

## Research Development Fund – Fall 2023 Application

**Application Title:** SRCML: Scalable Robots for Complex Missions Lab

**Lead contact for RDF Application:**

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**Key Participating Units:** Texas A&M Engineering Experiment Station (TEES), Texas A&M AgriLife Research (AgriLife), Texas A&M University (TAMU)

Texas A&M University - Colleges/Schools & Departments:

- College of Engineering (Departments): Mechanical Engineering (MEEN), Engineering Technology & Industrial Distribution (ETID), Computer Science and Computer Engineering (CSCE), Aerospace Engineering (AERO), Electrical and Computer Engineering (ECEN)
- College of Agriculture & Life Sciences: Soil and Crop Sciences (SCSC), Animal Science (ANSC), Biological & Agricultural Engineering (BAEN)
- School of Architecture (Landscape Architecture and Urban Planning (LAUP), Construction Science (COSC)
- College of Arts & Sciences: Oceanography (OCEN), Atmospheric Sciences (ATMO), Geography (GEOG), Texas Center for Climate Studies (TCCS)

**RDF Amount Requested (\$):** \$691,970

### Executive Summary

This RDF Project will establish the Scalable Robots for Complex Missions Lab (SRCML), bringing new scalable robotic autonomy capabilities to broad users and research communities across Texas A&M University (TAMU), Texas A&M Engineering Experiment (TEES), and Texas A&M AgriLife at the Brazos County locations. TAMU, as the largest and one of the top research universities in the U.S., is uniquely qualified and strategically positioned to successfully build and sustain this research infrastructure, making TAMU the first university with complete capabilities of scalable robotic autonomy implementation, experimentation, and validation. The SRCML will be a deployable mobile lab with 50+ robots, two mobile workstations, and a wide range of sensor and hardware accessories, offering researchers the level of scalability and configurability required to provide tailored support for individual research projects. We identified three physical locations to store, maintain, and repair the lab equipment within a 5-minute walking distance on the TAMU campus. The team will collectively seek a consolidated location as a permanent home of the SRCML within three years. Long-term sustainability and potential expansion of the SRCML rely on its frequent utilization in funded research projects. Based on the existing strengths of TAMU researchers, we will focus on five research cores: (1) National Security Core, (2) Agriculture Core, (3) Space Core, (4) Urban Core, and (5) Ocean & Climate Core. These five areas align with Texas A&M's strategic planning and investment, and thus we expect the synergistic leverages between the SRCML and the existing and new research infrastructures. During the 2-year RDF project, we will fully establish the lab and mobile workstation facilities and equip 50+ robots with fundamental autonomy requirements and networking capabilities. The two-fold sustainability plan encompasses (i) broadening the user base through strategic grant-seeking and curated team-building efforts and (ii) the development and implementation of a user fee mechanism. The project team will individually and collectively seek extramural research funds. The project team represents TEES, AgriLife, and TAMU with 13 individual Departments from four different Colleges and Schools. Based on the teams' demonstrated records of obtaining research funding and expected new collaborations among and beyond the project team, we anticipate a timely return on this RDF investment and the continued growth of SRCML.