UNDERGRADUATE RESEARCH ABSTRACTS

EMBRY-RIDDLE DISCOVERY DAY 2018

Prescott, Arizona

Discovery Day Schedule of Events

Friday, March 23, 2018

Poster Display
AC1-Atrium | 11 a.m. - 3 p.m.

Poster Presentations & Demonstrations
AC1-Atrium | 1 - 3 p.m.

Air Force ROTC Leadership Briefings
Davis Learning Center | 10 a.m. - noon, 2 - 4 p.m.

Parents' Reception
Eagle Gym | 7 - 9 p.m.

Saturday, March 24, 2018

URI Oral Presentations

Preview Day Welcome
Activity Center | 9 - 9:30 a.m.

Academic Program Meetings

College of Engineering
Activity Center | 9:45 - 11 a.m.

College of Aviation
Davis Learning Center | 9:45 - 11 a.m.

College of Arts and Sciences
Eagle Gym | 9:45 - 11 a.m.

College of Security and Intelligence
The Hangar | 9:45 - 11 a.m.

DR. FRANK AYERS
Chancellor, Embry-Riddle
Aeronautical University – Prescott

Welcome to Discovery Day 2018

Thanks to all of you who are making this, our sixth annual Discovery Day, a great success. It is our privilege to support the efforts of our students through our IGNITE and Eagle Prize initiatives, as well as through their classwork and special projects. We take time to celebrate their work every spring during Discovery Day. Today you will see the best work of our students, faculty and staff on display and will have an insight into what makes them such a special group. Take the time to ask each of our project teams to explain the what, why and how of their projects and be prepared to understand how the leaders of tomorrow are preparing today. To our students, we realize that these projects are how you express yourselves through imagination and creativity. To our faculty and staff, thanks for taking the time to work together with these amazing young scholars. Finally, to our parents, thanks for entrusting these great young people to our care. My wife, Debbie, and I look forward to wandering around all day and hope to see you at each of the Discovery Day venues.

Warm Regards,

Dr. Frank Ayers
Chancellor, Embry-Riddle Aeronautical University
Prescott, Arizona

ANNE BOETTCHER
Director, Undergraduate Research Institute and Honors Program

It has been an exciting year for our Embry-Riddle Prescott undergraduates, as is reflected in the breadth and depth of the presentations and demonstrations included in our 6th Annual Discovery Day. During the 2017-2018 Academic Year, the Undergraduate Research Institute was able to award a total of 20 IGNITE research/scholarship grants and 12 Eagle Prize competition grants. For IGNITE, projects ranging from one focused on airline schedule padding to one focused on supernova astrophysics. Eagle Prize teams will compete in regional and national competitions including the VEX Robotics World Championship, BIG Idea Challenge, and Model NATO. In addition, our students have been conducting independent and team research projects through course-based and student organization opportunities. Linked to their research and scholarship, these students have been active in numerous outreach efforts with regional middle and high schools, as well as the Prescott community as a whole.

I am repeatedly impressed with the insight, dedication, and determination of our students, faculty and staff. Through their combined efforts, our students are gaining the skills needed to be successful in their chosen career paths.

Thank you for helping us celebrate the accomplishments of our students.

Anne Boettcher
Director, Undergraduate Research Institute and Honors Program
Embry-Riddle Aeronautical University
Prescott, Arizona

Invited Oral Presentations

Top Air Force ROTC Briefings, March 23

Austin Fischer and Evan Bozanic, Aerospace Engineering Department
Jillian Green and Kerrigan McDonald-Ortega, Global Security and Intelligence Studies Department
Lower Hangar | 10 a.m. - noon

Jennifer Ruth and Brandon Ruth, Aeronautical Science Department
Lower Hanger, 2 - 4 p.m.

URI Oral Presentations, March 24

Preview Day Welcome
Geoffrey Winship, School of Business, Senior
Activity Center | 9 - 9:30 a.m.

Academic Program Meetings, March 24

College of Engineering
Jacqueline Worley, Mechanical Engineering Department, Senior
Activity Center | 9:45 - 11 a.m.

College of Aviation
Connor Anderson, Applied Aviation Sciences Department, Senior
Davis Learning Center | 9:45 - 11 a.m.

College of Arts and Sciences
Hunter McCraw, Department of Physics & Astronomy, Senior
Eagle Gym | 9:45 - 11 a.m.

College of Security and Intelligence
Holly Focareto, Intelligence Studies and Global Affairs Department, Senior
The Hangar | 9:45 - 11 a.m.

Posters and Demonstrations Presentations

(Number Corresponds to Poster/ Demonstration Number)

Friday, March 23, 2018
AC1-Atrium, 11 a.m. - 3 p.m.
Eagle Gym, 7 - 9 p.m.

1. **Adapting to Subordinates with Leadership Experience**
   Zane Zylstra, Alan Pacheco and Anthony Valenza
   Mentor: Lt. Col. Marella Tobolt Big Mountain

2. **Search and Rescue Ground Explorer (S.A.R.G.E.)**
   Jacqueline Worley, Sara El Baissi, Morgan Garone, Grayson Lynch, Chad Abramson Jr., Garrison Bybee, Mathew Todd and Riley Griffin
   Mentors: Iacopo Gentilini and Richard Mangum

3. **VEX Robotics Club**
   Lucas Widner, Adam Scott, Kyle Lutterman, Braxton Kendall, Jeffrey Ryan, Christopher Allyas and Geoffrey Winship
   Mentor: Joel Schipper

4. **Women in Leadership by The Fifty-One Percent**
   Jillian Green and Kerrigan McDonald-Ortega
   Mentors: Suzie Roth and Lt. Col. Marella Tobolt Big Mountain

5. **Optimization of Staging Mechanisms for Two-Stage High-Power Rockets**
   Matthew Boban, Robert Hagen, Joseph Scrivens, Reece Krantz, Matthew Espiritu, Alisha Lewis, Anna Bartz, Luke Tronstad, John Bannon, Reece Duenow, Indigo Kaul, Cody Warren, Dan Keaty, Eric Fitzgerald, Henrik Hoffman and Ryan Maslowas
   Mentor: Elliott Bryner

6. **FAR-Mars Challenge by 45kBiProp**
   William Carpenter and Daniel Dyck
   Mentor: Elliott Bryner

7. **How DISC Personalities Work in a Cockpit Setting**
   Andrew Barana, Jason Fung and Shane Hamman
   Mentor: Lt. Col. Marella Tobolt Big Mountain

8. **Toxic Leadership in the Cockpit**
   Tate Ottaway, Dominick Peluso, Jerad Richardson and Troy Fenner
   Mentor: Lt. Col. Marella Tobolt Big Mountain

9. **Hypoxia Training for General Aviation Pilots**
   Pamela Ward
   Mentors: Tim Holt, Jacqueline Luedtke and Jennah Perry

10. **An Empirical and Numerical Analysis of the Relationship Between Stall Hysteresis and Circulation Parameter**
    Cole Zenker and Jesse Ingraham
    Mentor: Wallace Morris

11. **Aviation Augmented Reality Glasses by Aero Glass**
    Jacob Ponter
    Mentors: Michelle Parker and Timothy Sestak

12. **A Longitudinal Analysis on the Cyclical Pattern of the US Airline Industry**
    Michelle Bennett
    Mentors: Brent Bowen and Jacqueline Luedtke

13. **Airline Schedule Padding and Consumer Choice Behavior**
Siddharth Varkey
Mentor: Jules Yimga

14. **Marketing Analysis of Scholarly Journals in a Social World**
Hunter Watson
Mentors: Brent Bowen, Jacqueline Luedtke and Tim Holt

15. **Modes of Monsoon Precipitation in Arizona and New Mexico**
Cynthia Kobold
Mentor: Dorothea Ivanova

16. **Changing Fire Conditions**
Matthew Johnson
Mentor: Mark Sinclair

17. **Radiosonde Recovery Guiding Unmanned Aerial Vehicle**
Connor Anderson and Riley Griffin
Mentor: Johnny Young

18. **Transformational Leadership from the Eyes of a Follower**
Jennifer Ruth and Brandon Ruth
Mentors: Lt. Col. Marella Tobolt Big Mountain and Capt David Gardner

19. **Psychological Effects of Leadership**
Alani Pon and Moritz Wienke
Mentor: Lt. Col. Marella Tobolt Big Mountain

20. **Detecting Small Unmanned Aircraft in Controlled Airspace with Automatic Dependent Surveillance Broadcast**
Destiny Penna and Jacob Huston
Mentors: Jennah Perry, Johnny L. Young, Jacqueline Luedtke and Michelle Parker

21. **The Future of Unmanned Traffic Management: Transforming and Combining Technologies to Implement Commercial Unmanned Aircraft Operations in Controlled Airspace**
Jacob Huston and Destiny Penna
Mentors: Jennah Perry, Johnny L. Young, Jacqueline Luedtke and Michelle Parker

22. **UAS Paradrogue Research and Development**
Forrest Mobley
Mentor: Shigeo Hayashibara

23. **Unmanned Aerial Vehicle Winglets**
Cindy Ma, Daniela Baroni and Andrew Carlson
Mentors: R. Andrew Gerrick and Shigeo Hayashibara

24. **UAV Research – CFD Studies in Venturi Wing Design**
Jiyoung Hwang
Mentor: Shigeo Hayashibara

25. **Micro Air Vehicle Platform Design**
Nitin Susendran, Nathan Mills, Adam Bergamini, Jacob Schneider and Joseph Grosjean
Mentors: Akhan Almagambetov and William Crisler

26. **AIAA Design Build Fly Regional Passenger Aircraft *Nova Forte***
Brian Study, Paul Sanders, Marcus Ross, Trevor Lau, Adam Bergamini, Bryan Shaefer, Nathan Mills, Joseph Grosjean, Simon Zemana, Bailey Symes, Samantha Carter, Cole Reeves, Corey Bullens, Indigo Kaul, Max Eisenstadt, Luke Tronstad, Mack Westerfeld and Alex Malinowski
Mentors: David Lanning, William Crisler and Jacob Zwick

27. **Recharging a Drone In-Flight through Wireless Power Transmission**
Michael Buck, Kristina Landen, Christina Openshaw and Paloma Symmonds
Mentors: James Doyle, Dennis Kodimer and Ed Post

28. **Eagle Aero Sport: Student-Built Aircraft**
Rachael Bradshaw and Chloe McBride
Mentors: Brian Davis and Wallace Morris

29. **Crisis Leadership**
Joshua Pederson
Mentor: Lt. Col. Marella Tobolt Big Mountain

30. **Effects of Perspective Bias on Leadership and Decision Making by Perspective Leadership**
Alexander Michael Lubiarz and Anthony Aurelio Tudela Viadoy
Mentor: Lt. Col. Marella Tobolt Big Mountain

31. **Hybrid Hydrogen-Octane Internal Combustion Engine by Evolved Combustion**
Ryan Arnold, Monty Bruckman, Dan Reynolds, Logan Strople, Michael Cruz and Nate Larson
Mentor: Daniel Dannelley

32. **Formula SAE**
Robert Graham, Stefan Johnson and John Rees
Mentors: Shigeo Hayashibara and Richard Gibson

33. **The Future of Transportation Technology (AZLoop: Arizona's SpaceX Hyperloop Competition Pod Team)**
Maciek Czyz, Akhil Gampala, Angel Rodriquez, Blake Tangora, Kale Shumard-Crippin, Kevin Gray, Leon Brown, Luke Hein, Monica Choiniere, Shadman Alamgir, Tristan Minkoff, Alan Izquierdo Ramirez, Matthieu Rada, Steven Duhamel, Kevin Pereira and Nedah Ibrahim
Mentors: Samuel Siewert and Michael Fabian

34. **International Model NATO**
Holly Focareto, Lucy Bebbington, Brandon Embrey, Jorden Long, Jack Lupori, Shannon McGirk, James Ritchey, Mason Russell, Stefan Johnson and Marc Rego
Mentors: Brooke Shannon and Tyrone Groh

35. **Cross-Cultural Leadership Studies**
James Ritchey
Mentor: Lt. Col. Marella Tobolt Big Mountain

36. **Edson's "Bloody" Ridge: A Study of Leadership, Morals and Their Effects on Human Decision Making in Combat**
Andrew Ruffini
Mentor: John Strandberg

37. **Project Management in Academia as Seen by the Management of: "Identifying Cost-Effective Security Barrier Technologies for K-12 Schools: An Interdisciplinary Evaluation"**
Ashtin Martinson and Shannon McGirk
Mentor: Reginald Parker

38. **Separating the Effects of Film Cooling and Pressure Gradients on Curved Surfaces from Pressure-Sensitive Paint**
Sarrah Bramblett
Mentor: Elliott Bryner

39. **Development of a Remote Mountaintop AllStar HAM Radio Node**
Austin Macosky, Cole Reeves and Kyle Bergmann
Mentor: Ed Post

40. **The Effect of Leadership Traits and Training on the Effectiveness of a Team**
Connor Golley, Anthony Quezada, Robert Myers and William Smith
Mentor: Lt. Col. Marella Tobolt Big Mountain

41. **Leadership in the Classroom: Teaching Effectiveness Based on Leadership Principals**
Austin Fischer and Evan Bozanic
Mentors: Col Randy Kaufman, Lt. Col. Marella Tobolt Big Mountain, Jessica Butts and Kaela Martin

42. **Protective Factors in the Development of Psychopathy from Adolescence to Adulthood**
Duran Delgadillo
Mentors: Michele Gazica and Erin Bowen

43. **NASA Human Exploration Rover Challenge**
Miguel Recabarren, Lars Grantz, Vaishnavi Harikumar, Karun Paul, Oliver Davis, Hossain Samei and Jacob Stites
Mentor: Brenda Haven

44. **Team KRATOS: Solar Concentration Power Generation on Mars Utilizing a Carbon Dioxide Brayton Cycle**
Margaret Mueller, Emily Lambert, Tyler Green, Eric Trevenna and Madalyn Markham
Mentors: Daniel Dannelley and Elliott Bryner

45. **EagleSat 2**
Hilliard Paige, Lauren Barthenheier, Jason Hamburger, Brennan Gray, Steven Buck, Chloe McClellan, Noor Rashid, David Stockhouse and Heather Humphreys
Mentor: Gary Yale

46. **Construction and Operation of an Arcjet Thruster**
Hunter McCraw and John Norton
Mentor: Darrel Smith

47. **Design and Simulation of a Miniature Hall-Effect Thruster**
John Norton, Hunter McCraw and Barik Smith
Mentor: Darrel Smith

48. **Sounds of Gravitational Waves from Core Collapse Supernovae**
Jasmine Gill and Pedro Jesus Quiñonez
Mentor: Michele Zanolin

49. **Julia Language Ephemeris and Physical Constants Reader for Solar System Bodies**
Julia Mihaylov and Renee Spear
Mentors: Kaela Martin and Damon Landau

50. **The Dipole Antenna Radio Telescope (DART)**
Brittany Wright
Mentor: Andri Gretarsson

51. **Personality Type versus Leadership Success**
Brandon Erekson and William Lester
Mentor: Lt. Col. Marella Tobolt Big Mountain

52. **Qualities of Great Leaders**
Christian Denman and Mulangu Mundemba
Mentors: Suzie Roth and Lt. Col. Marella Tobolt Big Mountain

53. **Selfish versus Selfless Leadership**
Walker Adema and James Denemark
Mentor: Lt. Col. Marella Tobolt Big Mountain

54. **Overcoming the "Distraction Dilemma": The Effects of Solitude on Leadership Capacity**
Harrison James Byrd and Andrew Robert Thomas
Mentor: Lt. Col. Marella Tobolt Big Mountain

Connor Anderson
Applied Aviation Sciences Department,
College of Aviation

Riley Griffin
Mechanical Engineering Department,
College of Engineering

Mentor:
Johnny Young
Applied Aviation Sciences Department,
College of Aviation

Radiosonde Recovery Guiding Unmanned Aerial Vehicle

IGNITE GRANT AWARD

Radiosondes are weather instruments sent into the atmosphere every day that provide vital weather information for aeronautical and non-aeronautical purposes around the world. However, little is being done to recover these plastic and Styrofoam units of reusable electronics and has always been considered not cost-effective to do so. However, with today's miniaturization of autopilot technologies, replacing the unguided parachute with a self-guiding GPS drone makes financial, practical, and environmental sense. We expect to demonstrate the feasibility of returning a radiosonde from altitude cheaply and effectively using simple programming and low-cost off-the-shelf electronics.

Demonstration

Hybrid Hydrogen-Octane Internal Combustion Engine by Evolved Combustion

IGNITE GRANT AWARD

The primary objective of this project is to design, fabricate, investigate, and characterize an innovative hydrogen induction system to enhance combustion in gasoline-powered engines. A secondary objective is to provide practical experience with program planning and execution, planning and execution of experiments, and translating engineering designs into hardware. This work could lead to patentable intellectual property and stimulate improvements to a wide variety of land, sea and air vehicles.

The research follows a phased approach. Initial phases create a baseline set of data and examine applications in small, inexpensive, single-cylinder motors, such as those used for larger radio-controlled model aircraft, small air compressors or lawnmowers. This provides experience with motor modifications, provide insights into test methods, and suggests additional lines of inquiry for larger, multi-cylinder engines. The team hopes to further the advancement of hydrogen fuel cell powered vehicles and hydrogen enrichment technologies to both internal combustion engines and larger scale energy combustion.

Poster Presentation

Ryan Arnold
Mechanical Engineering Department, College of Engineering

Monty Bruckman, Dan Reynolds, Logan Strople, Michael Cruz, and Nate Larson
Aerospace Engineering Department, College of Engineering

Mentor:
Daniel Dannelley
Mechanical Engineering Department, College of Engineering

Andrew Barana
Air Force ROTC Cadet and Global Security and Intelligence Studies Department,
College of Security and Intelligence

Jason Fung and Shane Hamman
Air Force ROTC Cadets and Aerospace Engineering Department,
College of Engineering

Mentor:
Lt. Col. Marella Tobolt Big Mountain
Air Force ROTC

How DISC Personalities Work in a Cockpit Setting

Our team focused on researching how different Dominance, Influence, Steadiness, and Conscientious (DISC) personalities function in a cockpit setting. To determine our results, we will study the four behavioral characteristics outlined by the DISC assessment. The team then will research what the key social factors were at play within the cockpit of an aircraft. We plan to utilize the key social factors to determine the interpersonal, leadership, and communication skills necessary to operate an aircraft. By determining the necessary skills, we form a general framework in which we compare each DISC personality and their benefits. The end goal of the team was to determine the best combination of individual DISC personalities within the cockpit.

Poster Presentation
Air Force ROTC Briefing

A Longitudinal Analysis on the Cyclical Pattern of the US Airline Industry

IGNITE GRANT AWARD

Michelle Bennett
School of Business, College of Arts and Sciences and Research Assistant, College of Aviation

Mentors:
Brent Bowen
Aeronautical Science Department, College of Aviation

Jacqueline Luedtke
Applied Aviation Sciences Department, College of Aviation

The Airline Quality Rating (AQR) is the nation's most comprehensive study of airline performance and quality for over two decades. The AQR sets the industry standard, providing consumers and industry watchers a way to compare performance quality among different U.S. airlines using objective performance-based data (Bowen and Headley, 2014). The quantitative weighted average is computed monthly for every airline and divided by the sum of the weight to create the index. Criteria weighted in this formula include baggage handling, customer complaints, denied boarding and on time arrivals. This research employs the application of a longitudinal analysis methodology resulting in finding the correlation between factors including legislation, economic conditions, and changes in technology on the impact and performance of airlines in the domestic market. The objective of this research is to analyze the relationship of the mentioned factors with AQR to better understand the cyclical nature of airline performance in order to determine the influence of one on the other, and as a result, be able to better predict future changes in the airline market place. Through the analysis, airlines will be able to utilize this data to better understand the cyclical patterns of their perceived airline performance, which can be used to employ strategies, and forecast future market conditions influencing their ratings.

Poster Presentation

Matthew Boban, Robert Hagen, Joseph Scrivens, Reece Krantz, Matthew Espiritu, Alisha Lewis, Anna Bartz, Luke Tronstad, John Bannon, Reece Duenow, Indigo Kaul, Cody Warren, Dan Keaty, Eric Fitzgerald, Henrik Hoffman and Ryan Maslowas
Aerospace Engineering Department, College of Engineering

Mentor:
Elliott Bryner
Mechanical Engineering Department, College of Engineering

Optimization of Staging Mechanisms for Two-Stage High-Power Rockets

IGNITE GRANT AWARD

The two-stage rocket project has the goal of building and flying a series of high-power multistage rockets that will test staging mechanisms that can be scaled and used on future high-altitude staged rockets. The project consists of the construction and flight-demonstration of two multistage rockets, the Prototype and the Full-scale. The Prototype will serve as a testbed for the staging system, and the Full-scale will be used to validate the system's scalability. The purpose of the project is to demonstrate that staged rockets are a feasible method of achieving high altitude rocket flight while being more efficient than single-stage rockets.

Poster Presentation

Eagle Aero Sport: Student-Built Aircraft

EAGLE PRIZE AWARD

Eagle Aero Sport (EAS) is the first student operated aircraft build team at Embry-Riddle Aeronautical University. Our team allows students to gain hands-on experience in all aspects of aircraft production including: aircraft assembly, design engineering, management of production operations, finance, marketing, and team building skills. Through research, and consulting with the Experimental Aircraft Association, our airplane of choice is the Van's RV-12. EAS is modifying the airplane to add real time flight test instrumentation for research. These instruments will gather data for aerodynamic, structural, and aircraft performance experiments. Presently, EAS is progressing with Build Team 70% complete and Engineering Team 65% complete. EAS has installed the power-plant and has partially skinned the wings. Our team implements OSHA standards and mandates that all build teams are led by an FAA certificated Airframe and Power-plant Mechanic. Once complete, EAS will have the opportunity to conduct novel research with regards to airframe structural analysis and fatigue, aerodynamic flow characteristics, and other flight test studies including meteorology. Some of these experiments have been specifically requested by Van's Aircraft, our industry partner. All the research and knowledge gathered by Eagle Aero Sport represents a rare asset that, we hope, will become more common-place as it is incorporated into Embry-Riddle's curricula, enhancing the student and faculty experience.

Poster Presentation

Rachael Bradshaw
Aerospace Engineering Department, College of Engineering

Chloe McBride
Mechanical Engineering Department, College of Engineering

Mentors:
Brian Davis
Computer, Electrical, and Software Engineering Department, College of Engineering

Wallace Morris
Aerospace Engineering Department, College of Engineering

Sarrah Bramblett
Mechanical Engineering Department,
College of Engineering

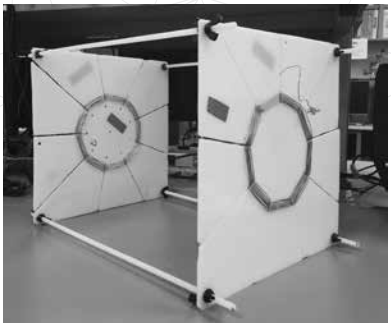
Mentor:
Elliott Bryner
Mechanical Engineering Department,
College of Engineering

Separating the Effects of Film Cooling and Pressure Gradients on Curved Surfaces from Pressure-Sensitive Paint

IGNITE GRANT AWARD

Pressure-Sensitive Paint (PSP) is a technique for measuring pressure distributions. This technique is especially important in the aerospace industry for testing pressure distributions on wings or turbine blades. The curvature of an airfoil creates a pressure gradient measured by PSP. Displacement of oxygen also affects PSP, such as film-cooled turbine blades. The normal test set-up includes a blue light, camera, and object with PSP applied. Under the blue light, the PSP will luminesce and the intensity of the luminescence depends on the pressure of the oxygen. The camera will capture images of the luminescence and import data to a program that can convert each pixel to a pressure reading. This research project will test PSP on a film-cooled airfoil in a wind tunnel. The end goal of the project is to differentiate the effects of film cooling and pressure gradients on PSP.

Poster Presentation



Recharging a Drone In-Flight through Wireless Power Transmission

Recharging a drone during flight could be a powerful step forward in the commercial use of drones. The purpose of this project is to investigate the potential capabilities of wireless power transmission to recharge drones. Inductive resonant coupling between flat spiral air coils is the method of power transfer used in this project. When the drone hovers near, or lands on, the source coil, power is transmitted, charging the drone's battery.

This project focuses on understanding the theory of inductive resonant coupling, constructing a proof-of-concept prototype, and producing simulations to model the power transmission. At the conclusion of this project, a final report summarizing the results and overall feasibility will be produced to support future design of a commercial drone recharging system.

Poster Presentation

Michael Buck, Kristina Landen, Christina Openshaw and Paloma Symmonds
Computer, Electrical, and Software Engineering Department, College of Engineering

Mentors:
James Doyle, Dennis Kodimer and Ed Post
Computer, Electrical, and Software Engineering Department, College of Engineering

Harrison James Byrd
Air Force ROTC Cadet and Aerospace Engineering Department, College of Engineering

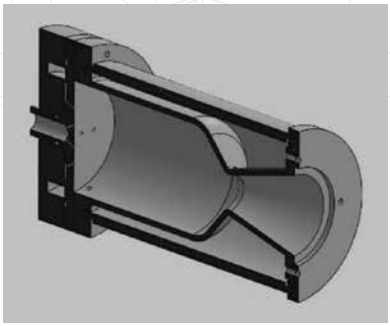
Andrew Robert Thomas
Air Force ROTC Cadet and Applied Aviation Sciences Department, College of Aviation

Mentor:
Lt. Col. Marella Tobolt Big Mountain
Air Force ROTC

Overcoming the "Distraction Dilemma": The Effects of Solitude on Leadership Capacity

Power of Solitude is an undergraduate, Air Force ROTC, research collaboration of members who hold different majors from the College of Engineering and the College of Aviation at Embry-Riddle Aeronautical University in Prescott, Ariz. The team is tasked to develop a quantitative analysis of the positive effects of solitude on leadership capacity in collaboration with the qualitative findings of Raymond M. Kethledge and Michael S. Erwin in their book 'Lead Yourself First'. The results will be collectively presented in an effort to better understand the effects of solitude on the four following leadership qualities: Creativity, Clarity, Emotional Balance and Moral Courage.

Poster Presentation
Air Force ROTC Briefing



FAR-Mars Challenge by 45kBiProp

EAGLE PRIZE AWARD

William Carpenter and Daniel Dyck
Mechanical Engineering Department, College of Engineering

Mentor:
Elliot Bryner
Mechanical Engineering Department, College of Engineering

45kBiProp is a team whose goal is to compete in the FAR-Mars challenge. The contest is won by the first collegiate team to fly a bipropellant rocket to a target altitude of 45,000ft. To qualify, the team must achieve an altitude of at least 32,000ft. To validate electronics and pneumatics, as well as to gain knowledge and experience, the team is developing a test stand to static fire a 200lbf LOX-ethanol rocket engine. This engine was built by the 2016/17 capstone group, Mercury Propulsion. Once completed, the team will design an 800lbf LOX-kerosene rocket engine for their flight vehicle, Altair. This project helps build the infrastructure and institutionalized knowledge required for future liquid rocketry projects.

Poster Presentation

Maciek Czyz, Akhil Gampala, Angel Rodriquez, Blake Tangora, Kale Shumard-Crippin, Kevin Gray, Leon Brown, Luke Hein, Monica Choiniere, Shadman Alamgir and Tristan Minkoff
Aerospace Engineering Department, College of Engineering

Alan Izquierdo Ramirez, Matthieu Rada and Steven Duhamel
Mechanical Engineering Department, College of Engineering

Kevin Pereira and Nedah Ibrahim
Computer, Electrical, and Software Engineering Department, College of Engineering

Mentors:
Samuel Siewert
Computer, Electrical, and Software Engineering Department, College of Engineering

Michael Fabian
Mechanical Engineering Department, College of Engineering

The Future of Transportation Technology (AZLoop: Arizona's SpaceX Hyperloop Competition Pod Team)

EAGLE PRIZE AWARD

AZLoop is a collaboration between Embry-Riddle Aeronautical University and Arizona State University graduate and undergraduate students. The purpose is to design, test, and build a small-scale prototype of a high-speed vacuum tube pod with the intent of competing at the SpaceX Hyperloop Pod Competition III. In August 2017, AZLoop competed against hundreds of international teams for a spot at Competition II and placed in the top 8. We have recently been accepted for a position at Competition III and are moving into the manufacturing phase. The goal for Competition III is to achieve maximum velocity and stop within a mile long, vacuum-pressure test track developed and built by SpaceX in Hawthorne, Calif. We intend to accomplish this through a combination of powerful electric propulsion, magnetic levitation, and high-speed short-distance braking. The team has demonstrated its ability to work across long distances, under extreme pressure, with strict constraints and unrealistic deadlines.

Poster Presentation

Protective Factors in the Development of Psychopathy from Adolescence to Adulthood

Duran Delgadillo
Department of Behavioral and Safety Sciences, College of Arts and Sciences

Mentors:
Michele Gazica and Erin Bowen
Department of Behavioral and Safety Sciences, College of Arts and Sciences

The purpose of this study is to investigate factors that may disrupt the stability of psychopathy from adolescence to adulthood, using the National Institute of Justice Pathways to Desistence archival dataset. This study consists of 776 males (average age at baseline: 16) who were serious adolescent offenders within Maricopa County, Arizona and Philadelphia County, Pennsylvania, at the beginning of the study period (baseline interviews were conducted between November 2000 to March 2003). Participants were assessed at baseline and every 6 months thereafter for 7 years. Psychopathy is a personality trait that is characterized by a lack of empathy, cynicism, arrogance, superficial charm, aggressiveness, irresponsibility, and reckless disregard for the safety of self or others and has been consistently linked to criminal behavior. Research shows that adolescents who score highly on psychopathy assessment tools also tend to score highly as adults, and vice versa. To date, most stability research has focused on exacerbating factors, such as abusive parents and delinquent peers. This research, on the other hand, focuses its efforts on protective factors: motivation to succeed, satisfaction with school, perceived opportunities of success, and bonding with teachers, all of which were assessed at baseline. I expect that the relationship between psychopathy scores in adolescence (assessed at 6 months after baseline) and psychopathy scores in adulthood (assessed at 84 months after baseline) will be weaker in those adolescents who score relatively higher on the protective factors than those who score relatively lower. I hope that the results of this study will inform future interventions to mitigate the development of psychopathy over time.

Poster Presentation

Christian Denman and Mulangu Mundemba
Air Force ROTC Cadet and Aerospace Engineering Department, College of Engineering

Mentors:
Suzie Roth, Christine and Steven F. Udvar
Hazy Library and Learning Center

Lt. Col. Marella Tobolt Big Mountain
Air Force ROTC

Qualities of Great Leaders

Our team plans to analyze the qualities of three great leaders and compare how there are certain traits that are similar between the three. We plan to use the Hazy Library to research the history, choices, and consequences of our three chosen leaders to compare their leadership. Ultimately, we plan to have a presentation that will showcase the traits of the leaders that anyone can follow and/or learn from.

Poster Presentation
Air Force ROTC Briefing

Personality Type versus Leadership Success

Personality Type versus Leadership Success in an undergraduate project whose researchers study from the College of Aviation at Embry-Riddle Aeronautical University in Prescott, Ariz. The team is asked to investigate the correlation between the Dominance, Influence, Steadiness and Conscientious (DISC) personality assessment and the level of success achieved as a leader, as defined by associated supervisors and subordinates. The end goal of the project is to identify the personality type most likely to be a successful leader.

Poster Presentation
Air Force ROTC Briefing

Brandon Erekson
Air Force ROTC Cadet and Aeronautics Department, College of Aviation

William Lester
Air Force ROTC Cadet and Applied Aviation Sciences Department, College of Aviation

Mentor:
Lt. Col. Marella Tobolt Big Mountain
Air Force ROTC

Austin Fischer and Evan Bozanic
Air Force ROTC Cadets and Aerospace Engineering Department, College of Engineering

Mentors:
Col Randy Kaufman and
Lt. Col. Marella Tobolt Big Mountain
Air Force ROTC

Jessica Butts
Front Seat Life™

Kaela Martin
Aerospace Engineering Department, College of Engineering

Leadership in the Classroom: Teaching Effectiveness Based on Leadership Principals

When instructors look at their role as a leader in the classroom, they approach their self-efficacy in a very different way than through the lens on being "only a teacher." Our research will center on the effectiveness of an instructor based on their consideration of students' personalities and understanding of leadership principles. This research is inspired by Steven Covey's 7 Habits of Highly Effective People and Jessica Butts' coaching of Myers Briggs personality types. This research will provide instructors with a different outlook on their position as a leader in the classroom, and recommendations on how to improve their communication and teaching effectiveness. Tailoring teacher approach to students' individual personality types with an emphasis on leadership principles will have a direct effect to students' experience and affective learning.

Poster Presentation
Air Force ROTC Briefing

International Model NATO

EAGLE PRIZE AWARD

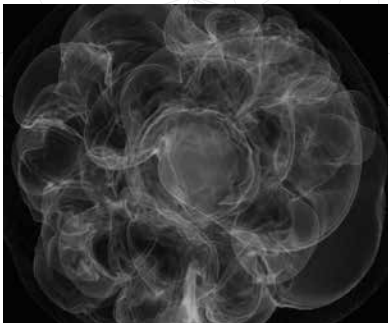
International Model NATO is an undergraduate team whose members hold different majors from the College of Security and Intelligence and the College of Engineering at Embry-Riddle Aeronautical University in Prescott, Ariz. The team prepared and competed in the International Model NATO competition in Washington, DC, on February 15-18, 2018. All members represented the country of Albania across six committees discussing a range of issues facing the members of the North Atlantic Treaty Organization including the North Atlantic Council, Military, Political Affairs, Nuclear Planning, Partnerships and Collective Security, and Emerging Security Challenges committees. The team applied their extensive knowledge along with their collaboration and communication skills at the competition. Through extensive research and analysis, team members built consensus about security issues from the perspective of Albania within the alliance. Participating in the competition, polished the team members understanding of global security issues and collective security through practicing the art of diplomacy in a serious simulation. The entire team successfully portrayed their real life Albanian counterparts and three of the members were recognized as Distinguished Delegates.

Poster Presentation
Invited Oral Presentation

Holly Focareto, Lucy Bebbington, Brandon Embrey, Jorden Long, Jack Lupori, Shannon McGirk, James Ritchey and Mason Russell
Intelligence Studies and Global Affairs Department,
College of Security and Intelligence

Stefan Johnson and Marc Rego
Aerospace Engineering Department,
College of Engineering

Mentors:
Brooke Shannon and Tyrone Groh
Intelligence Studies and Global Affairs Department,
College of Security and Intelligence



Jasmine Gill and
Pedro Jesus Quiñonez
Physics and Astronomy Department,
College of Arts and Sciences

Mentor:
Michele Zanolin
Physics and Astronomy Department,
College of Arts and Sciences

Sounds of Gravitational Waves from Core Collapse Supernovae

IGNITE GRANT AWARD

The detection of gravitational waves from coalescing binary black hole systems by LIGO proves that space time is a Jelly that can vibrate, and we can listen to these vibrations as new way to explore the universe and understand fundamental physics. Another important source of gravitational waves are Core Collapse Supernovae, the explosive death of stars at least 10 times the mass of our sun. My line of research is to detect these waves. As initial phase of my research I prepared a database of all the gravitational waveforms for exploding stars that have been calculated with numerical simulations. The web page I prepared allow to play the sound of more than thousand examples I am planning to share some of the expected sounds and describe their differences. I will also describe some of the further steps of my research.

Poster Presentation with Audio

The Effect of Leadership Traits and Training on the Effectiveness of a Team

This team consists of undergraduate students whose members all participate in Air Force ROTC at Embry-Riddle Aeronautical University in Prescott, Ariz. The topic of our class this year is leadership, so our team began researching how leadership training and positive leadership traits in subordinates changes the effectiveness of a team. We approached various teams around the campus, and surveyed members of those teams to see if any of the subordinates had received any formal or informal leadership training in the last five years. We also asked what type of leadership training they received, and what topics were covered in that training. We then measured the effectiveness of each team so that results could be compared across many groups. The end goal of the research is to determine if training subordinates in leadership topics is a good way of increasing the overall effectiveness of a team.

Poster Presentation
Air Force ROTC Briefing

Connor Golley
Air Force ROTC Cadet and Cyber Security and Intelligence Department, College of Security and Intelligence

Anthony Quezada
Airforce ROTC Cadet and Aeronautics Department, College of Aviation

Robert Myers and William Smith
Airforce ROTC Cadet and Aerospace Engineering Department, College of Engineering

Mentor:
Lt. Col. Marella Tobolt Big Mountain
Air Force ROTC

Robert Graham and Stefan Johnson
Aerospace Engineering, College of Engineering

John Rees
Mechanical Engineering, College of Engineering

Mentors:
Shigeo Hayashibara
Aerospace Engineering, College of Engineering

Richard Gibson
School of Business, College of Arts and Science

Formula SAE

EAGLE PRIZE AWARD

This project is to explore the concepts of automobile design by designing a race car to compete in the Formula SAE competition. This project will consist of researching other university's designs, improving on these designs in the fields of propulsion and aerodynamics, building the newly designed car, testing the car, improving the car, and finally racing the car in the Formula Student competition against other universities from around the world. Being a university focused on aerodynamics our focus will be on improving the overall aerodynamics of the car to give us an advantage in the competition. We will do this by making the overall shape of the car as aerodynamic as we can using composites and other advanced building materials. This project also gives the students working on it hands on experience designing, building, testing, and modifying a large engineering system which will give them skills which will be used beyond graduation.

Poster Presentation

Women in Leadership by The Fifty-One Percent

Jillian Green and Kerrigan McDonald-Ortega
Air Force ROTC Cadets and Global Security and Intelligence Studies Department,
College of Security and Intelligence

Mentors:
Suzie Roth, Christine and Steven F. Udvar
Hazy Library and Learning Center

Lt. Col. Marella Tobolt Big Mountain
Air Force ROTC

"Aggressive and hard-charging women violate unwritten rules about acceptable social conduct."
(Sheryl Sandberg, Lean In, 2013)

After informally surveying female students on campus, it is apparent that our negative experiences with the faculty and other students have been mirrored by other women.

We could no longer ignore the problem apparent in the campus culture surrounding women leaders. Male ambition is expected, whereas female ambition is discouraged – because it is intimidating. This project begins to address the constraints on women in leadership roles. During our research, we focused on how women are constrained in leadership positions, people's perception of women within leadership, and how it affects women ubiquitously. We are working to create recommended courses of action that can be implemented by Embry-Riddle Aeronautical University's Women's Ambassador Program. We plan to continue developing solutions to this problem to create a culture change on our campus and greater understanding of the positive impacts of gender equity. We believe these findings can create a proactive transformative environment for students at Embry-Riddle.

Poster Presentation
Air Force ROTC Briefing

Jacob Huston and Destiny Penna
Applied Aviation Sciences Department, College of Aviation

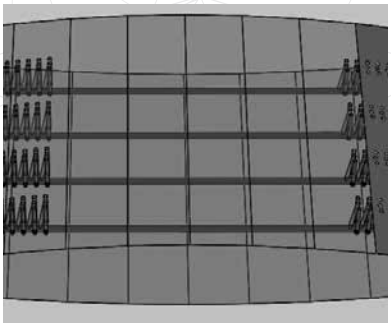
Mentors:
Jennah Perry, Johnny L. Young, and Jacqueline Luedtke
Applied Aviation Sciences Department, College of Aviation

Michelle Parker
Aeronautical Sciences Department, College of Aviation

The Future of Unmanned Traffic Management: Transforming and Combining Technologies to Implement Commercial Unmanned Aircraft Operations in Controlled Airspace

At present there is minimal legislation regulating the use of Unmanned Aerial Systems (UAS) within the National Airspace System and the legislation that does exist stifles economic activity. FAR part 107 covers commercial and recreational use of UAS but places extreme limitations of the application of these systems for commercial use. For example, the total weight of the UAS including payload cannot exceed 55 pounds, the remote pilot must maintain constant visual contact with the UAS and they are restricted to daylight operations. These limitations, along with many others are prohibiting the growth of UAS into the massive economic boon that it should be; fortunately, however, these limitations will no longer be necessary if an effective plan for integrating UAS into Air Traffic Management systems can be implemented. The goal of this research is to devise such a plan that takes advantage of existing Flight Service Station Facilities, especially trained Unmanned Air Traffic Controllers in conjunction with ADSB and Drone Net Technology, and a grid based low altitude airspace system similar to the Military Grid Reference System (MGRS). If implemented this plan would allow for the safe, efficient, and effective movement of UAS through the National Airspace without the need for such restrictive legislation.

Poster Presentation



UAV Research – CFD Studies in Venturi Wing Design

EAGLE PRIZE AWARD

Jiyoung Hwang
Aerospace Engineering Department, College of Engineering and Applied Aviation Sciences Department, College of Aviation

Mentor:
Shigeo Hayashibara
Aerospace Engineering Department, College of Engineering and Advanced Computing & Simulations Lab (ACSL)

The purpose of this research is to study the effects of the Venturi Wing Design, which is intended to increase the lift/drag coefficient ratio of UAVs. This new design concept uses Venturi's effect to create pressure modifications over a wing. The Venturi effect is a concept describing how a reduction in fluid pressure and increase in velocity occurs when fluid flows through a constricted pipe section. To apply this concept, the modified wing was designed with several longitudinal pipes running from the leading edge, the stagnation area where the air normally stops, to the trailing edge of the wing. Since the longitudinal pipes are connected to the stagnation area and the velocity inside of the pipes is higher than the wing upper surface, the air flowing into the pipes will be lower pressure. Additionally, there are two sections of pipes on top of the wing that run down to the longitudinal pipes. These vertical pipes are designed to create a suction that prevents flow separation over the wing. Also, the vertical pipes cause air flow into the canal since the pressure inside of canal is lower than the surface of the wing. Recent CFD simulation with horizontal pipes in a NACA 0012 showed the potential of this design in low Reynolds number condition. This wing design will be used for Society of Automotive Engineers (SAE) Aero West® competition to meet the unique airplane design requirement.

Poster Presentation

Matthew Johnson
Applied Aviation Sciences Department,
College of Aviation

Mentor:
Mark Sinclair
Applied Aviation Sciences Department,
College of Aviation

Changing Fire Conditions

Long-term variations in fire weather conditions are examined throughout the United States using fire point data from the USGS (United States Geological Survey) from 1980-2016. Fire incidence is increasing over most of the United States, causing issues for first responders and residents in fire prone areas. Fire incidence and behavior are influenced by changes in temperature, relative humidity, wind and drought. The impact of ENSO (El-Nino-Southern Oscillation) on fire occurrence is investigated. Results show that El Nino (La Nina) increases (reduces) precipitation which hinders (increases) fire activity. A composite analysis of fire incidence in Southern California revealed that strongest fire growth is associated with the high wind, low relative humidity, and higher temperatures that typically accompany the Santa Ana weather pattern.

Poster Presentation

Modes of Monsoon Precipitation in Arizona and New Mexico

Cynthia Kobold
Applied Aviation Sciences Department, College of Aviation

Mentor:
Dorothea Ivanova
Applied Aviation Sciences Department, College of Aviation

While recent studies have linked strong NA monsoons to summer drought in the U.S. mid-west, the sequence of events which produce the NA monsoon remains unclear. It is important to show how the NA monsoon may operate in two modes: one mode producing anomalously wet conditions in New Mexico (but not Arizona), the other mode producing wet conditions in Arizona (but not New Mexico). Before mechanistically understanding any possible linkage between the NA monsoon and mid-western precipitation patterns, it may be necessary to understand the processes responsible for these two apparent modes. Our previous studies provide evidence that Gulf of California (GOC) sea surface temperatures (SST) are a factor determining the timing and westward extent of the North American (NA) monsoon within the United States. For this to be true, GOC SSTs must influence NA monsoon rainfall, and evidence to this effect is presented. Some results described in this study are from our paper published in Journal of Climate (Mitchell and Ivanova, 2002). The SST data used were derived from the NOAA Advanced Very High Resolution Radiometer (AVHRR), which measures fluxes of emitted and reflected radiance from five channels in the visible, near-infrared and thermal infrared (see McClain et al. 1995).

The question can be asked, “are wet monsoon seasons for AZ also wet for NM, and vice-versa?” The results of this study show that in wet AZ years, wet conditions are extensive throughout the southwest, extending into Utah, Nevada and California, while eastern NM is slightly drier than normal. In wet NM years, AZ in near normal for the monsoon season, and wet conditions are confined to NM and parts of Colorado and Texas. Hence, a strong monsoon year for NM will generally not benefit other parts of the desert southwest. While both AZ and NM are affected by the monsoon, the means by which they are affected appears to be different, since wet monsoons in AZ tend not to be anomalously wet in NM, and vice-versa. Based on our previous work, we suggest that the dominant moisture source for wet AZ monsoon seasons is the N. Gulf of California, while this moisture source does not appear likely for wet NM seasons. Also, as shown in Higgins et al. (1999), the monsoon begins in western NM about a week earlier on average than in western AZ. If the NM monsoon moisture comes from the Pacific (which various satellite imagery suggest), it apparently comes from lower regions of the GOC or the eastern Pacific near Acapulco, Mexico. In these regions, SSTs warm earlier than in the N. GOC, and may explain the earlier onset times in NM.

Poster Presentation

Alexander Michael Lubiarz
Air Force ROTC Cadet and Aerospace Engineering Department, College of Engineering

Anthony Aurelio Tudela Viadoy
Air Force ROTC Cadet and Applied Aviation Sciences Department, College of Aviation

Mentor:
Lt. Col. Marella Tolbert Big Mountain
Air Force ROTC

Effects of Perspective Bias on Leadership and Decision Making by Perspective Leadership

Perspective Leadership is a two-person undergraduate Air Force ROTC cadet team with two unique majors and perspectives. The team will seek to define, identify, test, and determine the importance of recognizing perspective bias, and methods to remove it from the decision-making process on a personal level. The team will use real world examples of decision making with perspective bias, as well as create an example with a live demonstration, to showcase the detrimental effects of perspective on decision making, as well as how the situation improves when steps are taken to remove the bias. The ultimate goal of the team will be to produce qualitative data on the effectiveness of decisions made both with and without perspective bias.

Poster Presentation
Air Force ROTC Briefing

Unmanned Aerial Vehicle Winglets

IGNITE GRANT AWARD

Cindy Ma, Daniela Baroni, and Andrew Carlson
Aerospace Engineering Department, College of Engineering

Mentors:
R. Andrew Gerrick
Mechanical Engineering Department, College of Engineering

Shigeo Hayashibara
Aerospace Engineering Department, College of Engineering

Extensive research of winglets has been done for many commercial high-speed aircraft applications in the past. The objective of this project is to recognize how winglets assist in the performance of Unmanned Aerial Vehicles traveling at lower speeds, at lower altitudes, and in a more viscous (low Reynolds number) environment. A number of UAV winglets will be designed based on XFLR5/ANSYS-Fluent CFD (Computational Fluid Dynamics) analysis; then will be manufactured/tested in SolidWorks with 3-D printing technology. The analytical results will be verified in 1/9 scale low-speed subsonic wind tunnel testing. XFLR5 is used to vary the shape of the winglet design parameters in terms of winglet length, sweep, dihedral, and twist. The length of the winglet is varied/analyzed from 0.5 inches to 2 inches in small increments. Once the length that produces the highest Lift-to-Drag (L/D) ratio is chosen, the sweep, dihedral, and twist will be added to the design one by one and will be optimized in terms of highest L/D ratio. Each winglet design is analyzed using the Vortex Lattice Method in XFLR5 to visualize downwash and obtain estimates of induced drag coefficients and lift coefficients. The best winglet will be utilized on the SAE Aero West competition team's UAV main wing. The winglet will incorporate a compromise between a high L/D and a low total drag coefficient.

Poster Presentation

Austin Macosky, Cole Reeves, and Kyle Bergmann
Aerospace Engineering Department, College of Engineering

Mentor:
Ed Post
Computer, Electrical, and Software Engineering Department, College of Engineering

Development of a Remote Mountaintop AllStar HAM Radio Node

IGNITE GRANT AWARD

The AllStar HAM Radio network is a worldwide system of internet linked radios and radio repeaters. The vast coverage of this system allows for easy international communication and emergency effort coordination. The AllStar link system played a vital role in emergency effort coordination in the wake of hurricane Harvey that hit Houston in 2017. This team developed a robust AllStar node that was suitable for permanent deployment in adverse environmental conditions and that does not require an external power or data connection. During the completion of this project, our small team of 3 engineering students explored the realms of solid mechanics (building the structure to support a solar panel, antenna, and Wi-Fi dish), radio and antenna theory (minimizing RF interference and maximizing RF throughput), and city planning and development (seeking permission to place the node on a remote mountaintop). This node's all steel construction and electronics enclosure can support extreme snow-loading, rain, and winds over 100mph. One of the most important capabilities of this node is its ability to operate during power outages and cell service blackout. In the future, we hope to incorporate an open autopatch (an internet linked phone switch) into this node to allow ham radio operators to make local phone calls through the node itself. This node will be permanently deployed either on campus at Embry-Riddle Prescott or on a nearby mountaintop for public and emergency service use.

Poster Presentation and Demonstration

Project Management in Academia as Seen by the Management of: "Identifying Cost-Effective Security Barrier Technologies for K-12 Schools: An Interdisciplinary Evaluation"

IGNITE GRANT AWARD

School shootings have become all too common in American society, with the casualty rates usually astoundingly high. The College of Security and Intelligence has begun researching ways to delay intruders long enough for first responders to arrive and handle the situation. They are conducting this research by constructing a mock school facility and performing penetration testing on the door frames, locks, and windows with a multitude of weapons. Researchers McGirk and Martinson are using Project Management Methodologies to help manage the College of Security's enormous project. This method will ensure that the project runs smoothly and stays on budget, on time, and within the constraints of the project. The Project Management Methodology is globally acknowledged as the most efficient way to manage projects, however little research has been conducted focusing on project management in academia. McGirk and Martinson are overseeing the school security project and the means used by Project Manager Reginald Parker to study how effective the Project Management Methodology is when used on individuals who are not familiar with the process.

Poster Presentation

Ashtin Martinson and Shannon McGirk
Intelligence Studies and Global Affairs Department,
College of Security and Intelligence

Mentor:
Reginald Parker
Intelligence Studies and Global Affairs Department,
College of Security and Intelligence

Hunter McCraw and John Norton
Department of Physics & Astronomy,
College of Arts & Sciences

Mentor:
Darrel Smith
Department of Physics & Astronomy,
College of Arts & Sciences

Construction and Operation of an Arcjet Thruster

IGNITE GRANT AWARD

Electric propulsion systems are critical to extending the lifetimes of satellites and other spacecraft. They are an increasingly important area of research for space industry companies looking to offer the longest lifetimes for commercial satellites. Electrothermal thrusters are Electric Propulsion (EP) devices that use electric power (electro-) to generate heat (thermal) which is applied to a propellant. This propellant is compressed in a converging nozzle section, where pressure and heat increase, and then expanded through a diverging nozzle to generate thrust. Electric propulsion systems, compared with conventional chemical propulsion methods, have higher impulse ratings, higher thrust efficiency, better controllability, and longer operational lifetimes. This project focuses on designing, constructing, testing, and optimizing a low-power arcjet thruster device. Through modification of design parameters such as propellant mass flow rate, nozzle shape/length, cathode gap spacing, and electric power levels, the team aims to optimize the performance of the propulsion system. The project presents a simple arcjet that has been constructed and operated to demonstrate feasibility of low-power electric propulsion systems and allowing for the investigation of relevant properties such as thrust and specific impulse. The research results will contribute to the small body of knowledge regarding low-power arcjets of less than 1 kW in power, and their performance.

Poster Presentation
Invited Oral Presentation

Julia Language Ephemeris and Physical Constants Reader for Solar System Bodies

IGNITE GRANT AWARD

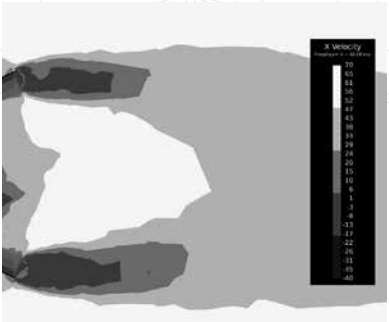
Julia Mihaylov and Renee Spear
Aerospace Engineering Department, College of Engineering

Mentors:
Kaela Martin
Aerospace Engineering Department, College of Engineering

Damon Landau
Jet Propulsion Laboratory, California Institute of Technology

Julia is an open source dynamic programming language publicly released in 2012. One of the benefits to using Julia is its computational efficiency that exceeds other dynamic languages, such as MATLAB or Python, and almost matches that of static languages, such as FORTRAN or C. With these characteristics, Julia is a unique combination of a high-performing, interactive, and productive interface. Since 2012, the Julia language has been deployed in many fields including finance, optimization, and data science. Within the astrodynamics community, Julia does not have an ephemeris reader including major and small bodies. An ephemeris tool offers a convenient and accurate approach to navigation applications, including satellites and other means of space-flight. The Julia Language Ephemeris and Physical Constants Reader for Solar System Bodies is an ephemeris reader written in Julia and a new tool intended for astrodynamic use. The ephemeris reader acquires necessary data for mission design from public JPL websites and calculates positions, velocities, accelerations, and other characteristics of major and small bodies at any user-defined times using the extracted data. This project was presented and published at the AIAA SciTech conference in January 2018. The team expects to publish a second paper at the AAS/AIAA conference in January 2019 where the code will have a more optimized computation time and potential additional features of higher order gravity harmonics for major bodies and moons and asteroid modeling.

Poster Presentation



Forrest Mobley
Aerospace Engineering Department,
College of Engineering

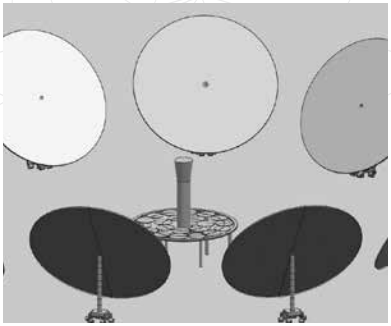
Mentor:
Shigeo Hayashibara
Aerospace Engineering Department,
College of Engineering

UAS Paradrogue Research and Development

IGNITE GRANT AWARD

Unmanned Aerial Systems (UAS) have become increasingly predominant within most reaches of the military and government, accomplishing tasks for less cost and in less time. To support this growing percentage of aeronautics, the ability to refuel/recharge UASs midflight using a drogue-probe (paradrogue) is being studied and developed using Computational Fluid Dynamics (CFD) methods. This project utilizes the most powerful computing resources available on the Embry-Riddle Aeronautical University Prescott campus to simulate and test a scaled model of a paradrogue system (already in use by the U.S. military for manned aircraft refueling) within various environments, to support the wide variety of UASs currently used. It is the goal of this project to compute sufficient data to begin wind tunnel testing and future model development.

Poster Presentation



Team KRATOS: Solar Concentration Power Generation on Mars Utilizing a Carbon Dioxide Brayton Cycle

EAGLE PRIZE AWARD

To meet the NASA BIG Idea Challenge requirements of designing a power generation system for use on Mars, Team KRATOS has selected a carbon dioxide (CO2) open Brayton cycle architecture. The heat input source will consist of a concentrated solar power system, with a graphite solar receiver tower and reflectors attached to pods for easy maneuverability. The pods will be packaged underneath the main tower to fit within an 11 m3 volume for transportation and be pre-programmed to arrange themselves around the main tower dependent on latitude in order to maximize the available energy. An initial Brayton cycle analysis has been performed to determine that 40kW of power can be generated from the system overall. Graphite thermal reservoirs will be utilized allowing the system to produce power during dust storms and at night. Dust mitigation on the solar reflectors will be controlled by the use of an electrodynamic shield.

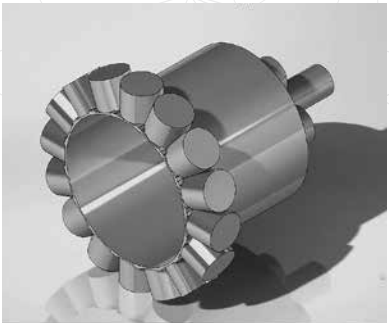
Poster Presentation

Margaret Mueller and Emily Lambert
Aerospace Engineering Department, College of Engineering

Tyler Green and Eric Trevenna
Mechanical Engineering Department, College of Engineering

Madalyn Markham
Computer, Electrical, and Software Engineering Department, College of Engineering

Mentors:
Daniel Dannelley and Elliott Bryner
Mechanical Engineering Department, College of Engineering



John Norton and Hunter McCraw
Department of Physics and Astronomy, College of Arts and Sciences

Barik Smith
Aerospace Engineering Department, College of Engineering

Mentor:
Darrel Smith
Department of Physics and Astronomy, College of Arts and Sciences

Design and Simulation of a Miniature Hall-Effect Thruster

IGNITE GRANT AWARD

Hall-Effect Thrusters are one of the simpler designs of modern Electric Propulsion (EP) systems, with one of the highest efficiency rates. They use a crossed electric and magnetic field to generate the known Hall current from which the device derives its name. Electrons race in a circular pattern around the thruster channel, stripping the propellant gas' outer electrons from their atomic orbits, thus positively ionizing the heavy atoms. These (now) positive propellant ions are then accelerated abruptly to astronomically high speeds as they are ejected from the thruster. This EP project focuses on research and design for a low-power miniature Hall-Effect Thruster. By simulating design parameters such as magnet type/grade, magnet placement, magnetic field line characteristics, performing cost analysis, etc., the team aims to generate an accurate model in the hopes of efficiently constructing such a miniature Hall-Effect Thruster in the future.

Poster Presentation

Toxic Leadership in the Cockpit

Toxic Leadership in the Cockpit is an undergraduate team whose members hold different majors as offered from multiple colleges at Embry-Riddle Aeronautical University Prescott. The team is tasked to uncover and discuss multiple cases of toxic leadership in the cockpit and the results of those instances. The presentation will discuss the potential for loss of life and how it can be avoided. The end goal of the project is to present leadership tactics that anyone can use to avoid conflicts in any professional environment, in any career field.

Poster Presentation
Air Force ROTC Briefing

Tate Ottaway and
Dominick Peluso
Air Force ROTC Cadets and Aeronautical Science Department, College of Aviation

Jerad Richardson
Air Force ROTC Cadets and Applied Aviation Sciences Department, College of Aviation

Troy Fenner
Air Force ROTC Cadets and Mechanical Engineering Department, College of Engineering

Mentor:
Lt. Col. Marella Tobolt Big Mountain
Air Force ROTC

Hilliard Paige, Lauren Barthenheier, Jason Hamburger, Brennan Gray, Steven Buck, Chloe McClellan, and Noor Rashid
Aerospace Engineering Department, College of Engineering

David Stockhouse
Computer, Electrical, and Software Engineering Department, College of Engineering

Heather Humphreys
Mechanical Engineering Department, College of Engineering

Mentor:
Gary Yale
Aerospace Engineering Department, College of Engineering

EagleSat 2

IGNITE GRANT AWARD

The EagleSat program at Embry-Riddle Aeronautical University, an extracurricular student organization, is currently building, with the intent to launch EagleSat 2, a 3U CubeSat satellite tailored to the requirements of the NASA CubeSat Launch Initiative, and NASA's strategic scientific goals. EagleSat 2 will combine existing commercial grade hardware with systems designed and manufactured in-house. Accordingly, EagleSat 2's mission is focused on the scientific goals of detecting cosmic ray particles and studying the effects of solar radiation on various types of Random Access Memory. EagleSat 2 provides undergraduate students with firsthand experience in all areas of spacecraft development and teaches valuable engineering skills to supplement regular engineering coursework. EagleSat 2 is also used as a powerful outreach tool, allowing the team to engage high-school students in our local community and foster a passion for STEM based activities.

Poster Presentation

Crisis Leadership

I am tasked with designing an optimal model for leadership in crisis situations and comparing it to standard leadership practices. The crisis model will include information on how to take charge of a situation, how to avoid alienating followers, and how to handle the aftermath. The end goal of the project is to create a reliable model that leaders can use effectively to take charge of a crisis situation.

Poster Presentation
Air Force ROTC Briefing

Joshua Pederson
Air Force ROTC Cadet and Aerospace Engineering Department, College of Engineering

Mentor:
Lt. Col. Marella Tobolt Big Mountain
Air Force ROTC

Destiny Penna and Jacob Huston
Applied Aviation Sciences Department, College of Aviation

Mentors:
Jennah Perry, Johnny L. Young and Jacqueline Luedtke
Applied Aviation Sciences Department, College of Aviation

Michelle Parker
Aeronautical Sciences Department, College of Aviation

Detecting Small Unmanned Aircraft in Controlled Airspace with Automatic Dependent Surveillance Broadcast

Unmanned aircraft systems (UAS) have become increasingly prominent in the everyday life of the American whether it be for commercial use or for recreational use. According to the FAA's 2016 Aerospace Forecast, the number of UAS registered in the United States is expected to rise to seven million by 2020. In order to allow the safe integration of small UAS (sUAS) into the National Airspace System (NAS), an operational system to detect and identify sUAS must be in place. Automatic Dependent Surveillance Broadcast (ADSB) is thought to be a solution to identifying and detecting sUAS in the NAS; however, ADSB was initially designed for much larger aircraft. Due to the potential erratic movement of sUAS and delays in real-time transmitter/receiver updates, it is essential to determine the accuracy of ADSB coupled with sUAS aircraft. Embry-Riddle Aeronautical University, Prescott is in the process of simulating and testing ADSB equipped sUAS. Over the course of this semester, test flights will be performed on two separate occasions in order to determine the track accuracy and response rates of ADSB equipped sUAS in order to determine if ADSB should be used as an effective tool for tracking and detecting sUAS in controlled airspace. Finding solutions to effectively and safely detect unmanned aircraft into controlled airspace will help to advance the sUAS integration process.

Poster Presentation

Psychological Effects of Leadership

Throughout history, leadership has and is a prominent aspect of society. Its influence on organizations, politics, and individuals is so diverse it is often difficult to truly understand. Along with having external factors on the success of organizations, leadership can have psychological effects on individuals. The perception of power can define a situation entirely and more times than not, power is misunderstood as leadership. Through this research project, both the positive and negative effects of leadership are explored. The results from the initial research are then to be used to compare and contrast the impression leadership has rather than power in an individual and organizational level. This final part of the research will come from studying past psychology experiments such as Dr. Phillip Zimbardo's Stanford Prison Experiment.

Poster Presentation
Air Force ROTC Briefing

Alani Pon
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Moritz Wienke
Air Force ROTC Cadet and School of Business, College of Arts and Science

Mentor:
Lt. Col. Marella Tobolt Big Mountain
Air Force ROTC

Jacob Ponter
Aeronautical Science Department,
College of Aviation

Mentors:
Michelle Parker and Timothy Sestak
Aeronautical Science Department,
College of Aviation

Aviation Augmented Reality Glasses by Aero Glass

Companies like Aero Glass are reinventing the world of aviation through technologies that allow us to "see" in a whole new way. From its maintenance to classroom applications to real-world flying, these revolutionary new "mixed reality" augmentation reality systems are promising to become the next evolution of safety technology in the aviation industry. Building on advancements with Head's Up Display (HUD) technology, Aero Glass developers are making it possible to "see" through the machine, or into layers of airspace, or inside the cockpit in virtual reality. Imagine the training benefits of highlighting items on the checklist while training a student pilot on a virtual flight deck, or viewing airspace restrictions in real time while flying. The potential for safety advances through this technology could be groundbreaking for pilots flying in ever-increasingly congested airspace, inside ever-increasingly complex aircraft. The interface between automation, augmented reality, and the human mind have posed challenges in the past; this type of new technology could help bridge the gap between human and machine.

Poster Presentation and Demonstration

NASA Human Exploration Rover Challenge

EAGLE PRIZE AWARD

Miguel Recabarren, Lars Grantz, Vaishnavi Harikumar, Karun Paul, Oliver Davis, Hossain Samei, and Jacob Stites
Aerospace Engineering Department, College of Engineering

Mentor:
Brenda Haven
Mechanical Engineering Department, College of Engineering

The NASA Human Exploration Rover challenge is a competition held by NASA where schools around the nation compete to research, design, and build a custom-made human powered rover. Students participating in this challenge will experience every facet of Engineering. The rover is completely built from the ground up from initial design concepts all the way to final testing of the physical product at the competition held in Alabama. This competition requires that the rover be strong enough to handle multiple and diverse terrains, light enough to maintain speed and be carried between two students, and capable of gathering extraterrestrial specimens for later study. The skills garnered in this engineering project will applicable to many engineering courses, especially the final senior capstone project. However, The NASA Human Exploration Rover challenge allows students to have valuable skill sets such as design, teamwork, fabrication, and analysis as soon as freshman year. This competition is a value learning experience that leads to a strong foundation for future engineering career as well as a chance to compete with other students across the nation.

Poster Presentation

James Ritchey
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Mentor:
Lt. Col. Marella Tobolt Big Mountain
Air Force ROTC

Cross-Cultural Leadership Studies

As part of Air Force ROTC curriculum as well as personal interest, I will be researching the different traits valued in leaders across multiple different cultures worldwide. As most leadership studies focus on what is valued in an American leader, the goal of this research is to look into what traits and characteristics are the most effective when leading people from different cultural backgrounds. I will look into how leaders are most effective in the Arab culture, how they are most effective in a Sub-Saharan African culture, and how they are most effective in a Northeast Asian culture. These geographic areas are some of the most volatile regions in the world, and the U.S. military is continually performing training and Foreign Internal Defense missions for locals in these cultures. To better train and perform in these missions, American trainers must be able to adapt to a different expectation of a leader.

Poster Presentation
Air Force ROTC Briefing

Edson's "Bloody" Ridge: A Study of Leadership, Morals and Their Effects on Human Decision Making in Combat

IGNITE GRANT AWARD

This study will evaluate the effects of both leadership and societal morals, in order to gain insight concerning how individuals react to the experience of combat. In order to accomplish this a detailed battle analysis of the Battle for Edson's "Bloody" Ridge will be conducted. This battle analysis will serve as the foundation in which the effects of leadership and morals will be studied. I will take the fundamental differences between the cultures and ideologies of WWII era Japanese and American societies, and see how these influence the leadership methods, and consequently the tactics executed in this particular battle. This study shall thus serve to provide warfighters, and intelligence professionals alike an example of the fundamental difference in western and non-western society's effect on the individual combatant's decision making in combat to better comprehend how actions against non-western adversaries should be looked at in future conflicts.

Poster Presentation

Andrew Ruffini
Intelligence Studies and Global Affairs Department,
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Mentor:
John Strandberg
Intelligence Studies and Global Affairs Department,
College of Security and Intelligence

Jennifer Ruth and Brandon Ruth
Air Force ROTC Cadet and Aeronautical Science Departmart, College of Aviation

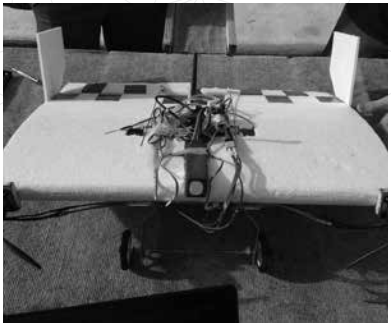
Mentors:
Lt. Col. Marella Tobolt Big Mountain
Air Force ROTC

Captain David Gardner
U-2 Pilot, Beale Air Force Base, Calif.

Transformational Leadership from the Eyes of a Follower

There is one trait every company, business or corporation deals with no matter how big or small: leadership. Creating a successful, healthy environment for employees comes from leadership in the workplace. Transformational leadership is not optional, it is essential to empower followers to perform and succeed in turbulent environments. The goal of our research is to help our audience see the crucial differences in leadership by sharing our experiences while using the full range leadership model and explaining how to apply these traits in workplace settings. Through self-realization and using the full range leadership model, companies and people are able to build transformational leaders.

Poster Presentation
Air Force ROTC Briefing



AIAA Design Build Fly Regional Passenger Aircraft *Nova Forte*

EAGLE PRIZE AWARD

The Goal of the Embry-Riddle AIAA DBF (Design Build Fly) Team is to design and build a UAV capable of participating and fulfilling the mission requirements of the annual AIAA DBF competition sponsored by Cessna Aircraft Company and Raytheon Missiles Systems. The competition includes the design and supporting documentation of the aircraft. Students are provided hands-on experience in designing and building an UAV giving all the students involved with the project exposure to the engineering process similar to aircraft design and capstone projects, teaching the process of engineering and technical design skills to members, and preparing them for what to expect in industry. Additionally, team members develop soft skills such as teamwork, time management, communication, and critical thinking. These skills are just as important as the technical knowledge to help prepare students for the real-world engineering projects. This year, the competition challenge is to carry passengers (bouncy balls) and cargo. The twist is that the aircraft must be modular, and therefore the major components such as motors, control surfaces, landing gear, and many other must be removable. The aircraft this semester, Nova Forte, is designed to fulfill these requirements. Nova Forte is a flying wing aircraft, with a motor on each wingtip to counteract the wingtip vortices produced by induced drag.

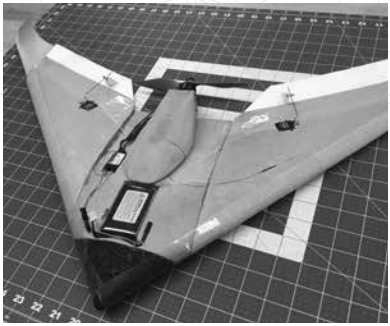
Preferred Presentation and Demonstration

Brian Study, Paul Sanders, Marcus Ross, Trevor Lau, Adam Bergamini, Bryan Shaefer, Nathan Mills, Joseph Grosjean, Simon Zemana, Bailey Symes, Samantha Carter, Cole Reeves, Corey Bullens, and Indigo Kaul
Aerospace Engineering Department, College of Engineering

Max Eisenstadt, Luke Tronstad, Mack Westerfeld, and Alex Malinowski
Mechanical Engineering Department, College of Engineering

Mentors:
David Lanning and William Crisler
Aerospace Engineering Department, College of Engineering

Jacob Zwick
Mechanical Engineering Department, College of Engineering



Nitin Susendran, Nathan Mills, Adam Bergamini, Jacob Schneider and Joseph Grosjean
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Mentors:
Akhan Almagambetov
Computer, Electrical, and Software Engineering Department, College of Engineering

William Crisler
Aerospace Engineering Department, College of Engineering

Micro Air Vehicle Platform Design

IGNITE GRANT AWARD

The majority of small scale Unmanned Aerial Vehicles (UAV's) are made using very high performance, high cost materials, such as carbon fiber or other composite matter, typically shaped into very unconventional shapes and structures. While the use of these materials helps the airframe's structural stability and performance, the cost to buy, shape or machine such materials is extremely high. The focus of this project is to use consumer grade materials and technology to design and build an autonomous micro air vehicle that can functionally compete with military grade systems, while still coming under budget compared to the average budget of a typical military grade drone. Our mission objectives include autonomous take-off and landing, waypoint navigation, collection and transmittal of data from IR & HD camera systems to the ground control module, perform minute stability control adjustments, basic flight maneuvers, and stay in the air for at least 1 hour. The first phase of our project was testing different airframes and airfoils to get a feel for their flight characteristics. Our most current prototype is a fixed flying airframe, remotely controlled by a UAS operator. Our aircraft is made mostly out of EXPS foam, with an EPP foam nose to provide impact resistance. We reinforced the leading edges of the aircraft with drywall tape and epoxy to provide a ruggedized structure. In addition, our UAV gets approximately 45 minutes of flight time at half throttle. Steps are being taken to implement a Lisa/S autopilot system for phase two of our project.

Poster Presentation and Demonstration

Airline Schedule Padding and Consumer Choice Behavior

IGNITE GRANT AWARD

Siddharth Varkey
School of Business,
College of Arts and Sciences

Mentor:
Jules Yimga
School of Business,
College of Arts and Sciences

Airlines are known to allow for buffer time to account for contingencies—a practice known as schedule/time padding. Schedule padding in the U.S. airline industry has generated public interest as frequent travelers oftentimes notice that nonstop flights offered by different airlines between the same airports show different durations in the computer reservation systems (CRS). One reason (among others) that has been widely documented is that 'padding' a scheduled flight time is a way for airlines to artificially improve their on-time performance, especially now that flight on-time performance has become a source of competitive advantage as passengers' expectations concerning on-time flights have increased in recent years. This study has a dual objective. First, the study will investigate the leading factors (including route and carrier characteristics) that drive buffer time differences across flights. Second and more importantly, the study will examine the implications and costs of schedule padding to consumers.

Poster Presentation

Pamela Ward
Aeronautical Science Department,
College of Aviation

Mentors:
Tim Holt, Jacqueline Luedtke and Jennah Perry
Applied Aviation Sciences Department,
College of Aviation

Hypoxia Training for General Aviation Pilots

IGNITE GRANT AWARD

Hypoxia is a lack of oxygen throughout the body which can be caused by several factors at any altitude. General Aviation (GA) pilots may argue that most GA aircraft cannot attain the required altitudes where one might be more affected by hypoxia, but that very attitude makes them more susceptible to hypoxia. Unlike airline or military pilots, there are no specific requirements for GA pilots to receive flight physiology training or to report hypoxic events to safety or governing agencies. Without reports, records, or statistics on hypoxia, there is no way to observe trends throughout the years which could help prevent other GA pilots from experiencing the same hazard.

To attain more information for this research on GA pilots' experiences with hypoxia, Embry-Riddle requested Aircraft Owners and Pilots Association (AOPA) and Curt Lewis & Associates, a safety forum and recommendation service for the aviation industry, to distribute an anonymous survey via electronic newsletter to collect hypoxia data. The information attained was analyzed to determine how often hypoxia occurs with GA pilots, reporting statistics, and how effective flight physiology training is for the GA population. The data obtained from the survey was also used to research and evaluate current training courses in university aviation programs. A new and improved flight physiology training program, which focuses on hypoxia awareness along with other common issues experienced at high altitudes, will be outlined based on survey data and the success of current training programs.

Poster Presentation

Marketing Analysis of Scholarly Journals in a Social World

The next methodology to the Airline Quality Rating (AQR) Social Media metrics is to determine if scholarly platforms for future use can benefit the AQR. The AQR authored by Dr. Brent Bowen and Dr. Dean Headley introduced the Airline Quality Rating (AQR) in 1993 as an objective method for comparing and scoring airline performance in areas deemed to be important for consumers. The quantitative metrics from utilizing new marketing techniques have increased the audience members attracted to this report. With a digitalized driven society, social media has been the main benefactor in gaining new attention. Continuing on the process to increase audience members in exploring scholarly journals to demonstrate social media as an effective tool. Concluding this method will be an in-depth analysis on Mendeley, ResearchGate and Academia.edu to determine what their marketing strategies are to help researchers.

Poster Presentation

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Jacqueline Luedtke and Tim Holt
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Lucas Widner, Adam Scott, Kyle Lutterman, Braxton Kendall and Jeffrey Ryan
Aerospace Engineering Department, College of Engineering

Christopher Allyas
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Geoffrey Winship
School of Business, College of Arts and Sciences

Mentor:
Joel Schipper
Electrical, Computer, and Software Engineering Department, College of Engineering

VEX Robotics Club

EAGLE PRIZE AWARD

The VEX Robotics Club is a competition-based group of students at Embry-Riddle Aeronautical University, Prescott Campus. The team designs and constructs robots using standard VEX parts and competes in university-level VEX Robotics competitions. The club is divided into three competition teams: Blue, White and Gold teams. Each team builds one robot and represents Embry-Riddle Aeronautical University at VEX Competitions. The VEX game for the 2017-2018 season is called "In the Zone." In the game, two competing robots score as many yellow plastic cones on red and blue stationary or mobile bases and can also move the mobile bases into scoring zones on two corners of the competition field during the two-minute matches. The robots must operate autonomously for the first 45 seconds of each match, then drivers can take over control of the robots. The teams began the season by researching different scoring ideas, building prototypes, and conducting research to determine the best designs. Then the teams built their robots and programmed them using the RobotC language, then competing in the first competition of the season in early November on campus and the second competition in early March on campus. The club is also responsible for hosting these two competitions, the second of which invites over seventy teams to compete in high school and university level divisions. Poster format preferred.

Poster Presentation

Search and Rescue Ground Explorer (S.A.R.G.E.)

Jacqueline Worley, Sara El Baissi, Morgan Garone, Grayson Lynch and Chad Abramson Jr.
Mechanical Engineering Department, College of Engineering

Garrison Bybee and Mathew Todd
Computer, Electrical and Software Engineering Department, College of Engineering

Riley Griffin
Mechanical Engineering Department and Computer, Electrical and Software Engineering Department, College of Engineering

Mentors:
Iacopo Gentilini
Mechanical Engineering Department, College of Engineering

Richard Mangum
Communication and Humanities Department, College of Arts & Science

The primary goal of project Search and Rescue Ground Explorer (S.A.R.G.E.) is to create an autonomous ground vehicle that can assist in ground-based Search And Rescue (SAR) missions. This includes carrying a payload of survival supplies (food, water, shelter, and basic medical supplies) and leading survivors to more suitable locations for rescue. Additionally, S.A.R.G.E. will be capable of being lowered into a SAR mission via rope from a helicopter.

The secondary goal is to compete in the 26th Annual Intelligent Ground Vehicle Competition (IGVC) hosted by Oakland University. The IGVC is comprised of an obstacle course that must be autonomously navigated by a mobile robotic vehicle. The vehicles must follow a set of rules including speed, obstacle avoidance and observation of boundary lines. Furthermore, the IGVC has two additional challenges involving design and software. The vehicle requirements and specifications have been defined to place near the top of all IGVC competition challenges.

Project S.A.R.G.E. is being completely fabricated by a team of 8 students enrolled in a senior capstone course. S.A.R.G.E.'s structure is comprised of a metal frame and a plastic shell. The vehicle has several sensors to aid in obstacle avoidance during the IGVC and will assist in SAR missions, including: a LIDAR, ultrasonic sensors, and stereoscopic cameras. S.A.R.G.E. also has a Graphic User Interface that can receive and send data such as battery level and GPS coordinates to a remote dispatch team for SAR missions. Finally, S.A.R.G.E. is powered by a battery designed and built by the team.

Poster Presentation and Demonstration
Invited Oral Presentation

Brittany Wright
Department of Physics and Astronomy, College of Arts and Sciences

Mentor:
Andri Gretarsson
Department of Physics and Astronomy, College of Arts and Sciences

The Dipole Antenna Radio Telescope (DART)

IGNITE GRANT AWARD

The Dipole Antenna Radio Telescope (DART) array consists of 48, dual-polarization, dipole antennas optimized for the 80 – 300 MHz range of frequency, being used to do radio astronomy. Radio Astronomy is a field of astronomy that studies celestial objects through radio waves. Radio waves have a long wavelength and a low frequency, thus allowing them to travel through the cosmic dust in the universe. This array of antennas is special because it is fully steerable without any moving parts. Having steerable antennas allows for a larger range of viewing, and with this particular telescope, it is fully steerable above 30 degrees. These antennas are arranged in the form of three 4 x 4 arrays, and are spread around Embry-Riddle's radio observatory. The main goal of DART is to detect pulsars, which are highly magnetized rotating neutron stars that emit a beam of electromagnetic radiation from its poles, usually in the form of radio waves. Pulsars show extreme physical concepts of density, gravity, magnetic fields, and electric fields, which make them a very elaborate object to study.

Poster Presentation

An Empirical and Numerical Analysis of the Relationship Between Stall Hysteresis and Circulation Parameter

IGNITE GRANT AWARD

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Mentor:
Wallace Morris
Aerospace Engineering Department, College of Engineering

Airplane stall is a pilot's worst enemy. Last year, the AOPA Air Safety Institute published a report outlining the effects of stall and spin on aviation accidents in the twenty-first century. They found that stall was responsible for almost 25% of fatal airplane accidents between the year 2000 and 2014. In 2002 alone there were 195 reported aviation accidents due to stall, 90 of which were fatal. They also showed that stall-induced plane crashes were more than 50% more likely to result in fatalities than other accidents. These statistics underline the danger of stall and justify further research into its causes.

Despite great interest in stall prevention, the science behind it is not yet fully understood. One of its mysterious characteristics, called "stall hysteresis", is an aerodynamic anomaly which occurs during a pilot's recovery from stall, where lift is inexplicably lost and the effects of the stall intensified. We assert that a more complete understanding of this phenomenon may provide the missing link necessary for the development of a more accurate model of stall.

Our experiment explores the hypothesis that stall hysteresis is a product of a factor called "circulation parameter", which causes the flow of air around a wing to behave as if the wing were substantially deformed. We plan to test this idea, by studying the flow over this deformed shape, called the "effective body" and comparing it to the flow about a wing experiencing stall hysteresis.

Demonstration

Zane Zylstra
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Alan Pacheco
Air Force ROTC Cadet and Intelligence Studies and Global Affairs Department, College of Security and Intelligence

Anthony Valenza
Air Force ROTC Cadet and Aeronautical Science Department, College of Aviation

Mentor:
Lt. Col. Marella Tobolt Big Mountain
Air Force Reserve ROTC

Adapting to Subordinates with Leadership Experience

Adaptability to different team dynamics, skillsets and motivation is a critical skill for a leader. Perhaps one of the most difficult scenarios a leader may encounter, is a subordinate or team of subordinates who hold prior work experience or leadership experience. This group will research the methodology in accommodating experienced team members as a leader as well as making these subordinates effective team members. The effort is to learn how a leader can not only gain the trust of followers with prior experience, but also how to help those followers grow and continue to gain experience. The focus of this research will be towards Air Force Reserve Officer Training Corps but much of the information collected should be able to be applied to most if not all leadership positions.

Poster Presentation
Air Force ROTC Briefing

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Chief Executive Officer and Co-Founder

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