NRITS:
Connected and Autonomous Vehicle Initiatives in Tennessee

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THE UNIVERSITY OF
MEMPHIS.

About the FedEx Institute:

- The Institute is the premiere advanced research organization in Memphis

- The Institute is the front door to research on the University of Memphis campus

- The Institute serves a vital role in promoting technology skills development in Memphis

- The Institute is a hub for technology innovation across the Mid-South

About the FedEx Institute:

- Research Cluster Initiatives:
  - Biologistics
  - Cybersecurity
  - Institute For Intelligent Systems
  - Mobile Data 2 Knowledge

  - DRONES – Drones, Robotics, and Autonomous Systems

Research Clusters: DRONES

The DRONES cluster at the FedEx Institute is committed to the development of innovative research, corporate partnership, an community engagement in all aspects related to Drones, Robotics, and Navigation Enabled Systems (including autonomous vehicles).

We help:

- Provide proactive leadership to the emerging community of commercial unmanned systems users in the Mid-South area.

- Develop training and education programs which provide valuable skills development.

- Cooperate with national leadership in unmanned systems and robotics to develop standards and practices for rapid dissemination of emerging technologies to commercial markets.

Research Clusters: DRONES: Research Awards

As part of the University of Memphis' push to develop strong research competencies in robotics, autonomous vehicles and drones, the FedEx Institute of Technology has granted research awards for the following projects:

- ***Application of Amphibious Drone Technology to Enable Environmental Monitoring and Sampling to Support Disaster Response and Drinking Water Resource Protection*** *(William Alexander) - Investigation into multiple aspects related to amphibious air-to-surface-water drones for water sampling applications.*

- ***Deep Learning Enabled Non-invasive Cognitive Interface: Where Machine Meets the Mind*** *(Mohammed Yeasin) - The development of a natural yet accurate cognitive state/events/activities enabled interface for machine (for example, drone and robot).*

- ***Enhancing Human Capabilities Using Unmanned Systems and Drones*** *(John Hochstein, Robert Pap) - New work based upon projects by Dr. Chuck Jorgensen with aircraft programs that Robert Pap did for NASA Hypersonic programs, which have evolved into autonomous boats and aircraft programs.*

- ***Considering the Potential Impact of Autonomous Vehicles on Transportation Planning and Equity in Memphis*** *(Charles Santo) - Research on the potential impact of autonomous vehicles ("driverless cars") on transportation planning and on urban form in Memphis.*

- ***Secure Information Sharing Among Autonomous Vehicles*** *(Lan Wang) - The development of a prototype data sharing system for autonomous driving that will run over Named Data Network (NDN) [8], a new data-centric network architecture.*

Research Clusters: DRONES: Research Awards

- ***Engineering Novel Lightweight Supercapacitor: Batteries for Ultra-Light-Vehicles*** *(Sanjay Mishra_ - Developing novel light supercapacitor batteries for futuristic energy applications related to ultra-light vehicles including drones.*

- **Restoring Damaged Metallic Parts of Robots, Autonomous Vehicles and Drones by Additive Manufacturing** (Ebrahim Asadi) - *Establishing of a multiphysics computational framework and tool to predict the residual stresses and temperature map in the damaged metallic key-parts of robots autonomous vehicles, and drones (RAVD) that are rapidly restored using Additive Manufacturing (AM) without disassembling the parts from the system.*

- **Investigating the Impact of Adopting/Using Drones on the Bargaining Power of Farmers in a Contract Process** (Euntae Lee, Hyungchul Kim) - An investigation of the impact of adopting/using drones or UAVs (Unmanned Aerial Vehicle) on the bargaining power of farmers in a contract process.

- **Integrated Platforms and Algorithms of Multisensory Data Capture and Decision Support for Autonomous Vehicles** (Robert Kozma) - *Addressing several key components of the DRONES initiative in the area of autonomous navigation and control of vehicles and drones using integrated platforms and algorithms of multisensory data capture and decision support in dynamically changing, complex environments.*

- **Drone Journalism Course Development** (Darin Devault) - *Developing of an unmanned aerial systems course designed to implement drones for journalistic purposes. This course, the first of it's kind in Tennessee, represents a push in the intergration of unmanned systems in a variety of industries from the FedEx Institute.*

These are NDA's with FedEx - cody said to ask if they should be listed. – YES - WILL NEED INFO

Wireless Vehicle Navigation

Sensor Selection for Robotic Inspection of Aircraft

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Autonomous Vehicles in Tennessee

The Fundamental Areas of Concern:

- Infrastructure
  - Foresight for integration

- Collaboration
  - Key industries working in concert to address fundamental concerns

- Adoption
  - Creating the opportunity for experience and experimentation with utilization

- Imagination
  - Perception is framed by our experiences

Thank You