Aerospace Engineering Senior Design Projects 2019-2020

Professor	Project Title	Project Summary
Bagchi, P.	Mechanical Bird/Mechanical Fish	The goal is to build a device that can mimic flying like a bird using flapping and deforming wings. Second project deals with building a device that can swim like a fish using body flexibility.
Bai, X.	A Land-Air Hybrid Vehicle	The goal of this project is to design, fabricate, and test a vehicle that is capable of both ground travels and aerial flights. On small scale, such vehicles can be used to explore large, difficult terrains; and on large scale, such vehicles can be driven on the road and into the air.
Baruh, H.	Wheelchair Modification	The kit will motorize a wheelchair and should fit under the seat, and should be possible to install/remove it in one hour. This year's project will deal with the additional requirement that the motor inertia not impede motion in case someone wants to move the wheelchair without the aid of the motors.
	Vision and Communication System for Two Vehicles Moving in Sync	In this project, students develop a communication system for two vehicles (car, truck, plane, drone) that are moving in sync. Each vehicle transmits its location to the other vehicle as well as to a base station, which will be used to coordinate the motion of the two vehicles.
Benaroya, H.	Hybrid Deployable-Inflatable Lunar Habitat	A hybrid deployable-inflatable surface lunar habitat will be designed and manufactured so that it can move through the deployment.
Bilgen, O.	Multi-Mode Hybrid Unmanned Delivery System: Combining Fixed-Wing and Multi-Rotor Aircraft with Ground Vehicles	The goal of this project is to investigate novel concepts for a multi-mode unmanned aerial system. Once the system within the vicinity of the delivery location, the multi-rotor will detach and will take care of the vertical movement for a controlled delivery to the ground.
	A Novel Quad-Copter Drone with Solid-State Rotors	The goal of this project is the design, analysis, fabrication and testing of a small quad-copter unmanned aerial vehicle (UAV) that utilizes smart materials to achieve control and improvement of performance of its rotor blades. The team will design, fabricate and test multiple iterations of the solid-state rotors as well as power/sensing electronics and control algorithms.

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Burlion, L.	Design and Testing of a Drone to Conduct Zero-G Experiments	The goal of this project is the design, analysis, fabrication and testing of a small quad-copter unmanned aerial vehicle (UAV) to act as a platform to conduct Zero-G experiments. The team will design, fabricate and test multiple iterations of the vehicle, as well as develop necessary control algorithms.
	Drone Hunter	The goal of the project is to design and build a drone capable of automatically tracking and/or neutralizing an unauthorized drone.
	Small Scale Flying Car	The goal of the project is to design and build a drone equipped with both tilt rotors (for vertical take off) and a main wing. In addition to design, special attention will be given to transition maneuvers.
Cuitino, A.	Drone Thermal Imaging for Farming	Drone Thermal Imaging offers a viable technology to advance sustainable farming to assess and quantify variable conditions on farms. During this project, a drone with thermal imaging capabilities will be utilized as a plaftorm for testing different approches for assessment of uilization of resources.
Diez, J.	Hybrid Drone	We will be a hybrid drone. Option 1: fuel cell drone. Option 2: gas/electric drone. Option 3: group decision.
DeMauro, E.	Design of VTOL Transition Mechanism	The goal is to design the transition mechanism for a custom-built VTOL, which must transition from vertical takeoff to forward flight.
DeMauro, E.	Design of a new schlieren system and control code	Design of a new schlieren system and control code for the jet thrust lab.
Knight, D.	Design of Model Aircraft Electric Engine Thrust Stand	Each group will design a tabletop test stand for measuring the thrust, input electric power, and RPM of a model aircraft electric engine according to specifications.

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Malhotra, R.	3D Printing with Elastomers	This project will develop a 3D printer that is capable of building solid structures (on a small scale) using deposition and curing of precursors for elastomers like PDMS. An infrared heater will be integrated with the printer to allow curing of the elastomer precursors into solid structures.
Tse, S	Equine Simulator for Hippotherapy	Hippotherapy is a form of physical therapy that uses the characteristic movements of a horse to provide graded motor and sensory input as a treatment strategy. Hippotherapy can help patients with neurological or other disabilities, such as cerebral palsy, arthritis, multiple sclerosis, head injury, stroke, and spinal cord injury. The students will design and construct an equine simulator that can provide the four basic gaits of a horse, namely walk, trot, canter, and gallop, for an average adult.
Weng, G.	High Strength, Light Weight Spherical Pressure Vessel with Fiber-Reinforced Composites	For space applications where both light weight and high strength are essential factors, fiber-reinforced polymer composites often provide one of the best choices as compared to traditional materials such as steel or aluminum. In this project, we will first learn the basic principles of fiber reinforced composites, and then apply them to construct a spherical pressure vessel subjected to a prescribed internal pressure without failure.