A Safety-Aware Ecosystem of Reputable sUAS

Lunch on the Hill

Prof. Douglas Thain

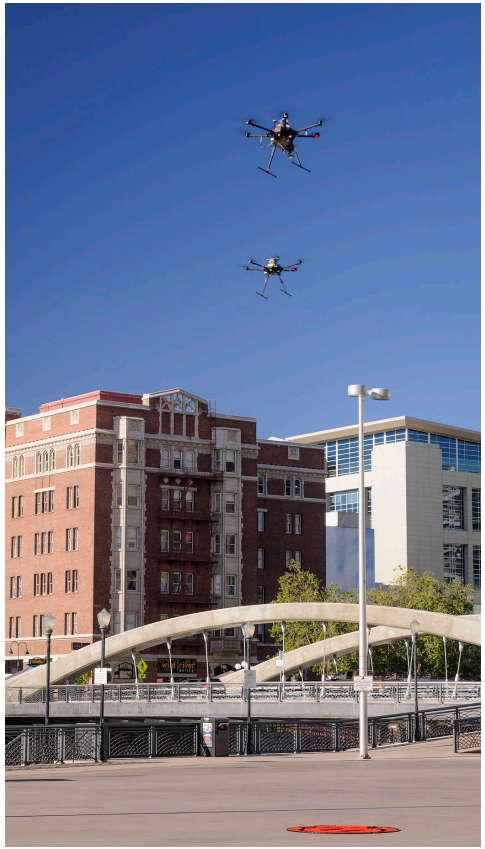
Presented to ULI Lunch and Learn

July 18, 2023

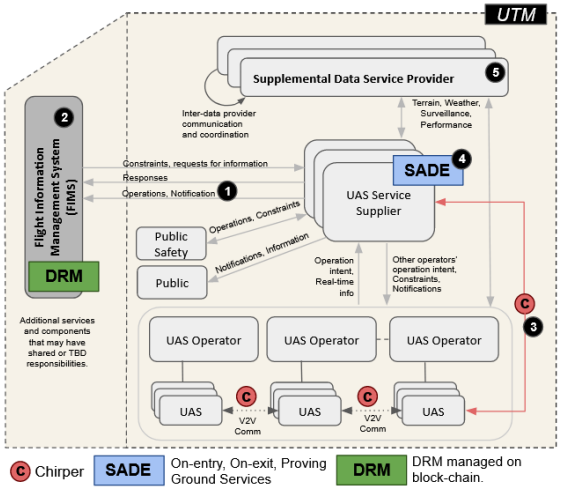
UNIVERSITY OF NOTRE DAME | COLLEGE OF ENGINEERING

NASA · ND · STATE · SAINT LOUIS UNIVERSITY · UTEP · DEPAUL UNIVERSITY · CHICAGO STATE UNIVERSITY · Drone Response · DRONERESPONDERS

SADE: Safety Aware Drone Ecosystem



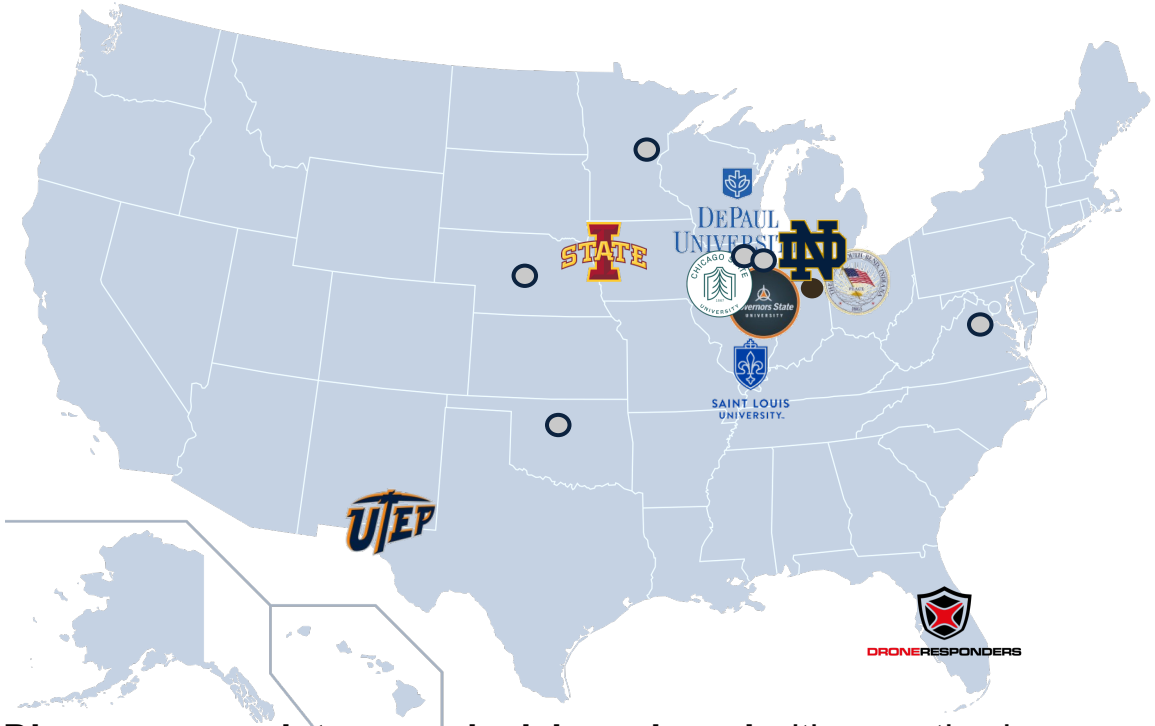
- **The Challenge:** The future UAS Traffic Management (UTM) system needs to support rapid, reliable, and correct permission authorizations for entry into controlled airspace.
- **Research Leadership:** We leverage our core competencies in sUAS systems, data analytics, safety assurance, large scale simulations, cyber-security, and integrated circuits design.
- **Our track record of engaging diverse students** promises to empower future generations.



Integration of SADE into UTM

- **Together as a team** we contribute towards the next generation of the UTM to empower rapid and safe deployment of sUAS for emergency response, commerce, and beyond.

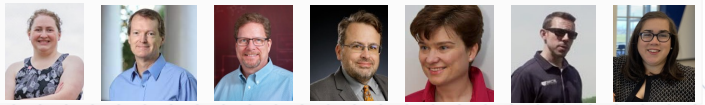
Our Team



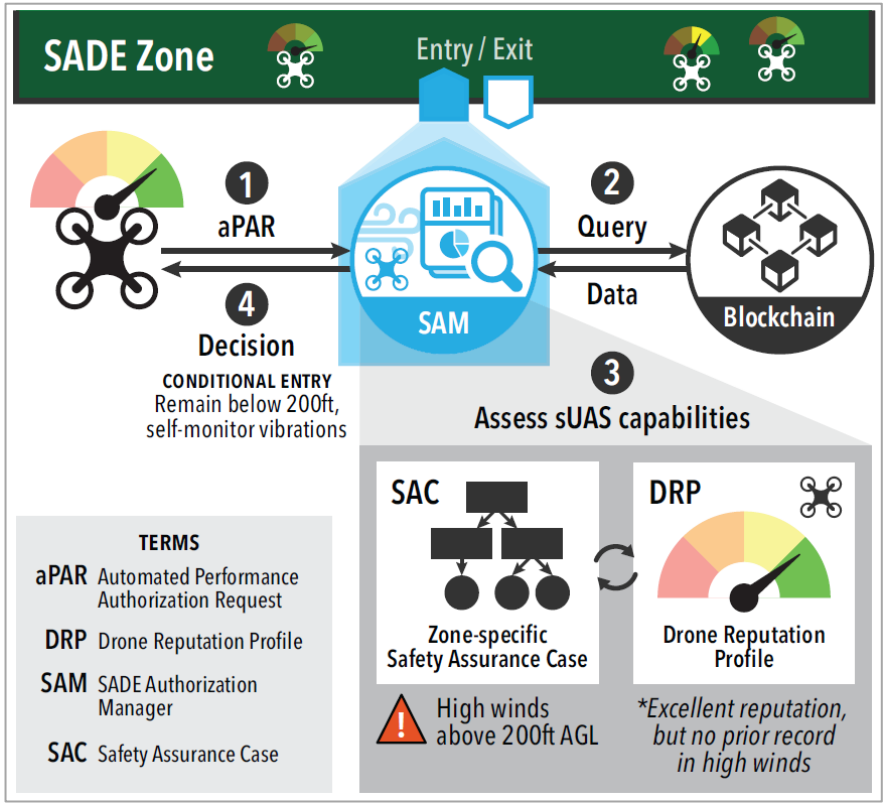
Diverse research team and advisory board with expertise in sUAS, data science, cyber-security, chip-design, simulations and high performance computing, safety assurance, & civic innovation.

Research Team & Outreach Partners

Advisory Board



Our Work



Challenge:

- Safe flights of sUAS in managed air spaces with privacy-preserving, fair & automated decision making.

Solution:

- Onboard analytics to capture flight behavior in privacy preserving, queryable, reputation models.
- Reliable communication via chirper.
- Fair and transparent decisions based on safety cases.
- Realistic, scalable, simulation environment to make SADE Zones accessible.

Our Goals

Build Reputable Drone Model

What makes a fair & equitable reputation?

Design & test infrastructure for assessing drone safety

Support for dynamic drone reputation model.

Provide a realistic simulation environment

Make SADE accessible to all drone operators via a testing and training environment.

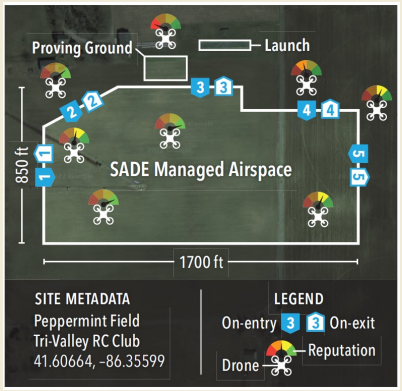
Deploy in the real-World

Fast and reliable chirper for shared communication

Establish proving grounds for sUAS testing

Deploy proof-of-concept SADE environment tested by sUAS pilots, and adoptable by the FAA's UTM.

Partner with South Bend schools and Minority Serving Institutes to engage and train diverse students.



Run Field tests at physical & simulated test sites.