Systems Design & Optimization

The Systems Design and Optimization (SDO) group researches the design of effective, efficient, and economical aerospace vehicles and systems. Faculty and students in the SDO group share common research interests in fundamental methods for vehicle design including multidisciplinary optimization, design space visualization and exploration, surrogate modeling, computer aided design and computer aided engineering, uncertainty quantification, reliability and robustness, safety, manufacturing, and systems engineering. The group applies these methods to design problems relevant to classes of aerospace vehicles that include fixed-wing aircraft, rotorcraft, and space systems.

Fixed-wing Aircraft

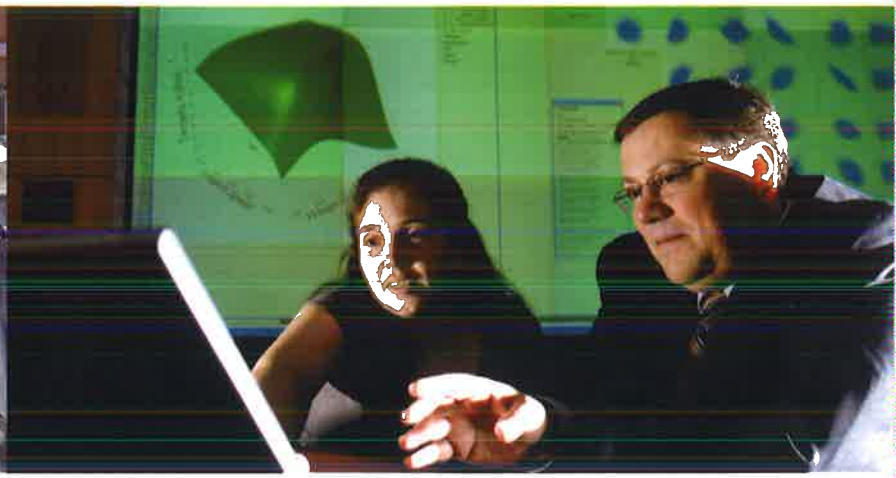
The fixed-wing design track focuses on the formulation, development, maturation, and application of design methods to problems related mainly to civil and military aircraft. Research areas include aircraft sizing and synthesis, systems engineering, system-of-systems modeling, multidisciplinary optimization, and design decision making. Applications span topics in propulsion, civil aviation, unmanned systems, defense systems, and energy systems. Graduates from this program are typically employed as mid-to-high level systems analysts, designers, and systems engineers, as well as researchers and subject matter experts in aerospace and defense fields.

Rotorcraft

Rotorcraft research is focused on the creation of new technologies and analysis methods for the advancement of rotary wing machines. Computational tools for rotor blade design, rotor aerodynamics, and rotorcraft structural dynamics are under continuous development. Flight dynamic methods and control system design algorithms for autonomous rotorcraft air vehicles are actively being persued with a mix of simulation and experimental flight testing. These tools and methodologies are applied to an array of configurations such as conventional helicopters, coaxial helicopters, tandem helicopters, tilt wing aircraft, compound rotorcraft, and wind turbines.

Space Systems

Space systems design research focuses on the identification and assessment of new technologies and architectures for human and robotic exploration, space commerce and national security. Advanced technologies relevant to the challenges of access to space, atmospheric entry, space mission operations, and space systems engineering are in development. Projects rely heavily on analytic methods to assess next-generation space missions, vehicles, and architecture concepts, including the development and application of novel design methods, new disciplinary analysis tools and multidisciplinary analysis and optimization techniques to the design of future space systems.



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