Possible Project Topics with Dr. Rodriguez

What can you do in order to stand out during that critical face-to-face career fair moment or interview. A common concern is: “I have no prior relevant technical internship experience.” What can do you do to stand out? Besides doing your homework on the company, applying for the relevant job posting and practicing your 3 minute (or 30 sec) career fair plea or pitch, what else can you do to prepare? One word: “Projects!” “Projects” is something entirely within your domain of control. Try to work on as many projects as possible - projects that will help you develop skills that are relevant to your future employer! For each project, write a report. Put that report on your resume. Be prepared to discuss what you did with that company rep. Remember: That company representative want to see how you think, how you learn, how you solve problems, how you use your course knowledge to solve real-world problems. They want to see you take initiative, learn new concepts, methods, principles, and new tools. As engineers, the rapid technology trends mandate that you learn quickly and continuously! The company representative will want to see that life-long learner in you - that resourceful curious inner being that will “find a way or make one” (inveniam viam - attributed to Hannibal - the Carthaginian general 247-181 BC). GO SUN DEVILS!

Dr. A.A. Rodriguez, Executive Director

Dr. Rodriguez would be interested in supervising projects (FURI, senior design, undergraduate honors, MS, PhD) in any of the following or related areas.

Please let Dr. Rodriguez know if you are interested in a specific topic as soon as possible; e.g. at least 1 month before the FURI deadline if that is your target.

GROUND VEHICLES – all could involve building

1) Toward the Design of a Ground-Based Projectile-Catching Vehicle
2) Development of a Solar-Powered Ground Vehicle
3) Development of an Autonomous Ground Vehicle (AGV)
4) Use of Lidar for Simultaneous Localization and Mapping (SLAM) for a Robotic Ground Vehicle
5) Use of Multiple Ground Vehicles for Environment Mapping

6) Tracking of a Quadcopter by a Ground Vehicle
7) Design of a Speed and Position Control System for a Rear-Wheel Drive Vehicle
8) Coordination of a Platoon of Driverless Ground Vehicles
9) Motion Planning for Multiple Ground Vehicles in the Presence of Generalized Obstacles
10) Brain Control of a Ground Vehicle
AIR VEHICLES

11) Tracking of a Ground Vehicle by a Quadcopter – could involve building
12) Design of a 500 gram Quadcopter for Disaster Inspection – could involve building

13) Use of a Drone for Transmission Line Inspection – could involve building
14) Use of a Drone for Communication Tower Inspection – could involve building
15) Use of a Drone for Factory Inventory Cataloging – could involve building
16) Use of a Drone for Infrastructure Inspection – could involve building
17) Use of a Drone for Traffic Monitoring – could involve building
18) Use of a Drone for Parking Lot Inspection – could involve building
19) Use of a Drone for Package Pickup and Delivery – could involve building
20) Use of Multiple Drones for Environment Mapping – could involve building
21) Development of an ASU Fulton Engineering Drone Campus Guide – could involve building

22) Modeling and Control of a Biomimetically Inspired Hawk-Moth Micro-Air Vehicle (MAV)

23) Toward the Design of a Two-Stage to Orbit (TITO) Scramjet-Powered Hypersonic Vehicle

24) Kill Zone Analysis for a Bank-to-Turn (BTT) Missile-Target Engagement
25) Modeling and Design of a Bank-to-Turn (BTT) Missile Control System
26) Modeling and Design of a Bank-to-Turn (BTT) Missile Guidance System

27) Modeling and Control of a Twin Lift Helicopter System
28) Modeling and Control of a Tilt-Wing Rotorcraft

SPACE VEHICLES

29) Modeling and Design of a Mini-Satellite
30) Coordination of a Large Mini-Satellite Constellation for Generalized Sensing
31) Use of Astrobee Robotic Flyer for International Space Station (ISS) Inspection
32) Modeling and Controlled Descent for a Reusable Rocket

SUSTAINABILITY

33) Tradeoffs Associated with Managing a Renewable Resource Gordon-Schaefer Fishery
34) Examination of Critical Coupling Issues in the Management of Food, Energy and Water (FEW) Systems
35) Distributed Irrigation System Management

INDUSTRIAL MANUFACTURING & OTHER ROBOTICS APPLICATIONS

36) Modeling and Control of a Single Degree of Freedom Flexible Robotic Manipulator
37) Modeling and Control of a Two Link Industrial Robotic Arm
38) Design of a Camera-Based Catapult-Trebuchet Projectile Launcher
39) Toward the Design of a Solar Tracking System for a Parabolic Solar Collector
40) Design of a Pan-Tilt Human/Object Image-Acoustic Tracking System
POWER ELECTRONICS – all could involve building

41) Design of a DC-DC Power Converter
42) Design of an LCL T-Filter-Based AC Inverter
43) Smart Grid Modeling and Robust Management of Energy Supply and Demand
44) Battery Life Modeling and Management
45) Use of Field Programmable Gate Arrays (FPGAs) for Controller Implementation
46) Use of FPGAs for Rapid Calculations

GAMING & SYSTEM ANIMATION

47) Development of a Modeling, Simulation, Animation and Real-Time Control (MoSART) Vehicle Environment
48) Development of a Modeling, Simulation, Animation and Real-Time Control (MoSART) Ground Vehicle Environment
49) Development of a Modeling, Simulation, Animation and Real-Time Control (MoSART) Airplane Environment
50) Development of a Modeling, Simulation, Animation and Real-Time Control (MoSART) Seesaw-Cart-Pendulum Environment
51) Development of a Modeling, Simulation, Animation and Real-Time Control (MoSART) Spring-Mass-Dashpot System Environment
52) Development of a Modeling, Simulation, Animation and Real-Time Control (MoSART) Thermal System Environment
53) Development of a Modeling, Simulation, Animation and Real-Time Control (MoSART) Flexible System Environment
54) Development of a Modeling, Simulation, Animation and Real-Time Control (MoSART) Rocket Environment
55) Development of a Modeling, Simulation, Animation and Real-Time Control (MoSART) Keplerian Planetary System Environment
56) Development of a Modeling, Simulation, Animation and Real-Time Control (MoSART) Brain Environment
57) Development of System-Specific Visual Indicators, Scenery, etc.
58) Use of GPUs for High-Speed Animation
59) Development of an Interactive Camera-Based Baseball Hitting Training Environment
60) Development of an Interactive Camera-Based Boxing Training Environment

LEARNING & ASSESSMENT

61) Development of an Intelligent Adaptive-Quizzing Interactive Learning Environment for Front-of-the-Engineering-Pipeline Mathematics
62) Development of an Intelligent Adaptive-Quizzing Interactive Learning Environment for Front-of-the-Engineering-Pipeline Physics
63) Development of an Intelligent Adaptive-Quizzing Interactive Learning Environment for Front-of-the-Engineering-Pipeline Computer Programming
64) Development of Real-Time Smart Phone Based Survey System for a Class
65) Development of a Web-based Survey System

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66) Development of a Modern Internet-Based Textbook Assembler Based on Available Internet Materials

67) Development of a Learning Community Communications Forum Monitoring, and Analysis and Prompting System

**ECONOMICS & INVESTMENT**

68) Sector Modeling and Performance Ranking
69) Portfolio Management and Optimization

**HOME AUTOMATION & SECURITY**

70) Development of a Home Security and Automation System
71) Development of a High Performance Home Heating and Air Conditioning Control System
72) Development of a Camera-Based & Code Smart Lock

**ALGORITHMS**

73) Application of Polynomial-Time Convex Optimization Algorithms for Constrained Nonlinear Problems
74) Application of Neural Networks, Machine Learning and Deep Learning Algorithms for Pattern Recognition and Control

**CYBERSECURITY**

75) Real-Time Control Takeover of a Spread-Spectrum Controlled Drone
76) Securing Drone Command and Control Features

**HEALTH**

77) Development of a Voice-Activated Calorie Counter

**ENTERTAINMENT**

78) Development of a Smart Video Jockey: A Music Inspired Video Player

Thank you very much for your feedback. It is greatly appreciated. Your feedback will significant impact many!