



Sponsors

- General Electric Transportation Systems
- Volvo Trucks North America
- Goodyear Tire and Rubber Company
- Visteon Automotive Systems
- Lear Corporation
- Lord Corporation
- National Science Foundation (NSF)
- Federal Highway Administration
- Raytheon Corporation
- Koni Suspensions
- Naval Surface Warfare Center (NSWC)
- United Defense, L.P.
- Association of American Railroads

Mission

The Advanced Vehicle Dynamics lab exists to:

- Provide innovative and cost effective solutions in our areas of expertise to improve our sponsors' technologies, products, and market share.
- Create a productive environment for educating both graduate and undergraduate students to better serve their future employers.
- Support state-of-the-art basic scientific and experimental research in the area of vehicle dynamics

About the Director of AVDL



Dr. Corina Sandu
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Dr. Sandu received her Ph.D. from The University of Iowa in December 2000. After working at Michigan Tech as a visiting and research faculty member from 2001 to 2003, Dr. Sandu came to Virginia Tech in August 2003 as an assistant professor of Mechanical Engineering. She has served as an associate director of the Advanced Vehicle Dynamics Lab from September 2003 to September 2004.



About the Director of CVeSS



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Dr. Ahmadian received his Ph.D. from State University of New York (SUNY) at Buffalo in 1984 and went on to teach at Clemson University from 1984 to 1987. After working at Lord Corporation as a Staff Engineer and at General Electric Transportation Systems as a Lead Design Engineer, Dr. Ahmadian came to Virginia Tech in 1995. He is the founding director of AVDL, a position he held until September 2004, and is currently a Professor of Mechanical Engineering and Director of the Center for Vehicle Systems and Safety.



Advanced Vehicle Dynamics Lab

<http://www.avdl.me.vt.edu>



About the Lab...

The Advanced Vehicle Dynamics Lab (AVDL) at Virginia Tech was established in 1995 by Dr. Mehdi Ahmadian, professor in mechanical engineering. The lab has already obtained more than two million dollars of funded research in the areas of vehicle dynamics and control. Several other faculty members in the College of Engineering bring their expertise to the AVDL as well. Currently, the lab is served by several visiting scholars, graduate research assistants, and undergraduate students. Dr. Corina Sandu became the director of AVDL in 2004. The lab is now part of the Center for Vehicle Systems and Safety (CVeSS).

Research

The current projects at AVDL can be divided into six broad categories:

- Suspensions
- Noise and Vibration
- Vehicle Dynamics
- Terramechanics
- Multibody System Dynamics
- Biodynamics



2-Post Rig for Vehicle Noise and Vibration Analysis

Suspensions

- Application of controllable Magneto Rheological (MR) dampers to industrial and advanced applications
- Dynamic and kinematics analysis of heavy truck suspensions
- Design and analysis of controllable seat suspensions for heavy vehicles
- Impact of heavy truck suspensions on road damage



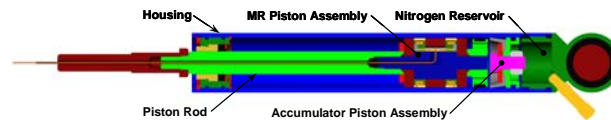
Single Suspension Test Rig

Noise and Vibrations

- Applying advanced piezoceramic materials for reducing noise and vibrations in ground vehicles
- Identifying the source of noise and vibration problems
- Reducing noise and vibrations using passive and piezoceramic (smart) damping material in vehicles such as cars, highway trucks, locomotive cabs, and farm tractor cabs.

Vehicle Dynamics

- Mathematical modeling and numerical analysis, as well as field-testing of vehicles
- Dynamic analysis of a single suspension, tire, seat assembly, or other subsystems of a vehicle
- Analytical modeling and computer simulation of tracked vehicles to evaluate their dynamic performance and off-road mobility



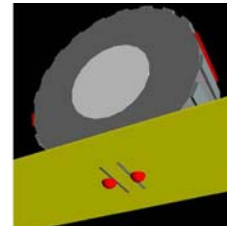
Semi-active Primary Suspension for Passenger Vehicles

Terramechanics

- Developing mathematical models to capture the vehicle-terrain interaction for wheeled and tracked off-road vehicles



Simulation of an M1A1 Tank on Washboard Terrain



Modeling of a Tractor Tire on Soft Soil

Multibody System Dynamics

- Efficient treatment of multibody dynamic systems with uncertainties
- Develop novel control methodologies for complex nonlinear mechanical systems

BioDynamics

- Studying the effect of vehicle noise and vibrations on human body comfort and fatigue and cognitive performance



Seat Suspension Tester



Seat Testing

Facility & Equipment



Test Rig for Evaluating the Kinematics and Dynamics of Heavy Truck Suspensions

AVDL enjoys a wide range of facilities and equipment which are housed in four different laboratories across the Virginia Tech campus, for a total of 8000 square feet of lab space.

The AVDL facilities include:

- Heavy truck suspension test system
- Single-axle-on-vehicle suspension test system
- Single suspension test rig
- Seat dynamic test system



Heavy Truck Suspension Dynamic