

Adan Ernesto Vela

Education

Doctor of Philosophy, 2011
Mechanical Engineering
Georgia Institute of Technology

Master of Science, 2006
Mechanical Engineering
Stanford University

Bachelor of Science, 2003
Mechanical Engineering
University of California, Berkeley

Professional Positions

Assistant Professor Industrial Engineering and Management Systems,
University of Central Florida, Orlando, Florida, 2016-current

Director Analytics, Decision, and Control Laboratory,
University of Central Florida, Orlando, Florida, 2016-current

Visiting Professor Dept of Aerospace and Mechanical Engineering
George Washington University, Washington, DC, Fall 2021-Current

Visiting Professor DHS Center for Accelerating Operational Efficiency
Arizona State University, Tempe, AZ, Summer 2019

Technical Staff Homeland Protection & Air Traffic Control,
MIT Lincoln Laboratory, Lexington, Massachusetts, 2012-2016

Impact of Recent Activities

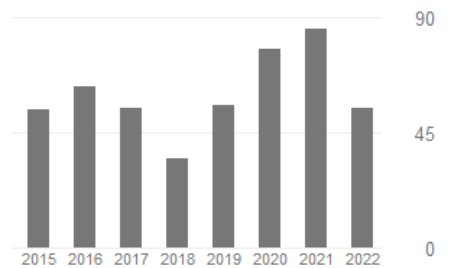
Research Highlights:

As director of the *Analytics, Decision, and Control Lab* Prof. Vela currently leads a group of graduate and undergraduate researchers in conducting research across a variety of applied domains: Air transportation, Education Analytics, Human-Machine Teaming, and Homeland Security. His research efforts are supported by grants from the National Science Foundation, the Department of Homeland Security, and the Department of Defense. Since arriving at UCF, Prof. Vela has helped secure \$3.77M in grants, of which he is credited with approximately \$1.8M. As part of this funding, Prof. Vela led the successful UCF proposal to serve as a partner institution to

the Department of Homeland Security National Counterterrorism Innovation, Technology, and Education (NCITE) Center of Excellence.

Prof. Vela has established himself as an expert in the domain of air transportation, with technical expertise in operation research. Over the years he has had accepted 13 journal papers and 36 conference papers for publication (7 journal papers and 13 conference papers while at UCF). According to Google Scholar Prof. Vela has been cited 649 times and has an H-index of 13. Prof. Vela’s conference publications have been awarded numerous times (e.g. best in session, best in track, best student), most recently, his PhD student was awarded *Best in Session* and was nominated for a *Best Student Paper* award.

	All	Since 2017
Citations	674	365
h-index	13	9
i10-index	16	9



Teaching Highlights:

Prof. Vela’s passion for teaching is observable through his mentoring of students and his development of supplemental teaching material, and is often reflected in student feedback comments. Prof. Vela’s SPI scores typically range between 3.24 and 4.57. In the classroom Prof. Vela constantly seeks to develop new online teaching material. This include a Youtube web-series on Markov chains in support of ESI4313. Also, in Fall 2020 Prof. Vela expanded ESI5306 to include CPLEX OPL programming; this expansion was also supported by the inclusion of a CPLEX programming video series which is worthy of note. Despite CPLEX being an industry standard, existing documentation and learning material on the CPLEX OPL programming language is limited and confusing. As such, Prof. Vela’s video series fills a needed gap for both UCF students and the greater academic community (see Youtube channel Vela@UCF – CPLEX programming playlist). Additionally, over the past years Prof. Vela continues to engage with undergraduate students external to coursework through a variety of pathways, including EXCEL, STRONG mentoring, and undergraduate research through ESI4912. More recently, Prof. Vela developed the special topics course ESI5937: Modeling Fanaticism Using Advanced IE Techniques; the course exposes and trains student in application of machine learning and natural language processing techniques to solve homeland security problems.

Prof. Vela actively seeks to support, mentor, recruit, and provide opportunities to low-income, first-generation, and under-represented students. Since starting his position at UCF, Prof. Vela has served as a research mentor to 48 students, of which over 50% come from under-represented ethnic/racial groups. Additionally, of the five recent graduate students in his lab, three are woman of color. These statistics are not happenstance, but rather part of dedicated effort that links teaching, service, and research. More so, through his leadership and coordination with another junior faculty member, he has helped transform undergraduate research within his department. Previously, the Department of Industrial Engineering and Management Systems engaged between 1-5 students in directed research each semester (out of approx. 500 students), today that number has quadrupled to approximately 20 and is growing through the implementation of vertically-

integrated research projects that scale much better than the traditional one-on-one undergraduate research paradigm.

Service and Impact Highlights

Over the past years Prof. Vela has made significant impacts in the area of service, and in particular has found unique ways to align his service activities to research and teaching. With COVID-19 significantly disrupting university operations, Prof. Vela was called upon by UCF Residential Housing to assist in the development of their COVID-19 testing and check-in process for the Fall 2020 semester. In one month, Prof. Vela led a mixed team of undergraduate and graduate student researchers in performing time-studies and a simulation analysis to assist Residential Housing, IT, campus Police, Facilities, and Parking in their decision making. Prof. Vela and his team's findings were critical in reducing the processing times of students by up to 80%. For his work efforts Prof. Vela was highlighted internally by President Cartwright (Sept. 3, 2020 press conference) and externally by numerous news organizations (e.g. WESH News, Aug. 24, 2020), and journal paper submission (see SJ-02). Prof. Vela's service to the university also includes serving as a technical research advisor to the Office of the President in many areas related to education analytics, this includes source selection and evaluation of a ChatBot to assist in financial aid services (see *KnightBot* at www.ucf.edu/financial-aid). Through both projects Prof. Vela has provided high-impact benefits to the university, while concurrently engaging undergraduate and graduate students in these work-efforts, and producing publishable research results.

Externally, his efforts are making regional and national impacts through his service to the City of Orlando's ongoing Urban Air Mobility efforts, and more so through advising to Prince Georges County, Maryland's Department of Human Services, and the Biden administration's COVID-19 Health Equity Task Force that led to improvement to vaccination registration and a first-in-the-nation community vaccination drive (see <https://pgccouncil.us/CivicAlerts.aspx?AID=1031&ARC=1424>). Prof. Vela's impact on problems of importance is not new, as Technical Staff at MIT Lincoln Laboratory Prof. Vela's work was critical in the final investment decision for the FAA's Terminal Flight Data Manager (see C-22 and TR-03), development of FAA UAV standards (see J-07), and the realizability of the FAA's next-generation of collision avoidance systems on aircraft (J-06).

Prof. Vela aggressively pursues service activities that benefit students, the IEMS department, and university at large. Over his tenure Prof. Vela regularly engages undergraduate students in high-impact research that produces publishable research while also benefiting society as a whole through his research in education and homeland security. Additional, Prof. Vela continues to serve on department committees (graduate admissions, graduate curriculum, awards), while also assisting the college and university in recruiting efforts and UAV policy and research development. Professionally, Prof. Vela is a member of numerous technical societies and regularly serves as a reviewer for conferences and journal publications.

TEACHING

Courses Taught at UCF

Course Number	Course Title	Credits	Class	Semester	# of Students	Overall Assessment
EIN4545*	Industrial Engineering Applications in the Service Industries	3	Junior & Senior	Fall 16	64	3.89
ESI4523*	Systems Simulation	3	Junior	Spring 17	106	4.26
EIN4545	Industrial Engineering Applications in the Service Industries	3	Junior & Senior	Fall 17	20	3.80
ESI4523	Systems Simulation	3	Junior	Spring 18	125	3.59
STA3032H*	Probability and Statistics for Engineers	3	Sophomore	Fall 18	24	2.20
ESI4523	Systems Simulation	3	Junior	Spring 17	123	3.19
ESI4313	Stochastic Operations Research	3	Junior & Senior	Spring 19	137	3.49
STA3032H*	Probability and Statistics for Engineers	3	Sophomore	Fall 19	18	4.57
ESI5306* <i>R01/OV61</i>	Operations Research	3	Graduate	Fall 19	38 <i>11/28</i>	3.87 <i>3.6/4.0</i>
ESI4313	Stochastic Operations Research	3	Junior & Senior	Spring 19	87	4.12
STA3032H	Probability and Statistics for Engineers	3	Sophomore	Fall 20	20	3.5

ESI5306* R01/OV61	Operations Research	3	Graduate	Fall 20	34 10/24	3.24 3.88/2.67
ESI5937* R01/OV61	SPECIAL TOPICS: Modeling Fanaticism Using Advanced IE Techniques	3	Graduate	Fall 21	7	--
ESI5306 R01/OV61	Operations Research	3	Graduate	Fall 21	34 14/23	3.24 3.88/3.45
ESI4313	Stochastic Operations Research	3	Junior & Senior	Spring 22	113	3.36

* New Prep or Major Revision

Student Advising (Ph.D. and M.S.)

Graduated – Advisor

[PhD-001]

Shahab Boumi

Status: PhD Student – Grad. Spring 2022

University: University of Central Florida

Department: Industrial Engineering and Management Systems

Funding Sources: Start-up; UCF Office of the President & The University Innovation Alliance; Department of Homeland Security.

Employment: American Psychological Association

Dissertation: Development of a Multivariate Poisson Hidden Markov Model for Application in Educational Data Mining

Dr. Boumi developed new algorithms in support of multivariate Hidden Markov Models with Poisson and other mixed emission distributions. These multivariate Poisson HMM are used in modeling the academic performance of students. They are also applied in modeling the online engagement patterns of users on social media websites.

[MS-001]

Cintia Zuccon Buffon

Status: MS Graduated (*Non-thesis*)

University: University of Central Florida

Department: Industrial Engineering and Management Systems

Funding: Department of Homeland Security

Project: Developed course material on natural language processing as part of a DHS sponsored vertically-integrated research project. Her

research explored the application of natural language processing and machine learning to identify social media users aligned with radical ideologies through their engagement within non-radicalized communities (e.g. Incel users posting in non-incel related discussion forums).

[MS-002]

Lauren Perrotta

Status: MS Student (*Non-thesis*)

University: University of Central Florida

Department: Industrial Engineering and Management Systems

Funding: Department of Homeland Security

Project: Developed course material on graph theory as part of a DHS sponsored vertically-integrated research project. Her research explored the distinctive engagement patterns and language usage of social media users aligned with the Incel movement.

In Progress – Advisor

[PhD-002]

Sharmistha Chakrabarti

Status: PhD Candidate (Passed July 2022)

University: University of Central Florida

Department: Industrial Engineering and Management Systems

Funding: Scholarship

Dissertation Project: Current research seeks to extract the decision-making of air traffic controllers when managing aircraft near airports using naturalistic radar data. PhD research will culminate in an expert model of air traffic controllers.

[PhD-003]

Kamalakkannan Ravi

Status: PhD Student

University: University of Central Florida

Department: Electrical and Computer Engineering

Funding: Department of Homeland Security.

Dissertation Project: Research explores the use and evolution of language in radicalized online communities using natural language processing and artificial intelligence techniques.

Other Student Advising (B.S. and Visiting Scholars)

[V-03]	Logan Manen [École Nationale de l'Aviation Civile] <i>Summer 2021</i> <i>Project:</i> Capture of dispersing targets using simulated annealing within vehicle routing formulation.
[V-02]	Hyunjin Paek [Korea Aerospace University] <i>Summer 2019-Fall 2019</i> <i>Project:</i> En-route Arrival Time Prediction using Gaussian Mixture Model <i>Outcome:</i> Paper published to the 2020 International Conference for Research in Air Transportation
[V-01]	Geoffrey Scozzaro [École Nationale de l'Aviation Civile] <i>Summer 2019-Fall 2019</i> <i>Project:</i> Optimizing UAV routes to manage environmental noise <i>Outcomes:</i> Paper published to 2020 SESAR Innovation Days Conference
[UG-33-40]	Sebastian Berdecia-Aparicio, Bryan Camacho (MS student), William Frazee (MS student), Jacob Jordan, Jose Hernandez, Ann Mai [LEARN], Chris Petit [LEARN] <i>Fall 2021-Spring 2022</i> <i>Project:</i> Various projects analyzing social media users on Reddit.
[UG-31-32]	Bryson Hancock, Mark Belina <i>Fall 2020-Current</i> <i>Project:</i> Development and construction of autonomous quadrotor UAV.
[UG-24-30]	Sebastian Berdecia-Aparicio, Jacob Jordan, Valentina Moss, David Nyguen, Dane Shelton, Gregory Sperry, Miguel Victoria <i>Spring 2021-Summer 2021</i> <i>Project:</i> Various projects analyzing social media users on Reddit.
[UG-23]	Julia de Oliveira <i>Fall 2020-Summer 2021</i> <i>Project:</i> Simulation and optimization of Collaborative Robots.
[UG-18-22]	Miguel Angel Victoria, Sebastian Berdecia-Aparicio, Elsayed Gabara, Valeria Laynes Fiascunari (Grad. student), Jorge Flavio Sarmiento Falla (Grad. student) <i>Fall 2020-current</i> <i>Project:</i> COVID-19 testing and housing check-in for UCF Student Housing <i>Outcomes:</i> Supported UCF decision-makers in deploying engineered system. Reduced expected wait-times by 80%. Recognized by President Cartwright (Sept 3, 2020 press conference) and externally by numerous news sources (TV and print).

[UG-17]	<p>Jonathan Manglardi <i>Fall 2020</i> <i>Project:</i> Evaluating the Performance of an AI-Chatbot for Financial Aid Services.</p>
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[UG-16]	<p>Robert Ferrand [EXCEL Program] <i>Spring 2020-Current</i> <i>Project:</i> Forecasting and Estimating the Impact of Severe Weather on Power Distribution Systems</p>
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[UG-15]	<p>Gabriela Coccaro [DHS Summer Research Team] <i>Summer 2019</i> <i>Project:</i> Forecasting and Estimating the Impact of Severe Weather on Power Distribution Systems</p>
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[UG-14]	<p>Santiago Ortiz Aguirre [Universidad Nacional de Colombia] <i>Fall 2018 – Spring 2019</i> <i>Project:</i> Optimizing Taxi Deployment Through Mean-field Games</p>
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[UG-13]	<p>Jose Villaneuva [Strong Program & Honors College] <i>Fall 2018 – Spring 2020</i> <i>Project:</i> Modeling In-Person Operations of UCF Financial Aid Services <i>Post Graduation:</i> Siemens Gamesa</p>
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[UG-11-12]	<p>Alexander Baekey [EXCEL Program], Joseph Walsh <i>Spring 2018-Fall 2018</i> <i>Project:</i> Identifying Gender Differences in Grade Sensitivity <i>Outcomes:</i> Paper published to 2018 Physics Education Research Conference</p>
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[UG-09-10]	<p>Austin Corella, Chase Mildner <i>Fall 2017-Spring 2018</i> <i>Project:</i> Development of autonomous Fixed-Wing UAV <i>Outcomes:</i> Construction of UAV. <i>Post Graduation:</i> HoverFly</p>
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[UG-08]	<p>Alex Hillegass [EXCEL Program & NSF REU] <i>Spring 2017-Summer 2018</i> <i>Project:</i> Flight Assisted UAV Controller for Infrastructure Inspection</p>
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[UG-06-07]	<p>Taylor Babin [EXCEL Program], Luis Ferriera <i>Spring 2017-Fall 2017</i> <i>Project:</i> Safety Analysis of Small UAV Mapping Operations <i>Outcomes:</i> Paper published to 2018 AIAA/IEEE AIAA/IEEE Digital Avionics Systems Conference.</p>
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[UG-06]	<p>Zach Sabo <i>Spring 2017-Spring 2018</i> <i>Project:</i> Big-Data Education Analytics <i>Post Graduation:</i> United States Postal Service</p>
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[UG-03-05]	<p>Lauren Brads [GEM], Bradley Austin Krizna, Estefania Reyez <i>Summer 2017-Spring 2018</i> <i>Project:</i> Quantifying the Impact of Re-Categorization at San Diego International Airport <i>Outcomes:</i> Work submitted to Transportation Research Board Airport Cooperative Research Program competition. Received Honorable Mention Prize. <i>Awards:</i> GEM Fellowship at Los Alamos National Laboratory, admission to GeorgiaTech Industrial Engineering MS program.</p>
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[UG-02]	<p>Kevin Sweet <i>Spring 2017-Fall 2017</i> <i>Project:</i> Modeling Crime Dynamics in Orlando <i>Post Graduation:</i> Boeing</p>
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[UG-01]	<p>Nicole Paz <i>Spring 2017-Summer 2017</i> <i>Project:</i> Safety Analysis of FlyTrex UAV Data <i>Awards:</i> Honorable Mention Ford Foundation Graduate Fellowship <i>Post Graduation:</i> National Aeronautics and Space Administration</p>
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Additional Educational Activities

Redesigned the undergraduate course EIN4545 to focus on the theory and application of convex optimization for solving real-world problems. Students are taught graduate-level material at an undergraduate maturity level. Course is structured to identify high-performing students with the goal of increasing the number of UCF students continuing to graduate programs in industrial engineering.

Creating online video content for ESI4323 Systems Simulation, ESI4313 Stochastic Operations Research, and ESI5306 Operations Research. Youtube videos allow students to learn the Simio Simulation and CPLEX software and course material through example problems.

As part of my Unmanned Aerial Systems (UAS) initiatives at UCF I created the organization UAS@UCF. The organization has facilitated 6 students receiving their FAA part 107a small UAV pilot's license. Students are now able to engage in undergraduate UAS research with a number of faculty.

RESEARCH

Key Words

Operations research (modeling, simulation, and optimization), transportation systems, UAVs, intelligent big-data systems, decision-support systems, stochastic dynamic modeling.

A selection of publications can be found [here](#) (Dropbox shared folder).

Journal Publications

IF Denotes Impact Factor

* Denotes graduate student that I advised or co-advised

** Denotes undergraduate student that I advised

Published/Accepted

[**Self** and **Student Names** highlighted]

- [J-13*] Gupta*, Zaki, **Vela**. “Generative Modeling of Pedestrian Behavior: A Receding Horizon Optimization-Based Trajectory Planning Approach” IEEE Access (2022). **IF: 3.367**
- [J-12**] **Vela, Laynes Fiascunari, Sarmeinto Falla, Berdicia-Aparicio**, Victoria**, Gabara****, Rabelo. “Rapid Deployment of Drive-Through Covid-19 Testing for Student Housing” *Accepted for publication to Applied Sciences, submitted for final review, expected Aug/Sept 2022. IF: 2.679*
- [J-11*] **Chakraabrti***, **Vela**. “Clustering of Spatially Varying Trajectories using Air Traffic Control Decisions” *Accepted for publication to AIAA Journal of Aerospace Information Systems, submitting for final review, expected Fall 2022. IF: 1.185*
- [J-10*] **Boumi***, **Vela**. “Quantifying the Impact of Student Enrollment Patterns on Academic Success Using a Hidden Markov Model.” Applied Sciences, 11, no 14 (2021). **IF: 2.679**
- [J-09] **Vela**, Singhose, Feigh, Clarke, Feron. “Evaluation of conflict-resolution policies on controller taskload,” Chinese Journal of Aeronautics, (Accepted August 2021, pending publication in 2021). **IF: 2.215**
- [J-08*] **Boumi***, **Vela**. “Improving Graduation Rate Estimates Using Regularly Updating Multi-Level Absorbing Markov Chains,” Educational Sciences, 10, no. 12 (2020). **IF: .8**

- [J-07] Weinert, Campbell, **Vela**, Schuldt, Kurucar. “A Well Clear Recommendation for Small Unmanned Aircraft Systems based on Unmitigated Collision Risk,” AIAA Journal of Air Transportation, 26, no. 3 (2018). **IF: Pending**
- [J-06*] Smith*, **Vela**, Kochenderfer, and Olson. “Optimizing a Collision-Avoidance System for Closely Spaced Parallel Operations.” AIAA Journal of Aerospace Information Systems, 12, no. 10 (2015): 618-633. **IF: 1.095**
- [J-05] Marzuoli, Gariel, **Vela**, and Feron. “Data-based modeling and optimization of en route traffic.” AIAA Journal of Guidance, Control, and Dynamics, 37, no. 6 (2014): 1930-1945. **IF: 1.856**
- [J-04] Clarke, Solak, Ren, and **Vela**. “Determining stochastic airspace capacity for air traffic flow management.” Transportation Science, 47, no. 4 (2012): 542-559. **IF: 3.275**
- [J-03] **Vela**, Feigh, Solak, Singhose, and Clarke. “Formulation of reduced-taskload optimization models for conflict resolution.” IEEE Transactions on Systems, Man, and Cybernetics-Part A: Systems and Humans, 42, no. 6 (2012): 1552-1561. **IF: 2.350**
- [J-02] Salaun, Gariel, **Vela**, and Feron. “Aircraft proximity maps based on data-driven flow modeling.” Journal of Guidance, Control, and Dynamics, 35, no. 2 (2012): 563-577. **IF: 1.856**
- [J-01] **Vela**, Solak, Clarke, Singhose, Barnes, and Johnson. “Near real-time fuel-optimal en route conflict resolution.” IEEE Transactions on Intelligent Transportation Systems, 11, no. 4 (2010): 826-837. **IF: 3.724**

Conference Publications

Published/Accepted

- [C-036*] **Chakrabarti, Vela**, Lee. “A Data-Driven Modeling Analysis for Identifying Potential Inefficiencies in Aircraft Landing Ordering”, AIAA Aviation Forum, 2022.
- [C-035*] **Boumi, Vela**. “Impacts of Students' Academic-Performance Trajectories on Final Academic Success”, *Accepted to American Society for Engineering Education (ASEE) Zone IV Conference*, 2022.
- [C-033*] **Boumi***, **Vela**. “Quantifying the impact of students' semester course load on their academic performance”, ASEE Annual Conference & Exposition, 2021.

- [C-032*] **Vela, Oleyaei-Motlagh.** “Ground Level Aviation Noise Prediction: A Sequence to Sequence Modeling Approach Using LSTM Recurrent Neural Networks”, AIAA/IEEE Digital Avionics Systems Conference 2020.
- [C-031*] **Chakraabrti, Vela.** “Clustering Aircraft Trajectories According to Air Traffic Controllers’ Decision”, AIAA/IEEE Digital Avionics Systems Conferences 2020. ***Best in Session. Nominated for Best Student Paper.***
- [C-030*] **Boumi, Vela.** “Markov Model Estimates of Graduation Rates Through Bayesian Priors”, AAPT Winter Meeting, 2020.
- [C-029*] **Paek, Lee, Vela.** “En-route Arrival Time Prediction using Gaussian Mixture Model”, International Conference on Research in Air Transportation, 2020.
- [C-028*] **Scozzaro, Delehay, Vela.** “Noise Abatement Trajectories for a UAV Delivery Fleet”, SESAR Innovation Days, 2019.
- [C-027*] **Saeidi, Boumi, Scheinert, Garibay and Vela.** “Application of machine learning to predict occupations income levels”, Computational Social Science 2019.
- [C-026*] **Boumi, Vela.** “Application of Hidden Markov Models to quantify the impact of enrollment patterns on student performance”, Educational Data Mining, 2019.
- [C-025**] **Vela, Chini, Baekey, Walsh.** “Variations in patterns of persistence.” Physics Education Research Conference, 2018.
- [C-024**] **Vela, Ferreira, Babin.** “A Safety Analysis of UAV Mapping Operations.” IEEE/AIAA Digital Avionics Systems Conference, 2018.
- [C-023] Hussain, Shapiro, Sommer, Ogden, Dea, Collins, Baum, **Vela**, and Chang. “Generating Robust and Flexible Operational Airlift Schedules Using Stochastic Simulation Based and Schedule Comparison Measures.” Military Operations Research Society Symposium, 2016.
- [C-022] **Vela, Sandberg, Reynolds.** “Evaluation of Strategic and Tactical Runway Balancing.” USA/Europe Seminar on Air Traffic Management Research & Development, 2015.
- [C-021] Smith*, **Vela**, Kochenderfer, Olson. “Collision Avoidance System Optimization for Closely Space Parallel Operations through Surrogate Modeling.” AIAA Guidance, Navigation, and Control Conference, 2013.
- [C-020] **Vela, Vela, Karasev.** “A posteriori Aircraft Control Signal Recovery via Sparsity-Inducing Norm Minimization.” AIAA/IEEE Digital Avionics Systems Conference, 2012.

- [C-019] Marzuoli, Feron, **Vela**. “Analysis of Airspace Degradation and Optimization of En-route Traffic under Degraded Conditions.” AIAA/IEEE Digital Avionics Systems Conference, 2012.
- [C-018] Karasev, **Vela**, Vela, Tannenbaum. “Detection of Human-Initiated Vehicle Maneuvers via Group-Sparsity.” International Symposium on Mathematical Theory of Networks and Systems, 2012.
- [C-017] **Vela**, Clarke, Feron, Singhose. “The Relative Value of Trajectory Prediction and Conflict-Resolution Algorithms.” AIAA/IEEE Digital Avionics Systems Conference, 2011.
- [C-016] Marzuoli, Gariel, **Vela**, Feron. “Air Traffic Optimization on a Data-Driven Network Flow Model.” AIAA/IEEE Digital Avionics Systems Conference, 2011.
- [C-015] **Vela**, Clarke, Durand, Feron, Singhose. “Determining the Value of Information for Minimizing Controller Taskload: A GraphBased Approach.” USA/Europe Seminar on Air Traffic Management Research & Development, 2011.
- [C-014] **Vela**, Salaun, Feron, Singhose, Clarke. “Bounds on Controller Taskload Rates at an Intersection for Dense Traffic.” IEEE American Control Conference, 2011.
- [C-013] **Vela**, Salaun, Feron, Singhose, Clarke. “Maximizing Throughput at an Intersection under Constrained Maneuvers.” IEEE Conference on Decision and Control, 2010.
- [C-012] **Vela**, Feron, Singhose, Clarke. “Control of Holding Patterns for Increased Throughput and Recovery of Operations.” AIAA/IEEE Digital Avionics Systems Conference, 2010.
- [C-011] Vela, **Vela**, Ogunmakin. “Topologically Based Decision Support Tools for Aircraft Routing.” AIAA/IEEE Digital Avionics Systems Conference, 2010.
- [C-010] **Vela**, Salaun, Burgain, Singhose, Clarke, Feron. “Predicting Controller Communication Time for Capacity Estimation.” International Conference on Research in Air Transportation, 2010.
- [C-009] Augris, **Vela**, Salaun, Gariel, Feron, Clarke. “A Conflict Resolution Algorithm For Reduced Controller Workload,” AIAA Infotech, 2010.
- [C-008] Gariel, Salaun, **Vela**, Feron, Clarke. “Airspace Statistical Proximity Maps Based on Data-Driven Flow Modeling.” AIAA Infotech, 2010.
- [C-007] **Vela**, Salaun, Gariel, Feron, Singhose, Clarke. “Determining Bounds on Controller Workload Rates at an Intersection.” IEEE American Control Conference, 2010.

- [C-006] **Vela**, Solak, Singhose, Clarke. “A Mixed Integer Program for Flight-Level Assignment and Speed Control for Conflict Resolution.” IEEE Conference on Decision and Control, 2009.
- [C-005] Singhose, **Vela**, Kim. “Comparison of Residual Vibration and Energy-Minimizing Control Methods for Command Generation,” IEEE Conference on Decision and Control, 2009.
- [C-004] Salaun, **Vela**, Feron, Clarke, Singhose. “A Simplified Approach to Determine Airspace Complexity Maps under Automated Conflict Resolution.” AIAA/IEEE Digital Avionics Systems Conference, 2009.
- [C-003] **Vela**, Salaun, Singhose, Feron, Clarke. “A Two-Stage Stochastic Optimization Model for Air Traffic Conflict Resolution under Wind Uncertainty.” AIAA/IEEE Digital Avionics Systems Conference, 2009.
- [C-002] **Vela**, Salaun, Solak, Feigh, Feron, Singhose, Clarke. “A Fuel Optimal and Reduced Controller Workload Optimization Model for Conflict Resolution.” AIAA/IEEE Digital Avionics Systems Conference, 2009.
- [C-001] Clarke, Solak, Chang, Ren, **Vela**. “Air Traffic Flow Management in the Presence of Uncertainty.” USA/Europe Seminar on Air Traffic Management Research & Development, 2009.

Under review

- [SC-03*] **Ravi, Vela**. “Interest Groups Classification in Reddit”, *Submitted to AMC Conference on Web Science*, 2022.

Other Publications

- [TR-04] Vela et al. “Blueprinting for overcoming disparities in vaccinating America”, 2021.
- [TR-03] **Vela**, Sanberg, Reynolds. “Terminal Flight Data Manager (TFDM): Runway Balancing Capability Assessment.” Tech. Report ATC-421, MIT Lincoln Laboratory, 2014.
- [TR-02] Harkleroad, **Vela**, Kuchar. “Review of STPA Method and Results to Support NextGen Concept Assessment and Validation.” Tech. Report ATC-427, MIT Lincoln Laboratory, 2013.

- [TR-01] Harkleroad, **Vela**, Kuchar, Barnett, Merchanet-Bennett. "Risk-Based Modeling to Support NextGen Concept Assessment and Validation." Tech. Report ATC-405, MIT Lincoln Laboratory, 2013.
- [OR-01] **Vela**. "Understanding Conflict-Resolution Taskload: Implementing Advisory Conflict-Detection and Resolution Algorithms in an Airspace." Ph.D. Thesis, Georgia Institute of Technology, 2011.

Invited Presentations

- [IP-10] "Extracting and Modeling Human Decision-Making Using Naturalistic Data", **Vela**. Korea Aerospace University, Virtual, August 9, 2021.
- [IP-09] "Improving Graduation Rate Estimates Using Regularly Updating Multi-Level Absorbing Markov Chains", **Vela**. Rochester Institute of Technology, Virtual, November 30, 2020.
- [IP-08] "Forecasting and Assessing the Impact of Severe Weather on Electrical Networks", **Vela**. Arizona State University, Tempe, AZ, July 23, 2019
- [IP-07] "A Safety Analysis of UAV Mapping Operations in the United States", **Vela**. Georgia Institute of Technology, Atlanta, GA, July 23, 2018.
- [IP-06] "Big-Data and Big-Simulation: Modeling Stochastic Dynamics for the Next Generation of Air Traffic Systems", **Vela**. INCOSE, Orlando, FL, Feb 21, 2018.
- [IP-05] "Benefits Analysis of a Runway Balancing Decision-Support Tool", **Vela**. MIT Lincoln Laboratory: Air Traffic Control Workshop, FAA Headquarters, Washington, DC, Oct. 27, 2015.
- [IP-04] "Understanding Conflict-Resolution Taskload: Implementing Advisory Conflict-Detection and Resolution Systems in an Airspace", **Vela**. MIT Lincoln Laboratory, Lexington, MA, Sept. 19, 2011.
- [IP-03] "Bounds of Performance in Air Transportation: Establishing and Optimizing Capacity in the Context of Safety," **Vela**. Massachusetts Institute of Technology, Boston, MA, Jun. 21, 2010.
- [IP-02] "Data Driven Approaches For Analytical Predictive Measures of Airspace Complexity," Gariel, **Vela**, Salaun. Massachusetts Institute of Technology, Boston, MA, Mar. 31, 2010.
- [IP-01] "Steps Towards Modeling Controller Taskload and Airspace Capacity using Mathematical Programming," **Vela**. Korea Transport Institute, Seoul, Korea, Dec. 10, 2009.

Grants and Contracts

Current & Awarded

<i>Investigators</i> <i>Title:</i> <i>Agency:</i> <i>Amount:</i> <i>Exp. Dates:</i> <i>Credit:</i>	Vela (PI) Toolkit for UAM Communications Management NASA/SBIR subcontract under Mosiac ATM \$30,000 8/2023-2/2023 100% (30K)
<i>Investigators</i> <i>Title:</i> <i>Agency:</i> <i>Amount:</i> <i>Dates:</i> <i>Credit:</i>	Vela (PI-UCF) , Windisch (Co-I Temple Univ) Understanding the Transition from Political Discourse to Election-Motivated Violence Department of Homeland Security / National Counterterrorism Innovation, Technology, and Education (NCITE) Center of Excellence \$108,625 (UCF) of \$204,468 (Total budget) 8/1/2022-7/30/2023 100% (204K)
<i>Investigators</i> <i>Title:</i> <i>Agency:</i> <i>Amount:</i> <i>Dates:</i> <i>Credit:</i>	P-Feigh (PI-Gatech), Coogan (CoI-Gatech), Vela (CoI-UCF) Human-AI Collaboration in Autonomous Aerial Vehicles Office of Naval Research \$400,835 (UCF) of \$1.3M (Total budget) 8/1/2021- 7/30/2024 100% (400K)
<i>Investigators</i> <i>Title:</i> <i>Agency:</i> <i>Amount:</i> <i>Dates:</i> <i>Credit:</i>	Vela (PI) Agility Prime: ORB Common Reference AFWERX/STTR subcontract under Mosiac ATM \$45,000 1/11/2021-5/24/2021 100% (45K)
<i>Investigators</i> <i>Title:</i> <i>Agency:</i> <i>Amount:</i> <i>Dates:</i> <i>Credit:</i>	P-Vela (PI-Gatech), Keathley (PI-UCF), Vela (Co-PI) , Karwowski (Co-PI) Supervise it! Optimizing intelligent robot integration through feedback to workers and supervisors National Science Foundation \$1,042,683 (UCF) of \$1,499,923 (Total budget) 7/20/2020- 9/30/2023 45% (469K)
<i>Investigators</i> <i>Title:</i> <i>Agency:</i> <i>Amount:</i> <i>Dates:</i> <i>Credit:</i>	Vela (PI) , Garibay (Co-PI), Eilen (Co-PI) Expanding the Pipeline: Vertical Research at Scale Department of Homeland Security / National Counterterrorism Innovation, Technology, and Education (NCITE) Center of Excellence \$245,305 & \$157,879 7/1/2020-6/30/2022 90% (362K)
<i>Investigators</i> <i>Title:</i>	Vela (PI) Forecasting and Estimating the Impact of Severe Weather on Power Distribution Systems

<i>Agency:</i>	Department of Homeland Security / Oak Ridge Institute for Science Education
<i>Amount:</i>	\$50,000
<i>Dates:</i>	2/3/2020-2/2/2021
<i>Credit:</i>	100% (50K)
<i>Investigators</i>	Vela (PI)
<i>Title:</i>	Google Cloud
<i>Agency:</i>	Google
<i>Amount:</i>	\$5,000
<i>Dates:</i>	2/8/2019-6/30/2020
<i>Credit:</i>	100% (5K)
<i>Investigators</i>	Vela (PI)
<i>Title:</i>	Simio Academic Software: Institution Grant
<i>Agency:</i>	Simio
<i>Amount:</i>	\$240,000
<i>Dates:</i>	2/8/2019-6/30/2020
<i>Credit:</i>	100% (240K)

PROFESSIONAL ACTIVITIES

Department Service

Member, IEMS Graduate curriculum committee, Fall 2017-Current.

Member, IEMS Graduate admissions committee, Fall 2018-Current.

Member, IEMS Pegasus Honors selection committee, Fall 2019-Current.

Faculty Guide, CSCS/IEMS Knight for a day (Open-house), 2018-Current

University Service

Faculty advisor to Aviator Knights student club

Optimization of COVID testing and Housing Check-In, Fall 2020.

UCF Academic ChatBot Committee, Spring 2019-Current.

E.A.T. with Honors, Honors College, November 8, 2018.

Predictive Analytics Fellow (Office of President), Big-Data in Education, Fall 2017-Spring 2018.

Panelist, UCF, Provost Forum on Student Success, February 7, 2018.

UCF representative (Office of President), University Innovation Alliance, April 3-5, 2018.

Panelist, UCF National Society of Black Engineering, Graduate School Panel, March 6, 2018.

Committee Leader, CECS UAS Research Committee, Spring 2017-2018.
Supported UCF application to the White House Unmanned Aircraft Systems Integration Pilot Program.

Service to Profession

Membership

Member, Society of Aircraft Performance and Operations Engineers.

Member, American Institute of Aeronautics and Astronautics

Member, Institute of Electrical and Electronics Engineers

Member, American Association of Physics Teachers

Session Chair in Professional Meetings

Session Chair, “Unmanned Aircraft Systems Technology - 1”, AIAA/IEEE Digital Avionics Systems Conference, London, UK, Oct. 2018.

Session Chair, “Decision-Support Tools & Trajectory Optimization”, AIAA/IEEE Digital Avionics Systems Conference, Seattle, WA, Oct. 2011.

Session Chair, “Traffic Conflict Management and Flow Management”, AIAA/IEEE Digital Avionics Systems Conference, Salt Lake City, UT, Oct. 2010.

Invited Session Chair, “Air Traffic Control Systems Theory I”, IEEE Conference on Decision and Control, Atlanta, GA, Dec. 2010.

Publication Reviewer

Transportation Research Part B, Journal of Aircraft, Transactions on Intelligent Transportation Systems, Journal of Aerospace Information Systems, Journal of Guidance, Control, and Dynamics, Journal of Air Transportation, Journal of Aerospace.

Service to the Community

- Subject-matter expert, City of Orlando Stakeholders Committee for UAM, Fall 2021-Current
- Simulation expert, COVID-19 Advising to Prince Georges County and White House Covid-19 Task Force.
- Lead engineering design, Optimization of COVID testing and Housing Check-In, Fall 2020.
- Participant, NSF Transitions to Success in STEM Fields at Hispanic-Serving Institutions.

Other Activities and Impacts

Thesis committee member (not as chair)

Name	Status	Department	Advisor
Yiduo Zhan	PhD, Graduated 2017	IEMS	Zheng
Mengnan Chen	PhD, Graduated 2019	IEMS	Zheng
Apurva Lanman	PhD Graduated 2020	IEMS	Lee
Buder Shageer	PhD Graduated 2020	IEMS	Proctor
Preteek Basavaraj	PhD Graduated 2020	IEMS	Garibay
Joshua Nelson	PhD Graduated 2020	IEMS	Keathley
John Aiken	PhD Graduated 2020	Physics University of Oslo	Caballero [MSU]
Cheng-Lung Chen	PhD Graduate 2022	IEMS	Boginski
Sudipta Dey Tirtha	PhD Graduted 2022	CECE	Eluru
Valeria Laynes	PhD Candidate	IEMS	Rabelo
Marwen Elkamel	PhD Pre-Quals	IEMS	Zheng

RECOGNITIONS AND AWARDS

Best in Session, DASC2020

MIT Lincoln Lab Excellence Award (ACAS-X Team), 2015

Best in Session, DASC2012

Best in Session and Best in Track, DASC2011

Best in Session, ACC2011

1st Place, Best Graduate Student Paper, DASC2010

2nd Place, Best Graduate Student Paper, DASC2009

Best in Session, DASC2009

Presidential Fellowship, Georgia Institute of Technology

Guezuela Fellowship, Georgia Institute of Technology

Stanford 3D Fellowship, Stanford University

Honors Distinction, National Science Foundation Graduate Fellowship

2nd Place, National Academic Olympiad, 2003 NTCC-SHPE

Drake Scholarship, University of California, Berkeley (ME Dept)

Luckenback Briggs Scholarship, University of California, Berkeley

Chancellor's Scholarship, University of California, Berkeley