CLEMSON
The Future of Mobility: Talent Needs
Zoran Filipi
Director, School of Mechanical and Automotive Engineering
Smoky Mountains Mobility Conference
Tuesday October 24th, 2023
Smoky Mountains Mobility Conf. 2023

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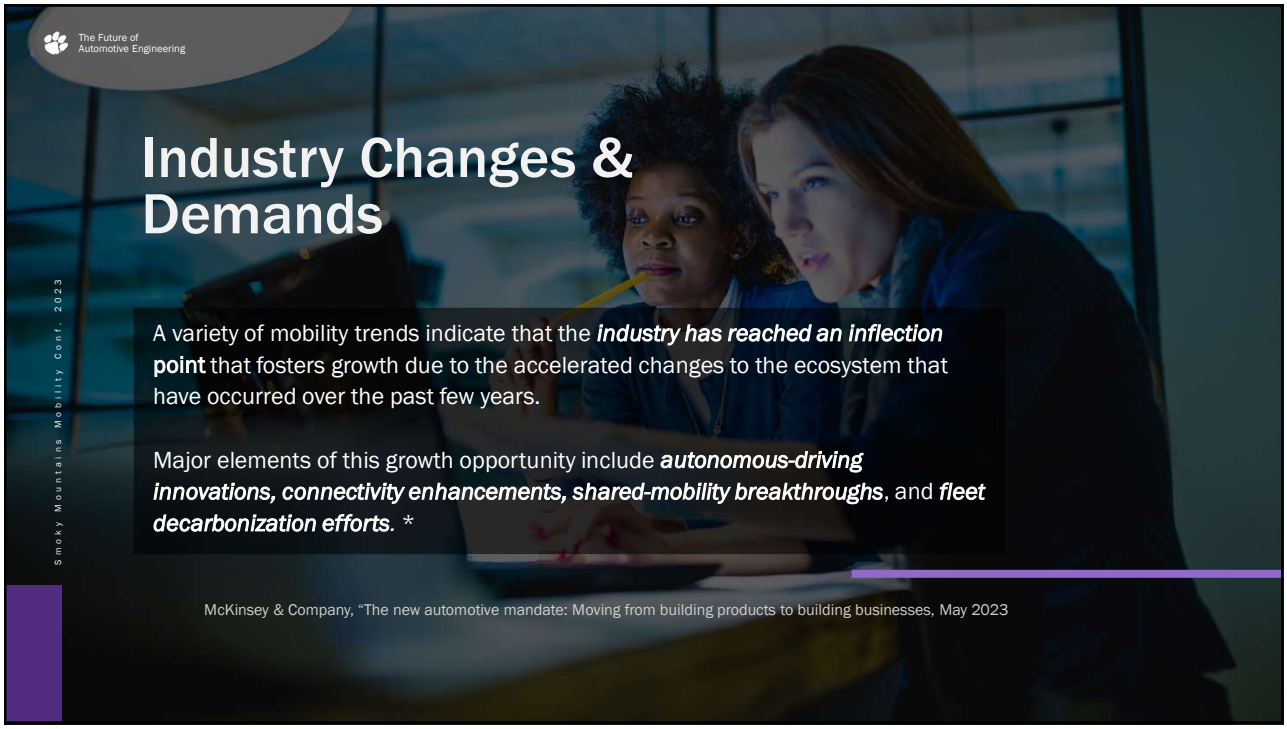
The Future of Automotive Engineering
Industry Changes & Demands
A variety of mobility trends indicate that the industry has reached an inflection point that fosters growth due to the accelerated changes to the ecosystem that have occurred over the past few years.
Major elements of this growth opportunity include autonomous-driving innovations, connectivity enhancements, shared-mobility breakthroughs, and fleet decarbonization efforts. *
McKinsey & Company, "The new automotive mandate: Moving from building products to building businesses, May 2023
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The Future of Automotive Engineering

Ten Technology Clusters*

- E-Hailing
- Semiconductors
- Autonomous Vehicle Sensors
- AI, Computing and Connectivity
- Electric Vehicles & Charging
- Batteries
- AV Software & Mapping
- Telematics & Intelligent Traffic
- Back End / Cybersecurity
- HMI & Voice Recognition

McKinsey & Company

*As identified by McKinsey & Company

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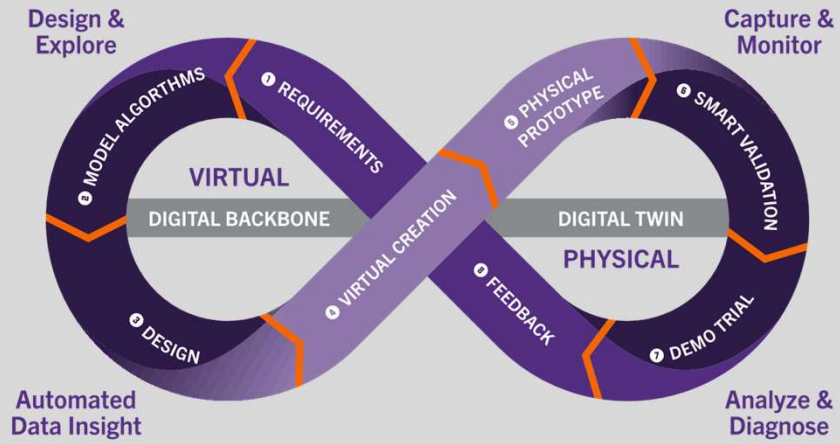
Digital Engineering Paradigm for Design of Complex Vehicular Systems



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Talent Deficit

- Transformation of the automotive industry will require aggressive investment in top talent with multidisciplinary skills, including software and human factors
- Forecasts predict creation of 115,000 automotive jobs in US by 2028*, and a 15% increase in SC from the current 72,000

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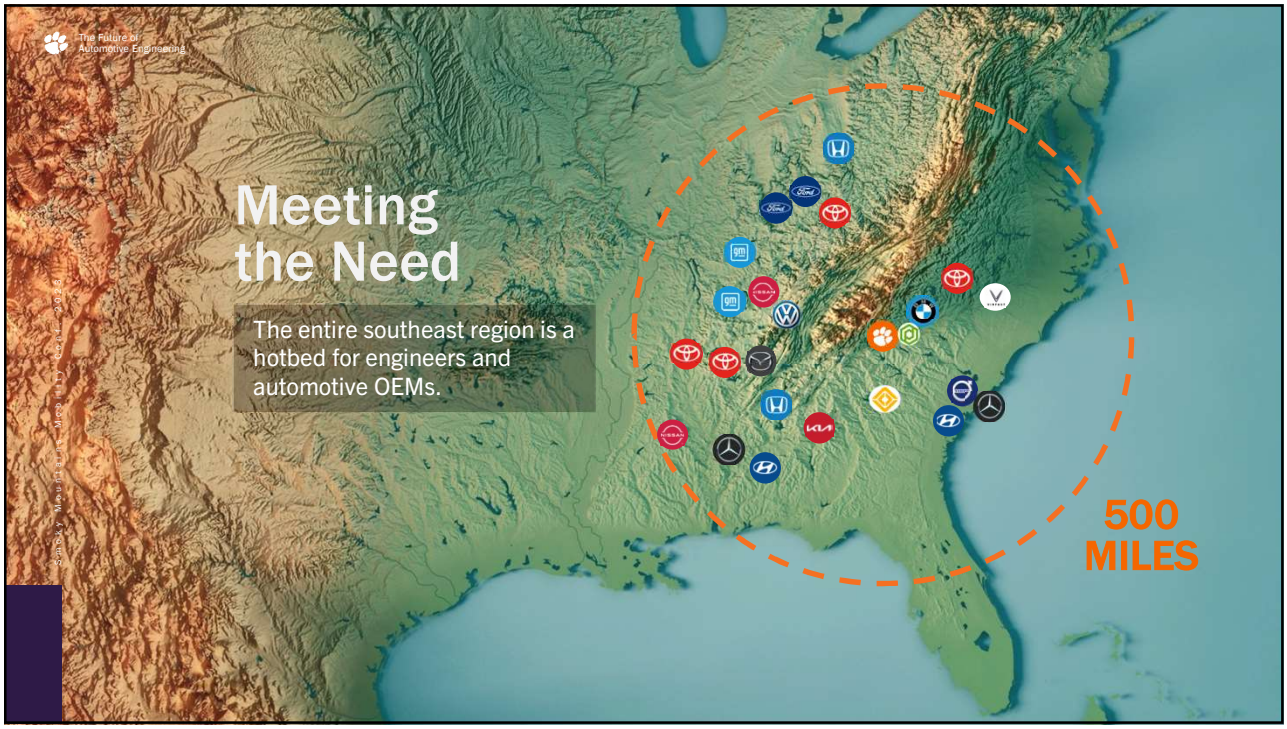

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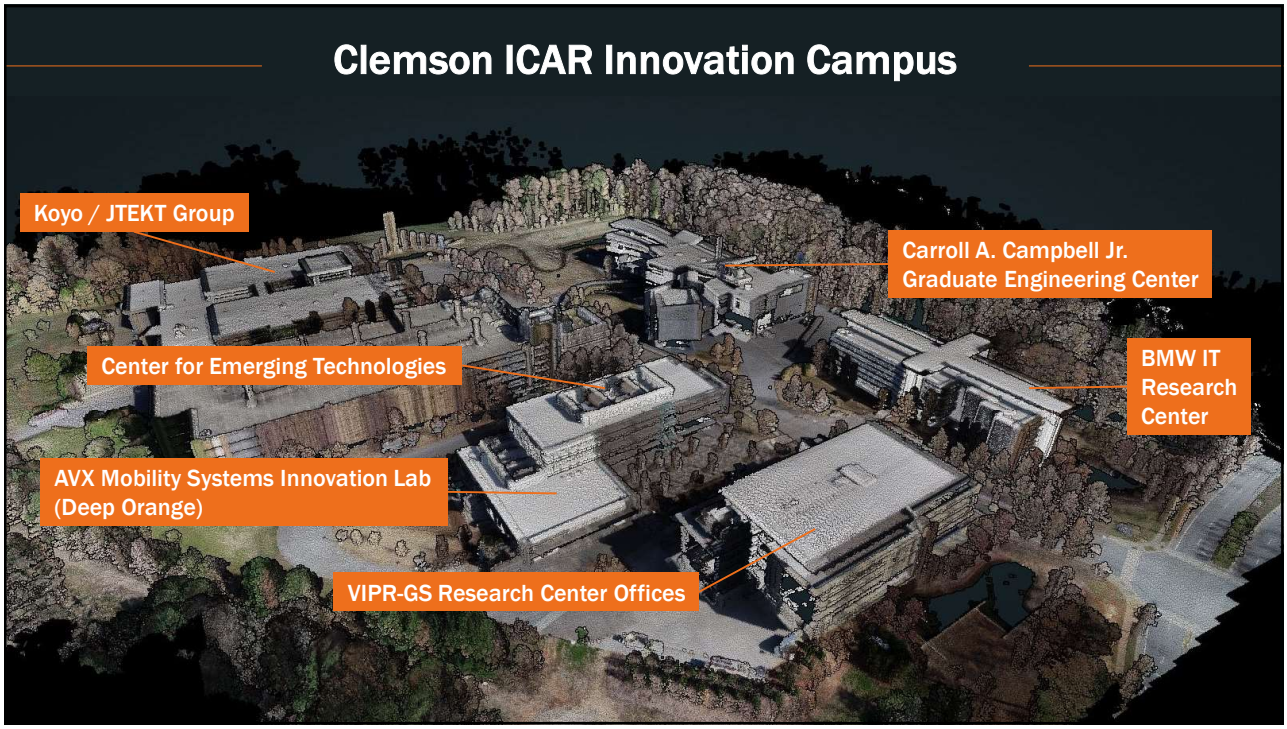
Clemson ICAR Innovation Campus
Koyo / JTEKT Group
Carroll A. Campbell Jr. Graduate Engineering Center
Center for Emerging Technologies
BMW IT Research Center
AVX Mobility Systems Innovation Lab (Deep Orange)
VIPR-GS Research Center Offices

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Department of
AUTOMOTIVE ENGINEERING
Automotive Engineering ≠ Mechanical World anymore. AuE faculty cover a wide range of disciplines.
Graduate program, MS and PhD, curriculum developed from ground up, with emphasis on critical disciplines and system integration.

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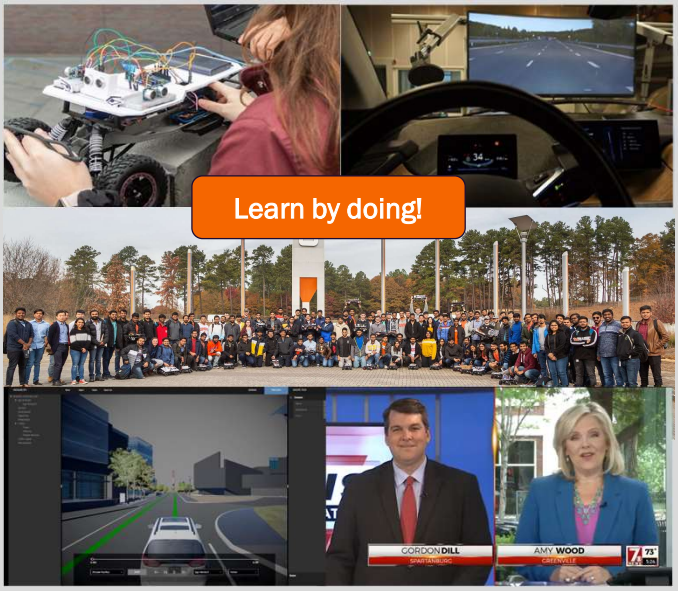
Courses in Automation

Courses Developed

- AuE 660: Dynamics of Vehicles
- AuE 693: Data Science
- AuE 820: Perception and Intelligence
- AuE 822: Autonomy: Mobility & Manipulation
- AuE 823: Autonomy: Science and Systems
- AuE 824: Autonomous Driving Technologies
- AuE 826: Vehicle Diagnostics
- AuE 827: Automotive Control Systems
- AuE 835: Automotive Electronics Integration
- AuE 836: Scaled Autonomous Vehicles
- AuE 850: Vehicle Stability and Safety
- AuE 893: Robust Predictive Control
- AuE 893: Cyber Physical Systems
- AuE 893: Computing & Simulation for Autonomy
- AuE 893: Deep Learning



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System Integration and Experiential Learning

Prepare students for successful careers in industry through project-based learning

Create a simulated industry R&D environment

Take the MS cohort through a complete product development process in two years

ENGINEERING, COMPUTING AND APPLIED SCIENCES

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The Future of Automotive Engineering

The Impact: Changing Society

Sustainability by Design

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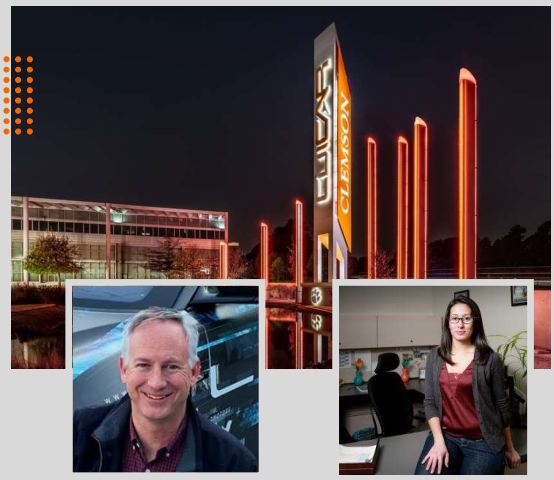
The Future of Automotive Engineering

Next: Continuing to Innovate

Clemson responded to the needs of industry by creating a graduate-level Automotive Engineering program in the mid 2000's.

- Graduated nation's first Ph.D. in Automotive Engineering in 2009 and nation's first female Ph.D. in Automotive Engineering in 2012
- Every year another 70-80 graduate with MS degree, and ~10 with PhD; employers include BMW, Ford, Tesla, Rivian, Volvo, Stellantis, GM, Apple etc.
- **Lessons learned from M.S. & Ph.D. programs will assist in launching the first Bachelor of Science in Automotive Engineering in the US.**



John Limroth, Ph.D., 2009
Current Director ADAS/AD Engineering for Lucid Motors

Jackeline Rios Torres, Ph.D., 2015
Eugene P. Wigner Fellow, Technical lead, DOE SMART Mobility consortium, ORNL

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The Future of
Automotive Engineering
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NEW Automotive Engineering Undergraduate Degree
Program Structure
A true multidisciplinary systems integration degree
How elements of automotive, mechanical, electrical, materials science, computer science, human factors, and more, work together
Experiential learning components

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The Future of
Automotive Engineering
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NEW Automotive Engineering Undergraduate Degree
Unique Senior Capstone
Seniors can work as part of the world-renowned Deep Orange program
Work alongside MS students to build a one-of-a-kind vehicle prototype
Can also work on research under faculty members in state-of-the-art lab space or research centers at CU-ICAR
CLEMSON COMPOSITES CENTER
AIM for composites
CLEMSON VIPR-GS
CLEMSON UNIVERSITY VEHICLE ASSEMBLY CENTER
DEEP ORANGE

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