CALL FOR RESEARCH PROPOSALS

The Cluster for Robotics, Autonomous Vehicles, and Drones (CRAVD) at the University of Memphis represents an interdisciplinary collaborative effort focusing on research, education, and technology transfer at the University’s FedEx Institute of Technology. CRAVD comprises a consortium of experts in robotics, autonomous vehicles, and drones, who provide proactive leadership and cohesion to the region’s interests in these state-of-the-art challenges. Private corporations, non-profit agencies, and state government agencies in Tennessee are joining together to tackle pertinent public policy questions and to find ways to incorporate these exciting new technologies in innovative ventures that drive the state’s economic growth and social development.

Robotics, autonomous vehicles, and drones are closely related through a variety of tasks and technologies including navigation, mobility, machine vision, pattern recognition, sensor-based movement, and big data. The ultimate goal is to tie all of these together in a mutually supportive way to create substantially autonomous and highly useful mobile platforms. The CRAVD initiative is calling for proposals from faculty in all Colleges at the University of Memphis for interdisciplinary research pertaining to any aspect of robotics, autonomous vehicles and drones including their social impacts on society and regional development. In addition to the technologies involved, the CRAVD initiative wishes to include such factors as financial, risk, legal, and other supplemental areas of concern. It seeks to provide seed funding to 10-12 initial pilot projects, averaging about $12,000 each that will help establish the University as the premier integrative research hub for such autonomous mobile platforms. Proposals should be between 5 and 6 pages in length (Word or PDF format) and include the following: justification for research, theoretical basis, research method, contribution to both theory and practice, timeline and a short budget. Applicants are also encouraged to specify in their proposals’ opportunities and mechanisms for data collection and collaboration with industry, community and government partners.

Priority will be given to proposals that can: 1) directly benefit our regional community, corporate, and government partners; 2) yield advanced content that can be included in CRAVD’s training and certification products; and/or 3) bring new ideas to CRAVD’s interdisciplinary research portfolio. Faculty whose proposals are selected for funding will be designated as CRAVD Research Fellows.
of the FedEx Institute of Technology. They will also be required to present their research at CRAVD’s annual Research Workshop.

Some specific examples of areas of research interest include the following, but faculty are encouraged to propose other interdisciplinary topics as well:

**Engineering and Computer Science**
- Current state-of-the-art of robotics, autonomous vehicles and drone
  - Navigation inside vs. outside buildings
  - Navigation in special-purpose facilities (wires in floors, reflectors on walls)
  - Robotic machine vision and self-learning
  - Ability to move across a space: rolling, flying, or walking
  - Autonomous sensing platform for environmental data capture
- Drone-based machine vision platform for recognizing and tracking objects
- Manipulation and lift capabilities with a variety of materials
  - Energy density and sources
  - Power sources such as electricity and compressed gas
  - Communication and data capture
  - Telepresence
  - Long-range communication (i.e. to drones)
  - Wi-Fi and Bluetooth capabilities with mobile platforms
  - Real-time data capture and “big data”
    - Data capture from sensors
    - Sensor-based animation
    - Visualization
  - Lidar use in mobile platforms
  - Security drones
  - Flying RFID capture system
  - Tethered drones
- Camera mounted on a mobile platform for environmental data capture

**Finance, Marketing, Management, and Legal**
- Financial considerations of autonomous platforms
- Technical feasibility and capability plotted against financial considerations and risk
  - “Eye-in-the-sky” object location
- Task management of semi- or fully-autonomous systems
- Maintenance considerations for semi- or fully-autonomous systems
Reputation management with associated risks and opportunities
Public relations value of using autonomous mobile platforms
Human-robotics system implementation
Hybrid workforce considerations
Human-robot communication mechanisms
Making robots look more “human”
Legal considerations of robotics
Legal considerations of drones
Legal considerations of autonomous vehicles

**Operations Research and Operations Management**
Exploring new business models
Linking operations to new business models
Warehouse operations
Ways of handling returns

**Social Impacts, Video Production and Journalism**
Technical issues in shooting video from drones
Commercial applications of shooting video from drones
Lifestyle and public health impacts
Social welfare and community impacts

Deadline for receipt of proposals is November 20, 2015. Please submit proposals as email attachments addressed to: Ms. Tammy Alexander of the FedEx Institute of Technology at tlxander@memphis.edu. A selection committee of robotics, autonomous vehicles, and drones experts and CRAVD leadership will review applications and select those which will funding. Those submitting proposals will be notified of the outcome within several weeks of the committee’s meeting. To foster interdisciplinary collaboration, successful proposals may be clustered into distinct research groups under CRAVD that will be tasked with developing larger grant proposals from external granting bodies.

For further information, please contact Dr. Mark Gillenson at Mark.Gillenson@memphis.edu.