

**Report on Areas of
Research, Scholarly and Creative Activities, and Discovery (RSCAD) Strength**

Date 5/6/14

A. Area of Strength:	Unmanned Aircraft System Airspace and Vehicle System Integration
B. Scope and Context:	Recent years has seen a proliferation of platforms and applications for small unmanned aircraft systems and commercial opportunities abound. The FAA however has been slow to grant airspace access to these systems citing safety concerns. Universities are uniquely positioned to assist in this role as public entities as we have unique access to airspace that other organizations do not. Proving technology and testing concepts and payloads are key activities in this area and there is a high demand for K-State expertise and services to enable research and proof-of concept work across multiple industries.
C. Current or Emerging Strength:	<input type="checkbox"/> Current Emerging <input checked="" type="checkbox"/> Both
D. Criteria of Strength (1, 3, 5, etc.):	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 13, 14, 15, 16, 17, 18, 19
E. Narrative:	Since we got out early in this area in 2007 we are internationally recognized as a leader in terms of education and applied research. We routinely receive media inquiries from around the globe. Although we have our own research agenda surrounding the aircraft technology proof and validation, this area is ripe for collaboration in that it enables countless other research as a platform for local remote sensing.
F. Keywords/Tag words:	UAS, Unmanned, Unmanned Aircraft, Remotely Piloted Aircraft, Applied Research, Research enablement, sensor integration, airspace, aviation, Drone, sUAS

A. Area of Strength:	Innovative Manufacturing
B. Scope and Context:	Innovative Manufacturing is an emerging research area in the Department of Engineering Technology. In contrast to ‘advanced manufacturing’, innovative manufacturing research is established to provide ‘vertical’ advances in the field of manufacturing rather than ‘horizontal’ advances in the field.
C. Current or Emerging Strength:	<input type="checkbox"/> Current <input checked="" type="checkbox"/> Emerging <input type="checkbox"/> Both
D. Criteria of Strength (1, 3, 5, etc.):	1,2,3,5,7,8,10, 11, 13, 14, 15, 16, 17,18,19
E. Narrative:	Emerging research areas in the field of innovative manufacturing focuses on science-based manufacturing such as micro and nanomanufacturing, adiabatic cutting, pulsed water jet machining, production printing, and big data analytics.
F. Keywords/Tag words:	Advanced Manufacturing, Innovation, Physics and Chemistry of Manufacturing, Big Data Analytics

A. Area of Strength:	Unmanned Aircraft System Airworthiness Certification
B. Scope and Context:	Access to the National Airspace System by small unmanned aircraft depends largely on a robust Federal Aviation Administration (FAA) Aircraft certification process. This certification is dependent on a set of agreed upon standards for certification and while these have been developed by the ASTM as industry consensus standards, they have not been tested and validated. Currently we have a Federal contract with the FAA to validate those consensus standards for adequacy. This will result in a follow-on competency in this area and opportunities for consulting and service agreements in the future.
C. Current or Emerging Strength:	<input type="checkbox"/> Current X Emerging Both
D. Criteria of Strength (1, 3, 5, etc.):	1, 4, 6, 8, 11, 13, 15, 16, 17
E. Narrative:	As we stand up a core competency in this area we will become the leading experts in this area and this expertise can be monetized and leveraged for the benefit of the university.
F. Keywords/Tag words:	Unmanned Aircraft Systems, UAS, sUAS, UAS Certification, Airworthiness, Drone, Remotely Piloted Aircraft

A. Area of Strength:	Bulk Solids
B. Scope and Context:	Bulk solids research is an emerging area in the Department of Engineering Technology that supports the Kansas State University Bulk Solids Innovation Center located in Salina.
C. Current or Emerging Strength:	<input type="checkbox"/> Current X Emerging Both
D. Criteria of Strength (1, 3, 5, etc.):	1,2,3,6,7,8,11,12,13,14,15,16,17,18,19
E. Narrative:	This emerging field leverages the expertise in the department in areas such as nanotechnology (coatings and materials), contact mechanics, tribology, and particle dynamics. A science-based approach to the understanding of bulk solids motion is characteristic of the strategy employed by the faculty in the department.
F. Keywords/Tag words:	Bulk Solids, Mechanics, Materials, Physics, Engineering, Nanotechnology

A. Area of Strength:	Unmanned Aircraft Systems Photogrammetry
B. Scope and Context:	Determining price measurements independently using on-board technology is a key technological enablement for many potential commercial uses of small Unmanned Aircraft Systems (sUAS). This capability will dramatically increase the utility of sUAS and is a technology yet to be developed. Using stereoscopic paired imagery is one technique which can enable this concept; it involves using 2 imaging systems located separately on the same aircraft triggered simultaneously. We are working to explore this technology and help bring it to market.

C. Current or Emerging Strength:	<input type="checkbox"/> Current <input checked="" type="checkbox"/> Emerging <input type="checkbox"/> Both
D. Criteria of Strength (1, 3, 5, etc.):	1, 2, 3, 4, 6, 7, 8, 11, 13, 14, 15, 16, 17, 18
E. Narrative:	This is an emerging research area internationally and we have a stereoscopic imaging company here in Salina with whom we can collaborate to help bring this technology to market. Patents here could prove lucrative for the university but we will have to act quickly to get ahead of competition.
F. Keywords/Tag words:	Unmanned Aircraft Systems, small Unmanned Aircraft Systems, UAS, sUAS, photogrammetry, stereoscopic imaging, precision imaging

A. Area of Strength:	Unmanned Systems Manufacturing, Controls, Systems Integration
B. Scope and Context:	Unmanned systems research in the Department of Engineering Technology currently supports efforts already underway in the Department of Aviation at Salina. The research area also supports other areas of unmanned systems such as robots, automated vehicles and transportation systems, and other computer-controlled hardware systems.
C. Current or Emerging Strength:	<input type="checkbox"/> Current <input type="checkbox"/> Emerging <input checked="" type="checkbox"/> Both
D. Criteria of Strength (1, 3, 5, etc.):	1,2,3,4,5,6,7,8,9,11,12,13,14,15,16,17,18,19
E. Narrative:	The research area leverages the expertise already present in the department in areas such as automation and control, wireless systems, robotics, electronics, computer systems and materials analysis.
F. Keywords/Tag words:	Automation, Robotics, Control Systems, Materials, Antennas and Propagation, Communication Systems, Sensor Integration