

## **System of Systems Engineering Collaborators Information Exchange (SoSECIE)**

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### **A Heterogeneous Autonomous Collaborative System for Powerline Inspection using Human-Robotic Teaming**

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#### **Abstract**

A novel heterogeneous collaborative system for powerline inspection using human-robotic teaming will be presented. The research uses the Quanser Autonomous QCar and QDrone to demonstrate the results. This heterogeneous powerline inspection system consists of three separately controlled elements that work collaboratively within a centralized controlled space: 1) A control system operated by the human that supervises the Autonomous car and drone, 2) An autonomous unmanned ground vehicle system which operates along a pre-determined path, and 3) An autonomous unmanned aerial vehicle system that conducts the powerline search and inspection. All three systems operate together as an inspection system, demonstrating the application of human-robotic teaming. This presentation will demonstrate how the proposed system architecture is constructed and the results obtained from GNC Lab.

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#### **Biographies**

Srikanth Vemula is a Principal Investigator at CIL lab and an Instructor at University of the Incarnate Word. He is a PhD Candidate and has a 6-year' professional experience as a Game programmer in UK, Singapore, India and U.S responsible for developing games and managing teams for PC, Arcade Machines, PlayStation, IOS and Android platforms. His current research is focused on how we might use Human Centered Explainable AI for anomaly detection by augmenting humans in the loop during inspection.

Jovany Avila is a staff engineer for the Autonomous Vehicle Systems (AVS) Laboratories, where he conducts research on adaptive controls for autonomous flight and driving. He is currently pursuing M.S. in Electrical Engineering at the University of Texas at San Antonio. His future interests are to continue his studies in dynamic control systems and data analytics.

Dr. Michael Frye, is a tenured Professor of Engineering at UIW and Chair of the Engineering Department. He is also the PI and Director of the AVS Research Labs and is responsible for the lab's management and research production. Dr. Frye has a background in flight controls and modeling of fixed and rotorcraft vehicles. He earned his Ph.D. in Electrical Engineering from the University of Texas at San Antonio in 2006 and received his tenure-track appointment at UIW in August 2007. The PI teaches courses in electrical engineering, engineering mathematics, control theory, and machine learning. Prior to joining UIW, the PI worked for Continental Airlines on predictive windshear systems, Lockheed Martin Skunkworks on air data, autopilot, and flight controls, NASA Ames/Army Rotorcraft Directorate on rotorcraft modeling and control, and the Southwest Research Institute on signal estimation and detection.