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Curriculum Vitae

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1 BIOGRAPHICAL DATA

1.1 NAME

Ivan I. Garibay

1.2 EDUCATION

Ph.D. in Computer Science, 2000-2004

School of Computer Science, University of Central Florida

Dissertation title: The Proteomics Approach to Evolutionary Computation: An Analysis of Proteome-based Location Independent Representations Based on the Proportional Genetic Algorithm.

M.Sc. in Computer Science, 1997-2000

Computer Science Department, University of Central Florida

Thesis title: Automatic Generation of Natural Language Documentation from Statecharts.

P.E. in Electronic Engineering (Professional Engineering license), 1995

Electronic Engineering Department, Ricardo Palma University.

B.Sc. in Electronic Engineering, Highest Honors, 1990-1994

Electronic Engineering Department, Ricardo Palma University.

Languages: Fluent in English and Spanish

1.3 IMPACT OF RECENT ACTIVITIES

1.3.1 RESEARCH

My research impact can be measured not only by productivity in terms of publications and grants, but also in scholarly stewardship via the development of interdisciplinary research teams and programs using a *team science* approach.

First, since starting my tenure-earning appointment the Fall of 2016, I have contributed 48 scholarly publications. This included 9 peer-reviewed journals articles, including one published in the journal *Scientific Reports (Nature)*. I also contributed 26 peer-reviewed conference proceeding papers and gave 48 peer-reviewed conference presentations, including a *best paper award* at the Computational Social Science Society of the Americas annual meeting, 2019. As evidence of my research impact, since 2016, I have given 20 invited presentations (4 international), with 2 as invited keynote addresses and a congressional testimony to the Artificial Intelligence–Opportunities and Challenges Forum, invited by US Congressman Darren Soto. In addition, according to Google Scholar, my publications have been cited over 315 times and I currently have an H-index of 8. Based upon comparative disciplinary analyses, this puts me approximately at the 90th percentile among assistant

professors.²

Second, with regard to grant funding, since 2016, I have helped to secure and manage over \$9.5 million in awarded funding to UCF. This includes \$6.3M as principal investigator (PI) and \$2.2M as Co-PI of federal funding, and \$1.0M as PI of industry funding. These awards come from a variety of sources including NSF (4), DARPA (2), Disney (2), Microsoft (2), etc. Because of this, I have been continually ranked as one of the top UCF faculty for research funding.

Third, as evidence of scholarly stewardship, in this period, I have mentored 16 doctoral students (major academic advisor), 4 post-doctoral students and 4 research faculty. Out of the 16 doctoral students under my supervision, 2 have successfully graduated so far. I have also built a network of collaborators, approximately 53 UCF faculty and 14 external faculty, with whom I have written interdisciplinary grants, coauthored papers, or both.

1.3.2 TEACHING

In my teaching, I hope to impact student educational experience by creating and delivering high quality programs and courses in response to scientific developments and industry workforce needs.

First, I started, and currently direct, a graduate program in data sciences at UCF—the Master of Science in Data Analytics³. This program is a collaboration between the College of Engineering and Computer Science and the College of Science. I started this program in 2016, and now it employs an assistant director, an associate director, and several lecturers full-time, in addition to the multiple tenure faculty teaching part-time. This program has a sustained growth of 30% each year in applications, graduated over 90 students, and brought to UCF more than \$4.8M in revenue. So far, 100% of graduates either find employment in data science or are admitted to doctoral programs 6-months after graduation. This program has also served as a industry relations vehicle for UCF by establishing connections with top management from industry leaders such as Amazon and Disney.

Second, I have created two courses: *Agent-Based Modeling for Social Systems (ESI6534)* and *Advance Agent-Based Modeling (ESI6535)* contributing to the complex systems cluster of faculty at UCF. I have also updated *Decision Support Systems (ESI4628)* to include Python notebooks introductory to data analytics and machine learning⁴.

Finally, I have co-designed the *capstone* course for the Masters of Science Data Analytics program. By closely listening to the advise of our industry advisory board, and leveraging 6 years of continuous NSF funding for the UCF I-Corps program (Co-PI), we designed the capstone to focus on entrepreneurship for data analytics, where the student are challenged to solve a real world problem by creating a "start-up" in the data science space.

²For comparison see <https://tinyurl.com/ssugqtp>

³<https://www.ce.ucf.edu/credit/master-data-analytics/>

⁴Developed notebooks available at <https://github.com/igaribay/DSSwithPython>

1.3.3 SERVICE

I currently serve as the director of the Complex Adaptive System Laboratory ⁵. This laboratory attracts approximately \$2.0M/year of funded awards and employs approximately 35 researchers, including 2 assistant research professors, 4 postdoctoral fellows, 18 doctoral graduate students, and various faculty collaborators from UCF and other research institutions. I started this research laboratory in 2016 with no startup funds. In addition, I serve as advisor to the Vice-President for Research and Dean of Graduate Studies in the areas of technology and innovation and serve on the editorial board of the Journal on Policy and Complex Systems.

1.4 PROFESSIONAL EXPERIENCE

1.4.1 ACADEMIA

- **Assistant Professor**, August 2016 - Present, Industrial Engineering and Management Systems, University of Central Florida
- **Director of Complex Adaptive Systems Laboratory**, November 2015 - present, Industrial Engineering and Management Systems, University of Central Florida
- **Director, Master of Science in Data Analytics**, October 2016 - present, College of Engineering and Computer Science, University of Central Florida
- **Joint Faculty, Computer Science**, January 2017 - present, Computer Science Department, University of Central Florida
- **Joint Faculty, Learning Sciences Cluster**, January 2018 - present, Learning Sciences Cluster Initiative, University of Central Florida
- **Assistant Research Professor**, June 2013 - October 2015, Institute for Simulation and Training, University of Central Florida
- **Joint Faculty**, 2012-2013, Institute for Simulation and Training, University of Central Florida
- **Joint Faculty**, 2006-2013, School (now Department) of Electrical Engineering and Computer Science, University of Central Florida.
- **Lecturer**, 1995-1997, Electronic Engineering Department, Ricardo Palma University.

1.4.2 INDUSTRY: HIGHER EDUCATION ADMINISTRATION

- **Director, Technology & Innovation and Chief Information Officer** Research & Commercialization Division, 2015-2016, University of Central Florida.
- **Director, Research Information Systems** and Chief Information Officer for the Research Division, 2009-2015, University of Central Florida.

⁵<https://complexity.cecs.ucf.edu>

- **Associate Director & Chief Information Officer**, 2006-2009, Office of Research and Commercialization, University of Central Florida.
- **Assistant Director**, 1996-1997, Computer Services and Informatics Office (Oficina Central de Informatica y Computo), Universidad Ricardo Palma.

2 TEACHING

2.1 COURSES

Course Number	Course Title	Credits	Class	Semester	Number of Students	Overall students perception of instruction (5 is the maximum)
ESI 6534	AGENT-BASED MOD SOCIAL SYS	3	Grad	Spring 20	16	-
ESI6938	Special Topics (Agent-Based Models)	3	Senior	Spring 19	14	4.14
ESI4628	Decision Support Systems (Intro to Data Science)	3	Senior	Fall 18	111	3.70
ESI5531	Discrete Systems Simulation	3	Grad	Spring 17	12	3.88
ESI5531	Discrete Systems Simulation	3	Grad	Spring 17	5	3.33
ESI4628	Decision Support Systems	3	Senior	Fall 16	124	3.33
CAP6675	Complex Adaptive Systems	3	Grad	Fall 2012	12	
CAP6675	Complex Adaptive Systems	3	Grad	Fall 2011	14	
CAP5512	Evolutionary Computation	3	Grad	Spring 2007	15	

2.2 MAJOR ADVISOR FOR Ph.D. DISSERTATIONS

2.2.1 COMPLETED

1. **Chathika Gunaratne, Ph.D. in Modeling and Simulation, Fall 2019.** I served as his major academic advisor for his dissertation work.
 - Source of support: federal grant (DARPA).
 - Dissertation title: “EVOLUTIONARY MODEL DISCOVERY: AUTOMATING CAUSAL INFERENCE FOR GENERATIVE MODELS OF HUMAN SOCIAL BEHAVIOR”
 - Present position: Postdoctoral Fellow at CASL UCF and Visiting Scholar at Massachusetts Institute of Technology (MIT), Computer Science and Artificial Intelligence Lab (CSAIL).
2. **Prateek Basavaraj, Ph.D. in Industrial Engineering, Spring 2020.** I served as his major academic advisor for his dissertation work.
 - Source of support: state grant (Florida University System, Board of Governors)
 - Dissertation title: “UTILIZING INSTITUTIONAL DATA FOR CURRICULUM ENHANCEMENT TO IMPROVE STUDENT SUCCESS IN UNDERGRADUATE COMPUTING PROGRAMS”
 - Present position: Data Scientist at the American Association of State Colleges and Universities, Washington DC.

2.2.2 IN PROGRESS

1. **Milad Talebzadehosseini, Ph.D. in Industrial Engineering, expected graduation Fall 2020.** Ph.D. dissertation major advisor. Source of support: industry grant (DISNEY). Dissertation title: “Nations Transitions Toward a Green Economy”.
2. **Nisha Baral, Ph.D. in Industrial Engineering, expected graduation Summer 2021.** Ph.D. dissertation major advisor. Source of support: federal grant (DARPA). Dissertation title: ”Bounded Rational Agents for Information Diffusion in Online Social Media: Response Capacity and its Possible Effects under Information Overload”.
3. **Chathurani Senevirathna, Ph.D. in Industrial Engineering, expected graduation Fall 2021.** I serve as her dissertation major advisor. Source of support: federal grant (DARPA). Dissertation title: “Not all influence is born equal: on the effects of various types of influence relationships on social media”.
4. **Ramya Akula, Ph.D. in Computer Science, expected graduation Fall 2021.** Ph.D. dissertation major advisor. Source of support: federal grant (DARPA). Dissertation title: “Artificial Consciousness Operating System using multiagent reinforcement learning”.

5. **Marie Alaghand, Ph.D. in Industrial Engineering, expected graduation Summer 2022.** Ph.D. dissertation major advisor. Source of support: TA. Dissertation title: “Machine learning for social good: the sign language recognition problem”.
6. **Toktam Oghaz, Ph.D. in Computer Science, expected graduation Summer 2022.** Ph.D. dissertation major advisor. Source of support: MSDA. Dissertation title: ”Probabilistic Approach for Social Media Content Analysis and Modeling”.
7. **Chathura Jayalath, Ph.D. in Industrial Engineering, expected graduation Summer 2022.** Ph.D. dissertation major advisor. Source of support: federal grant (DARPA). Dissertation title: “Agent-Based Modeling for predicting social dynamics and information flow”.
8. **Jasser Jasser, Ph.D. in Computer Science, expected graduation Summer 2022.** Ph.D. dissertation major advisor. Source of support: Scholarship. Dissertation title: “Detecting and Identifying Topics of Conversation in Distinguished Periods of Online Users Activities.”.
9. **Ece Mutlu, Ph.D. in Industrial Engineering, expected graduation Fall 2022.** Ph.D. dissertation major advisor. Source of support: Scholarship. Dissertation title: “Quantum Probabilistic Models using Feynman Diagram Rules for Better Understanding Human Decision-Making”.
10. **Amirarsalan Rajabi, Ph.D. in Computer Science, expected graduation Fall 2022.** Ph.D. dissertation major advisor. Source of support: industry grant (DISNEY). Dissertation title: “Modeling the spread of information and disinformation in social networks: An agent-based modeling approach”.
11. **Bruce Miller, Ph.D. in Industrial Engineering, expected graduation Fall 2022.** Ph.D. dissertation major advisor. Source of support: industry grant (DISNEY). Dissertation title: Quantifying the impact of social technologies on innovation and sustainable development..
12. **Hanin Alhaddad, Ph.D. in Industrial Engineering, expected graduation Fall 2022.** Ph.D. dissertation major advisor. Source of support: GRA-ORC. Dissertation title: “Modeling crows dynamics using agent-based models”.
13. **Ege Tutunculer, Ph.D. in Industrial Engineering, expected graduation Summer 2023.** Ph.D. dissertation major advisor. Source of support: GRA - Evaluation and Proficiency Center. Dissertation title: “Combating Disinformation and Adversarial Narratives: A Social Constructivist Approach”.
14. **Aida Tayebi, Ph.D. in Industrial Engineering, expected graduation Fall 2024.** Ph.D. dissertation major advisor. Source of support: GRA - MSDA. Dissertation title: TBD (new student).

2.3 EDUCATIONAL CONTRIBUTIONS

2.3.1 NEW DEGREE PROGRAM DEVELOPMENT: MASTER OF SCIENCE IN DATA ANALYTICS

- Master of Science in Data Analytics (MSDA) curriculum development. As the program director, I have substantially revised several of the courses in collaboration with the faculty teaching them and the industry advisory board for the program.
- Curriculum developed includes the following courses:
 - Network Science
 - Statistical Analysis
 - Parallel and Cloud Computation
 - Text Mining I
 - Data Preparation
 - Computational Analysis of Social Complexity
 - Machine Learning
 - Data Mining Methodology I & II
 - Social Media and Network Analysis Interactive Data Visualization
 - Machine Learning Methods for Bioinformatics Data
 - Parallel and Distributed Databases
 - Project in Data Analytics
- MSDA program capstone course development. In collaboration with the MSDA industry advisory board, I have developed the capstone course: Lean Big: Using Lean Methods in Entrepreneurship and Intrapreneurship on Big Data Analytics. This capstone course is taught twice a year (Fall and Spring) since Spring 2018.
- MSDA internship and co-op program development. In collaboration with the MSDA industry advisory board subcommittee on internships and co-ops, I have developed a comprehensive and innovative internship program for all MSDA students.
- Co-Teach MSDA Capstone: Spring 2018, Fall 2018, and Spring 2019.

2.3.2 NEW GRADUATE PROGRAM DEVELOPMENT: DEEP LEARNING FOR INDUSTRY INNOVATION

This program is currently being piloted under the sponsorship of Disney. If this pilot program meets expectations, it will be converted into a custom master program in deep learning.

- As the PI of this effort, I have co-developed the curriculum for the following courses:
 - Introduction to Machine Learning

- Deep Learning I
- Deep Learning II
- Capstone on Deep Learning: Lean Launchpad (I-Corps)

2.3.3 CURRICULA DEVELOPMENT: ENTREPRENEURSHIP COURSES

Under the National Science Foundation Innovation-Corps (I-Corps) Program:

As part of the NSF funded grant: University of Central Florida I-Corps Sites Program: Enhancing Technology Commercialization to Develop a World-Class Innovation Ecosystem (ID: 1055907), co-developed and co-taught various specialized versions of the UCF I-Corps: Evidence-Based Entrepreneurship class:

1. MSDA Capstone I-Corps: The Lean Big - Evidence Based Entrepreneurship for Big Data Applications (co-taught with Ozlem Garibay, Oscar Rodriguez, and Thomas O’Neal) Spring 2019
2. MSDA Capstone I-Corps: The Lean Big - Evidence Based Entrepreneurship for Big Data Applications (co-taught with Ozlem Garibay and Edwin Nassiff) Fall 2018
3. UCF I-Corps: The Lean LaunchPad - Evidence Based Entrepreneurship (co-taught with Oscar Rodriguez, Thomas O’Neal) Spring 2018
4. MSDA Capstone I-Corps: The Lean Big - Evidence Based Entrepreneurship for Big Data Applications (co-taught with Ozlem Garibay, Oscar Rodriguez, Thomas O’Neal) Spring 2018
5. UCF I-Corps: The Lean LaunchPad - Evidence Based Entrepreneurship (co-taught with Oscar Rodriguez, Michael O’Donnell , Thomas O’Neal, David Metcalf) Fall 2016
6. UCF I-Corps: The Lean LaunchPad - Incubator workshop (co-taught with Oscar Rodriguez) Summer 2016
7. UCF I-Corps: The Lean LaunchPad - Evidence Based Entrepreneurship (co-taught with Oscar Rodriguez, Thomas O’Neal, David Metcalf) Spring 2016
8. UCF I-Corps: The Lean LaunchPad - Evidence Based Entrepreneurship (co-taught with Thomas O’Neal, Oscar Rodriguez, Michael O’Donnell, David Metcalf, Cameron Ford) Fall 2015
 - revised the curriculum , developed “Talking to Humans” module based on *Talking to Humans: Success Starts with Understanding Your Customers* by Giff Constable, et.al.
9. UCF I-Corps: The Lean LaunchPad - Evidence Based Entrepreneurship (co-taught with Jerry Engel (Berkeley), Thomas O’Neal, Oscar Rodriguez, Michael O’Donnell, David Metcalf, Cameron Ford) Spring 2015
 - Secured Jerry Engel, co-creator of the methodology and NSF National Faculty Director for the I-Corps program, to inaugurate and to co-teach the inaugural UCF I-Corps class

- Secured National Science Foundation I-Corps Faculty accreditation for entire UCF teaching team
- Adapted curriculum from *Lean LaunchPad: Evidence Based Entrepreneurship Educators Guide* by Steve Blank (Stanford), Jerry Engel (Berkeley) and Jim Horvath (Princeton)
- Course offered to selected teams of Florida faculty, students and mentors
- Textbooks: *Startup Owner's Manual* by Blanks and Dorf, *Business Model Generation* by Osterwalder, et.al.

I-Corps classes are taught as part of the NSF Funded Effort: "UCF I-Corps Site: enhancing technology commercialization to develop a world-class innovation ecosystem"

2.3.4 CURRICULA DEVELOPMENT: GRADUATE COURSES

Developed completely new curricula for the following courses:

- **ESI6938: Special Topics**, convergence of agent-based modelling, artificial intelligence, data science and social networks analytics. Industrial Engineering and Management Systems, UCF, Spring 2019
 - Created a completely new curricula to teach graduate students how to successfully conduct research in the areas of Agent-Based Modeling, Artificial Intelligence, Machine Learning, Big Data and Complex Systems with the goal of publishing their work.
 - Created original educational methodology to teach students to conduct publishable research: "The Research Canvas"
- **ESI5245: Agent-Based Modeling of Social Systems**, using machine learning and data science for modeling and simulation of social systems. Industrial Engineering and Management Systems, UCF, Fall 2018
 - Created a new course.
- **EIN 6455: Advanced Agent-Based Modeling**, advance topics and research project. Industrial Engineering and Management Systems, UCF, Fall 2018
 - Created a new course.
- **Agent-Based Simulation for Innovation Ecosystems**, modeling and simulation of economic systems with emphasis on technological innovation and economic growth, UCF, Fall 2015
 - IDS6908. Directed Independent Study.
- **Simulating Innovation**, Modeling and Simulation, UCF, Summer 2015

- IDS6908. Directed Independent Study. Textbooks: *Simulating Innovation: Computer-based Tools for Rethinking Innovation* by Christopher Watts and Nigel Gilbert.
- **Complex Adaptive Systems**, Computer Science, UCF, Fall 2012
 - CAP6675. Adjusted curriculum.
- **Complex Adaptive Systems**, Computer Science, UCF, Fall 2011
 - CAP6675. Developed entirely new curriculum. Textbooks: *Complexity: A guided Tour* by Melanie Mitchell, *Complex and Adaptive Dynamical Systems* by Claudius Gros, and *The Computational Beauty of Nature: Computer Explorations of Fractals, Chaos, Complex Systems, and Adaptation* by Gary William Flake.
- **Evolutionary Computation**, Computer Science, UCF, Spring 2007
 - CAP5512. Developed entirely new curriculum. Textbook: *Evolutionary Computation: A Unified Approach* by K. De Jong.

2.3.5 CURRICULA DEVELOPMENT: UNDERGRADUATE INSTRUCTION

- **ESI 4628: Introduction to Data Science (Decision Support Systems for Industrial Engineers)**, Industrial Engineering and Management Systems, UCF, Fall 2018
 - Created a completely new curricula to teach introduction to data science using Python
 - Created instructional materials (Jupyter Notebooks) publicly available on GitHub at <https://github.com/igaribay/DSSwithPython>

3 RESEARCH INTEREST

3.1 KEY WORDS

Computational social sciences, complex systems, agent-based modeling and simulation, information diffusion, information and mis-information dynamics in social media, cognitive cybersecurity, data analytics, big data, deep learning, agent-based computational economics, complexity economics, network science, social network analysis, evolutionary computation, autonomous agents systems, multi-agents systems, self-organizing systems, innovation ecosystems, innovation driven economic growth, entrepreneurship support organizations, entrepreneurship education and STEM education.

3.2 RESEARCH AREA

My primary area of research is human behavioral modeling using complex systems with an inherent interdisciplinary emphasis. I have taken a leadership role in developing the field of inverse generative social sciences, a synthesis of artificial intelligence, complex systems, data

science, and agent-based modeling of human social behavior. The goal is to leverage currently available vast computational power and large human behavior data sets by using complexity science and artificial intelligence to create cognitive theory-guided models of social human behavior. This includes not only developing cognitive and behavioral theories at various scales, but also developing computational models, methods and algorithms.

My primary area of research is complemented by research on the design and implementation of models of information spread and evolution on social media. This draws from network science (polarization, influence), information theory (entropy metrics of social influence), cognitive psychology (human factors that modulate information spread) and epistemology (truth as a social construct). In order to analyze the phenomena of misinformation we have developed novel models of conversation and of narratives to model narrative amplification and dampening by organic users, and malicious actors (bots and trolls). We use these models to analyze and counter phenomena like misinformation, polarization, and radicalization.

3.3 PUBLICATIONS

I publish with a network of collaborators and with all my students:

- (*) indicates postdoctoral, graduate or undergraduate student conducting research under my direct supervision
- (**) indicates a collaborator working on a funded project for which I am the principal investigator or research faculty employed by laboratory I direct
- (++) indicates a graduate student working under the direct supervision of a collaborator funded by a grant for which I am the principal investigator on topics in support of the grant main idea.
- (+) indicates the corresponding author

3.3.1 REFEREED CHAPTERS AND EDITED BOOKS

1. **Garibay(+)**, I., Gunaratne(*), C., Yousefi(*), N., and Scheinert(**), S. (2019). The agent-based modeling canvas: A modeling *Lingua Franca* for computational social science. In Davis, P. K., OMahony, A., and Pfautz, J., editors, *Social-Behavioral Modeling for Complex Systems*, pages 521–544. Wiley. ISBN: 978-1-119-48496-7
2. Hadzikadic, M., Carmichael, T., Dixon, D., Koehler, M., Gulden, T., **Garibay, I.**, Yang, Z., von Briesen, E., and Howe, A., editors (2017). *CSS 2017: Proceedings of the 2017 International Conference of The Computational Social Science Society of the Americas*, New York, NY, USA. Association for Computing Machinery. ISBN: 978-1-450-35269-7. <https://dl.acm.org/doi/proceedings/10.1145/3145574>

3. Hollander(*), C. D., **Garibay(+), I.**, and O'Neal, T. (2012). Transformation networks: A study of how technological complexity impacts economic performance. In Teglio, A., Alfarano, S., Camacho-Cuena, E., and Gins-Vilar, M., editors, *Managing Market Complexity. Lecture Notes in Economics and Mathematical Systems*, volume 662, pages 15–26. Springer, Berlin, Heidelberg. ISBN: 978-3-642-31301-1. https://doi.org/10.1007/978-3-642-31301-1_2
4. **Garibay, I.** (2010). Dario Floreano and Claudio Mattiussi (eds): Bio-inspired artificial intelligence: theories, methods and technologies. *Genetic Programming and Evolvable Machines Journal*, 11:441–443. <https://doi.org/10.1007/s10710-010-9104-3>. Impact factor: 1.458
5. **Garibay, I.**, Jansen, T., Wiegand, R. P., and Wu, A. S., editors (2009). *FOGA 09: Proceedings of the Tenth ACM SIGEVO Workshop on Foundations of Genetic Algorithms*, New York, NY, USA. Association for Computing Machinery. ISBN: 978-1-605-58414-0. <https://dl.acm.org/doi/proceedings/10.1145/1527125>

3.3.2 REFEREED JOURNAL PAPERS

1. Gunaratne(*), C. and **Garibay(+), I.** (in press). Evolutionary model discovery of causal factors behind the socio-agricultural behavior of the ancestral pueblo. *PLOS ONE*. arXiv preprint at <https://arxiv.org/abs/1802.00435>. Impact factor: 2.776
2. Talebzadehhosseini(*), S., Scheinert(**), S., and **Garibay(+), I.** (in press). Growing green: the role of path dependency and structural jumps in the green economy expansion. *Journal on Policy and Complex Systems*
3. Gunaratne(*), C., Baral(*), N., Rand(**), W., **Garibay(+), I.**, Jayalath(*), C., and Senevirathna(*), C. (in press). Evolutionary model discovery of causal factors behind the socio-agricultural behavior of the ancestral pueblo. *Computational and Mathematical Organization Theory*. Impact factor: 1.372
4. Bidoki(++), N. H., Schiappa(*), M., Sukthankar(**), G., and **Garibay, I.** (2020). Modeling social coding dynamics with sampled historical data. *Online Social Networks and Media*, 16:100070. <https://doi.org/10.1016/j.osnem.2020.100070>
5. **Garibay, I.**, Mantzaris(**), A., Rajabi(*), A., and Taylor(*), C. E. (2019). Polarization in social media assists influencers to become more influential: analysis and two inoculation strategies. *Scientific Reports*, 9:18592. <https://doi.org/10.1038/s41598-019-55178-8>. Impact factor: 5.2
6. Talebzadehhosseini(*), S., **Garibay(+), I.**, Keathley-Herring(**), H., Al-Rawahi(*), Z. R. S., Garibay, O. O., and Woodell, J. K. (2019). Strategies to enhance university economic engagement: evidence from us universities. *Studies in Higher Education*, pages 1–20. <https://doi.org/10.1080/03075079.2019.1672645>. Impact factor: 2.854

7. Akula(*), R. and **Garibay, I.** (2019). Viztract: Visualization of complex social networks for easy user perception. *Big Data and Cognitive Computing*, 3(1):17. <https://doi.org/10.3390/bdcc3010017>
8. Taylor(*), C., Mantzaris(**), A., and **Garibay, I.** (2018). Exploring how homophily and accessibility can facilitate polarization in social networks. *Information*, 9(12):325. <https://doi.org/10.3390/info9120325>
9. Lasrado, V., Sivo, S., Ford, C., O'Neal, T., and **Garibay, I.** (2016). Do graduated university incubator firms benefit from their relationship with university incubators? *Journal of Technology Transfer*, 41:205–219. <https://doi.org/10.1007/s10961-015-9412-0>. Impact factor: 4.12
10. **Garibay(+), I.**, Wu, A. S., and Garibay, O. O. (2006). Emergence of genomic self-similarity in location independent representations. *Genetic Programming and Evolvable Machines*, 7(1):55–80. <https://doi.org/10.1007/s10710-006-7011-4>. Impact factor: 1.458
11. Wu, A. S. and **Garibay, I.** (2004). Intelligent automated control of life support systems using proportional representations. *IEEE Transactions on Systems, Man and Cybernetics Part B (Cybernetics)*, 34(3):1423–1434. <https://doi.org/10.1109/TSMCB.2004.824522>. Impact factor: 5.131
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3.3.3 REFEREED JOURNAL PAPERS - SUBMITTED

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2. Alaghand(*), M., Yousefi(**), N., and **Garibay(+), I.** (2020). Feph: An annotated facial expression dataset for the rwth-phoenix-weather 2014 dataset. *Manuscript submitted for publication*
3. Jasser(*), J., **Garibay(+), I.**, and Mantzaris(**), A. (2020a). Social media activity segmenter (sma-seg): automatic identification of social media narrative phases using online social media activity. *Manuscript submitted for publication*
4. Basavaraj(*), P., **Garibay(+), I.**, and Garibay, O. O. (2020a). Pathway patterns: A comparative study of first time in college vs. transfer students to improve retention and completion rates using student degree mobility patterns. *Manuscript submitted for publication*
5. Basavaraj(*), P., Sedghi, M., **Garibay(+), I.**, Garibay, O. O., and Guha, A. (2020b). Computer science qualifying exam: a case study on improving student success and program quality. *Manuscript submitted for publication*

6. Gunaratne(*), C. and **Garibay(+), I.** (2020b). Nl4py: Agent-based modeling in python with parallelizeable netlogo workspaces. *Manuscript submitted for publication*

3.3.4 REFEREED JOURNAL PAPERS - IN PREPARATION

1. Gunaratne(*), C., **Garibay(+), I.**, and Rand(**), W. (2020b). The multi-action cascade model of social media conversation. *Manuscript in preparation*
2. Gunaratne(*), C. and **Garibay(+), I.** (2020a). Evolutionary model discovery of factors driving residential segregation. *Manuscript in preparation*
3. Talebzadehhosseini(*), S. and **Garibay(+), I.** (2020). The role of non-path dependent development on green production: evolutionary adaptation versus high investment jumps. *Manuscript in preparation*
4. Gunaratne(*), C., Talebzadehhosseini(*), S., and **Garibay(+), I.** (2020d). Innovation is driven by capabilities: exploring the dark matter of the product space. *Manuscript in preparation*
5. Yousefi(**), N. and **Garibay(+), I.** (2020). Sharp excess risk bounds for online convex learning algorithms. *Manuscript in preparation*
6. Gunaratne(*), C., **Garibay(+), I.**, and Belcher(*), B. (2020a). Vegetation sparsity affects aedes aegypti populations: A simulation study. *Manuscript in preparation*

3.3.5 REFEREED PUBLICATIONS IN CONFERENCE PROCEEDINGS

1. Rajabi(*), A., Gunaratne(*), C., Mantzaris(**), A. V., and **Garibay(+), I.** (2020b). On countering disinformation with caution: Effective inoculation strategies and others that backfire into community hyper-polarization. In *International Conference on Social Computing, Behavioral-Cultural Modeling and Prediction and Behavior Representation in Modeling and Simulation (SBP-BRiMS)*. Springer. (to appear)
2. Rajabi(*), A., Talebzadehhosseini(*), S., and **Garibay(+), I.** (2020c). Resistance of communities of against conspiracies. In *Proceedings of the Conference of the Computational Social Science Society of the Americas (CSS2019)*, Santa Fe, NM. Springer. (to appear)
3. Baral(*), N., Gunaratne(*), C., Jayalath(*), C., Rand(**), W., Senevirathna(*), C., and **Garibay(+), I.** (2020). Negative influence gradients lead to lowered attention span on social networks. In *Proceedings of the Conference of the Computational Social Science Society of the Americas (CSS2019)*, Santa Fe, NM. Springer. (to appear)
4. Mutlu(*), E. and **Garibay(+), I.** . (2020). The degree-dependent threshold model: Towards a better understanding of opinion dynamics on online social networks. In *Proceedings of the Conference of the Computational Social Science Society of the Americas (CSS2019)*, Santa Fe, NM. Springer. **Best paper award** (to appear)

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15. Bidoki(++), N., Sukthankar(**), G., Keathley(*), H., and **Garibay(+), I.** (2018). A cross-repository model for predicting popularity in github. In *International Conference on Computational Science and Computational Intelligence (Social Network Analysis, Media, and Mining)*, volume 1, pages 1248–1253. IEEE.
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41. **Garibay, I.**; Hollander, Christopher D.; Ozmen, Ozlem and Goel, Amit (2012). Yet another approach to modeling economic phenomenon. In the *Proceedings of Swarmfest 2012*, Charlotte, USA.
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3.3.6 REFEREED ABSTRACTS PRESENTED IN CONFERENCES WITH NON-ARCHIVAL PROCEEDINGS

1. Rajabi(*), A., **Garibay, I.**, Mantzaris(**), A., and Taylor(*), C. (2020a). Reducing negative effects of polarization in a social network. In *International Conference on Computational Social Science (IC2S2-2020)*, poster session, Cambridge, MA USA
2. Mutlu(*), E. C. and **Garibay, I.** (2020). Effects of assortativity on consensus formation with heterogeneous agents. In *International Conference on Computational Social Science (IC2S2-2020)*, poster session, Cambridge, MA USA
3. Jasser(*), J., **Garibay, I.**, Scheinert(**), S., and Mantzaris(**), A. (2020b). Controversial information diffuses faster and further in reddit. In *International Conference on Computational Social Science (IC2S2-2020)*, poster session, Cambridge, MA USA
4. Zhang(++), X., Aravamudan, A., Koufakou, A., Gunaratne(*), C., **Garibay, I.**, and Anagnostopoulos(*), G. (2020). Predicting software vulnerability exploits from social media confabulations. In *International Conference on Computational Social Science (IC2S2-2020)*, poster session, Cambridge, MA USA

5. Talebzadehhosseini(*), S. and **Garibay, I.** a. (2020). Analyzing countries paths of green growth. In *International Conference on Computational Social Science (IC2S2-2020)*, poster session, Cambridge, MA USA
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10. Gunaratne(*), C., Senevirathna(*), C., Jayalath(*), C., Baral(*), N., Rand(**), W., and **Garibay(+), I.** (2019). A multi-action cascade model of conversation. In *Proceedings of International Conference on Computational Social Science (IC2S2-2019)*, University of Amsterdam, The Netherlands
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12. Senevirathna(*), C., Gunaratne(*), C., Jayalath(*), C., Baral(*), and **Garibay(+), I.** (2019a). Evidence of influence hierarchies in githubs cryptocurrency community. In *Proceedings of International Conference on Computational Social Science (IC2S2-2019)*, University of Amsterdam, The Netherlands
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14. Talebzadehhosseini(*), S., Gunaratne(*), C., Scheinert(**), S., and **Garibay(+), I.** (2019a). Countries diversification and transition to green economy. In *Proceedings of the Second Northeast Regional Conference on Complex Systems (NERCCS2019)*
15. Saeidi(*), M., Akula(*), R., Scheinert(**), S., Berea(**), A., and **Garibay(+), I.** (2019). The network of occupation space needs for economic improvement. In *Proceedings of the Second Northeast Regional Conference on Complex Systems (NERCCS2019)*
16. Talebzadehhosseini(*), S., Rajabi(*), A., and **Garibay, I.** (2019b). Countrys growth and the importance of citys urban green development. In *The 1st International Conference on Smart Tourism, Smart Cities and Enabling Technologies (The Smart Conference)*, Orlando, FL
17. Belcher(*), B. and **Garibay(+), I.** (2019). Scalable user authentication via keystroke dynamics. In *The 1st International Conference on Smart Tourism, Smart Cities and Enabling Technologies (The Smart Conference)*, Orlando, FL
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19. Talebzadehhosseini(*), S. and **Garibay(+), I.** (2018). A sustainable business model innovation for developing the nations green product space: Toward a better development of nations green economy. In *Doctoral Consortium on Computational Sustainability*, Ithaca, NY
20. **Garibay, I.**, Talebzadehhosseini(*), S., Astore(*), C., Borah(*), L., and Torres(*), K. (2017). An agent-based model to study the effects of epidemiological factors on three common influenza strain's virulence. In *Proceedings of the Computational Social Sciences conference (CSS). Poster Session*, Santa Fe, NM
21. Gunaratne(*), C., **Garibay, I.**, Akbas(*), M. I., and Ozmen, O. (2016c). The need for product space complexity for agent-based computational economics. In *Duke Forest Conference 2016 Economics in the Era of Natural Computationalism and Big Data Celebrating the 50th anniversary of the Theory of Self-Reproducing Automata (by John von Neumann)*, Durham, North Carolina
22. Gunaratne(*), C., **Garibay, I.**, Akbas(*), M. I., , and Ozmen, O. (2016b). GIS derived spatial constraints for agent-based modeling of aedes aegypti population dynamics. In *SwarmFest Conference: Meeting on Agent-Based Modeling & Simulation*, University of Vermont, Burlington, Vermont

3.3.7 NON-REFEREED PUBLICATIONS

1. Soyler, E. and **Garibay(+), I** (2016). "UCF I-Corps: The Effects of Entrepreneurial Education on Entrepreneurial Intentions". Technical Report-02-16, Complex Adaptive System Laboratory, University of Central Florida.

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3. **Garibay(+), I**(Editor) (2012). Student Papers, Complex Adaptive Systems Class, Fall 2012. Technical Report Number CS-TR-12-05, Complex Adaptive System Laboratory, University of Central Florida.
4. **Garibay(+), I**(Editor) (2007). Student Papers, Evolutionary Computation Class, Spring 2007. Technical Report Number CS-TR-07-11, SEECs, University of Central Florida.
5. **Garibay(+), I** (2003). Advanced Life Support System Simulation. Technical Report CS-TR-03-05, University of Central Florida, School of Computer Science.
6. **Garibay(+), I** (2000). Generating Natural Language Documentation from Statecharts. Technical Report, University of Central Florida, School of Computer Science.

3.4 INVITED PRESENTATIONS

1. **Garibay I.(+)** (2019). Invited Speaker: Data Science During a Pandemic: Challenges and Opportunities for New Data Scientists. *Graduation Ceremony via Teleconference: Master of Science in Data Analytics, Class 2020*, Orlando FL, April 25, 2020.
2. **Garibay I.(+)** (2020). Invited Talk: From Deep Agents to Inverse Generative Social Sciences: On ways to leverage artificial intelligence and vast computational power to reformulate modeling of social phenomena. *Inverse Generative Social Science Workshop*, DC, USA, January 23-25, 2020, <https://www.igss-workshop.org>
3. **Garibay I.(+)** (2019). Keynote: Ciencias Sociales Computacionales: En la era de Inteligencia Artificial, Big Data e Innovación. *UCongreso internacional de Innovaciones Digitales Disruptivas - Ciudad Universitaria Universidad Nacional Mayor de San Marcos (UNMSM)*, Lima, Peru, October 28-30, 2019.
4. **Garibay I.(+)** (2019). Invited Talk: Computational Social Sciences Social Sciences in the age of AI, Big Data and Computational Modeling. *UCF College of Business Interdisciplinary Speaker Series* Orlando, October 3rd, 2019.
5. **Garibay I.(+)** (2019). Invited Talk: Inteligencia Artificial, Datos Grandes e Innovación. *Universidad Externado de Colombia*, Bogota, Colombia, October 1st, 2019.
6. **Garibay I.(+)** (2019). Invited Talk: El investigador emprendedor: como iniciar, desarrollar y llevar al éxito un laboratorio de investigación en tecnología. *ISIT 2019 International Symposium on Innovation and Technology (IIITEC)*, Cuzco, Peru, July 22-24, 2019.

7. **Garibay I.(+)** (2019). Keynote: Deep Agent: Combatiendo desinformacin en redes sociales usando ciencias sociales computacionales. *ISIT 2019 International Symposium on Innovation and Technology (IIITEC)*, Cuzco, Peru, July 22-24, 2019.
8. **Garibay I.(+)** (2019). Invited Speaker: The Future of Data Science: Being a Successful and Responsible Data Scientist. *Citrus Club Orlando: MSDA Graduation, Class 2019*, Orlando FL, May 2, 2019.
9. **Garibay I.(+)**, Fiore S., Cassani L. (2019). Invited Pitch for Funding: SIMS: Societal Influence Modeling & Simulation - TFA: Artificial Intelligence / Machine Learning for MISO. *SOFWERX*, Tampa FL, April 8, 2019.
10. **Garibay I.(+)** (2019). Invited Talk: Large Multidisciplinary Proposals. *UCF Researcher Experience Development initiative (REDi)*, Orlando FL, February 26, 2019.
11. **Garibay I.(+)** (2019). Invited Talk: Artificial Intelligence, Ethics, & Law: How AI is Disrupting the Legal Profession, Laws and Legal Technology. *Orange County Bar Association*, Orlando FL, February 21, 2019.
12. **Garibay I.(+)** (2019). Addressing the Department of Defense Science Board: Deep Agent: A Framework for Information Spread and Evolution in Social Networks. *IITSEC*, Orlando Convention Center, Orlando FL, Nov. 27, 2018.
13. **Garibay I.(+)** (2019). Panel Host: Using Big Data Analytics to Create Better Guest Experiences *1st International Conference on Smart Tourism, Smart Cities, and Enabling Technologies (The Smart Conference)*, May 1-4, 2019, Rosen College of Hospitality Management, Orlando Florida, USA.
14. **Garibay I.(+)** (2019). Fireside Chat Hosting Mr. Peter Torrellas, National Lead for Smart Cities and Communities at Siemens Smart Infrastructure. *1st International Conference on Smart Tourism, Smart Cities, and Enabling Technologies (The Smart Conference)*, May 1-4, 2019, Rosen College of Hospitality Management, Orlando Florida, USA.
15. **Garibay I.(+)** (2018). Invited Panelist: The post-truth society: misinformation, deepfakes, democracy and the role of scientists on an increasingly polarized world. *Conference of the Computational Social Science Society of the Americas*, Santa Fe, NM, 2018.
16. **Garibay I.(+)** (2018). Invited Talk: Big Data & Innovation: How UCF is Helping Develop the Central Florida Big Data Innovation Ecosystem via Education, Research and Innovation. *UCF Data Analytics Annual Symposium*, Orlando FL, March 22, 2018.
17. **Garibay I.(+)** (2018). Invited Talk: Innovation in the era Artificial Intelligence: How Disney can leverage Deep Agent Modeling of Guess Experience and Life Long Learning Programs. *Disney Parks & Resorts Technology Innovation Open House Panel Discussion*. Walt Disney World, Orlando FL, February 23, 2018.

18. **Garibay I.(+)** (2017). **Congressional Testimony:** Responsible Innovation via Lifelong Learning: Artificial Intelligence Opportunities and Challenges. *Artificial Intelligence Opportunities and Challenges Forum organized by The New Economy Task Force part of Jobs for America Task Forces - Invited by US Congressman Darren Soto.* The Capitol, Washington DC, November 15, 2017
19. **Garibay I.(+)** (2017). Invited Talk: University of Central Florida and Walt Disney World: Common History and Perspectives for a Bright Future Together. *Disneys Engineering Excellence Town Hall.* Walt Disney World, Orlando FL, April 6th, 2017.
20. **Garibay I.(+)** (2016). Invited Talk: University of Central Florida's Master of Science in Data Analytics: Big Data Impact on Defense and How UCF is Preparing to Meet Future Workforce Demand from the Defense Sector. *Lockheed Martin's Data Analytics Town Hall.* Lockheed Martin Corporation, Orlando FL, July 14th, 2016.
21. **Garibay I.(+)** , Ford C., ONeal T., Ozmen O. (2014). Invited Talk: Agent-based models of business incubation in the context of innovation ecosystems. Workshop on Innovative Methods for Testing Theory in the Practice of Organizational Sponsorship *Annual Meeting of the Academy of Management.* Philadelphia, USA, August 1-5, 2014.
22. **Garibay I.(+)** (2014). Invited Talk: UCF I-Corps Site: NSF funded program that makes UCF a member of the National Innovation Network and will support 96 startup teams over 3 years (2014-2017). *Central Florida Entrepreneurship Network Group .* Orlando, USA, May 28th, 2014
23. **Garibay I.(+)** (2013). Invited Talk: Construyendo Ecosistemas de Innovación: Incubando Empresas en la Florida y en Silicio. *3rd International Symposium on Innovation and Technology.* Cusco, Peru, November 26-28, 2013.
24. **Garibay I.(+)** (2013). Invited Talk: Possibilities for data collection, analysis and modeling using machine learning and complexity sciences techniques. *Workshop on Data Collection, Analysis and Modeling of Nanoparticle/Cell Interactions for Cancer Research.* Orlando, FL, October 11, 2013.
25. **Garibay I.(+)** (2013). Invited Talk: Innovation Ecosystems: Agent-Based Generative Modeling of Regional Economic Growth. *DARPA/Bank of America Economic Modeling Workshop at University of North Carolina's Complex Systems Institute.* Charlotte, NC, March 21, 2013.
26. **Garibay(+), I** (2011). Invited Talk: Agent-Based Modeling of Social and Economical System. *2nd International Symposium on Innovation and Technology.* Lima Peru, November 28-30, 2011.
27. **Garibay(+), I**(2006). Dagstuhl Seminar 06061: Theory of Evolutionary Algorithms (participation by invitation only, financed by the German federal government). The International Conference and Research Center for Computer Science, Wadern, Germany, February 5-10, 2006. (Internationales Begegnungs- und Forschungszentrum für Informatik (IBFI) Schloss Dagstuhl gGmbH)

28. **Garibay(+), I** (2006). Invited Talk: Proteomics approach to Evolutionary Computation. Seminar at the Electrical Engineering and Computer Science Department, Universidad Ricardo Palma, Lima, Peru, January 4, 2006. Delivered also at a Seminar at the Research Institute of the Systems Engineering and Informatics Department, Universidad Nacional Mayor de San Marcos, Lima, Peru, January 5, 2006.
29. **Garibay(+), I**, Miller J., Kumar S., Hornby G., Ozmen O., and Oner K. (2006), Opening Talk: Workshop on Complexity through Development and Self-Organizing Representations: Building Complexity from Simplicity, In *Workshop Proceedings of Genetic and Evolutionary Computation Conference - GECCO 2006*, Seattle, USA, July 8-12, 2006.
30. **Garibay I.(+)**, and Wu A.S. (2004). Opening Talk: Workshop on Self-Organization in Representations for Evolutionary Algorithms: Building complexity from simplicity. In the *Proceedings of the GECCO 2004 Workshop on Self-organization in Representations for Evolutionary Algorithms*, Seattle, USA, June 26-30, 2004.
31. Ozmen O., **Garibay I.(+)**, and Wu A.S. (2004). Invited to submit: No Free Lunch for Module Encapsulation. In the *Proceedings of the GECCO 2004 Workshop on Modularity, Regularity and Hierarchy in Open-ended Evolutionary Computation*, Seattle, USA, Jun 26-30, 2004.

3.5 PATENTS AND COPYRIGHTS

Copyrights:

- Florida Angel Nexus: Angel Investor Network Management System ©2012 UCF
- APAS: Institutional Animal Care and Use Committee Management System ©2012 UCF
- Institutional Review Board and Regulations Compliance Management System ©2005 UCF
- A University Resources On-Line Reporting Application: AURORA ©2004 UCF
- Intellectual Property Management System: Intel-Pro ©2003 UCF
- Personal Access to the Office of Research Information Systems: PARIS ©2003 UCF
- Digital Documents Storage and Retrieval System: TeraServer ©2002 UCF

3.6 GRANTS AND CONTRACTS

3.6.1 FEDERAL FUNDING

Agency: Defense Advance Research Projects Agency (DARPA), Co-PI
 Title: Artificial Social Intelligence to support Macrocognition in Teams (ASIMT)
 Role: Co-PI
 Period: December 2019—December 2023
 Amount: **\$1,494,689** (IG 22.5%: \$336,305)

Investigators:Ivan Garibay (Co-PI); Gita Reese Sukthankar (Co-PI); Florian Jentsch (Co-PI); Stephen M Fiore (Co)

Agency: Defense Advance Research Projects Agency (DARPA), PI
Title: Deep Agent: A Framework for Information Spread and Evolution in Social Networks
Role: PI
Period: October 2017—December 2021
Amount: **\$6,200,000** (IG 40%: \$2,480,000)
Investigators:Ivan Garibay (PI); Gita Reese Sukthankar (Co-PI); Alexander Mantzaris (Co-PI); Stephen M Fiore (Co-PI)

Agency: National Science Foundation (NSF), PI, NSF
Title: Disrupting LegalTech: Using Artificial Social Intelligence for Successfully Designing AI-Assistants for Legal Teams.
Role: PI
Period: July 2019—December 2019
Amount: **\$50,000** (IG 100%: \$50,000)
Investigators:Ivan Garibay (PI);

Agency: National Science Foundation (NSF), PI, NSF
Title: EAGER: Defining, Measuring and Advancing University Economic Engagement: A Research Initiative for moving forward Science and Innovation Policy
Role: PI
Period: May 2017—May 2018
Amount: **\$50,000** (IG 95%: \$47,500)
Investigators:Ivan Garibay (PI); Ozlem Garibay (Co-PI)

Agency: National Science Foundation (NSF), Co-PI, NSF
Title: UCF I-Corps Site - enhancing technology commercialization to develop a world-class innovation ecosystem
Role: Co-PI
Period: August 2017—July 2020
Amount: **\$300,000** (IG 33%: \$99,000)
Investigators:Thomas P O'Neal (PI); Ivan I Garibay (Co-PI); David S Metcalf (Co-PI)

Agency: National Science Foundation (NSF), Co-PI, NSF CNS: 1347356
Title: University of Central Florida I-Corps Sites Program: Enhancing technology commercialization at a world-class innovation ecosystem
Role: Co-PI
Period: May 2014—May 2018
Amount: **\$360,000** (IG 20%: \$72,000)

Investigators: Thomas P O'Neal (PI); Ivan I Garibay (Co-PI); Cameron M Ford (Co-PI);
Michael Jay O'Donnell (Co-PI); Timothy G Kotnour (Co-PI)

3.6.2 INDUSTRY FUNDING

Agency: Walt Disney Attractions, Inc. (Disney), PI
 Title: Disney-UCF Lifelong Learning Program: A New paradigm in STEM and
 Business Workforce Development - PHASE II
 Role: PI
 Period: January 2019—March 2020
 Amount: **\$398,000** (IG 60%: \$239,000)
 Investigators: Ivan I Garibay (PI); Charles E Hughes (Co-PI)

Agency: Microsoft Corporation, PI
 Title: Microsoft Azure Credit-NSF BDHub network
 Role: PI
 Period: January 2019—January 2020
 Amount: **\$60,000** (IG 100%: \$60,000)
 Investigators: Ivan I Garibay (PI)

Agency: Royal Bank of Canada, PI
 Title: Deep Cyber: Using Big Data Distributed Machine Learning for Fraud De-
 tection and Risk Assessment in Large Financial Institutions
 Role: PI
 Period: January 2018—December 2018
 Amount: **\$102,890.00** (IG 100%: \$102,890.00)
 Investigators: Ivan I Garibay (PI)

Agency: Florida High Tech Corridor Council (FHTCC), PI
 Title: Deep Cyber: Using Big Data Distributed Machine Learning for Fraud De-
 tection and Risk Assessment in Large Financial Institutions
 Role: PI
 Period: January 2018—December 2018
 Amount: **\$33,361.00** (IG 100%: \$33,361.00)
 Investigators: Ivan I Garibay (PI)

Agency: Walt Disney Attractions, Inc. (Disney), PI
 Title: Disney-UCF Lifelong Learning Program: Deep Learning Intrapreneurship
 Pilot
 Role: PI
 Period: January 2018—December 2018
 Amount: **\$397,479** (IG 60%: \$238,487)
 Investigators: Ivan I Garibay (PI); Charles E Hughes (Co-PI)

Agency: Amazon.com, PI
 Title: AWS Cloud Credits for Research Program (Large-scale modeling and simulation of complex socio-economic systems)
 Role: PI
 Period: March 2017—March 2018
 Amount: **\$20,000** (IG 100%: \$20,000)
 Investigators:Ivan I Garibay (PI)

Agency: Microsoft Corporation, PI
 Title: Microsoft Azure Research Award (Computational modeling of the Zika virus spread: A GIS driven complex adaptive systems approach to modeling the population dynamics of Aedes aegypti)
 Role: PI
 Period: January 2017—January 2018
 Amount: **\$5,000** (IG 100%: \$5,000)
 Investigators:Ivan I Garibay (PI)

3.7 PENDING FUNDING

Agency: US Army Research Office (MURI), PI
 Title: Socio-Cognitive Artificial Intelligent Agents (SCAIA): A Cognitive-Centric Generative Approach to Modeling Spread of Information and Misinformation in Social Media
 Role: PI
 Period: May 2020—April 2025
 Amount: **\$6,249,999.95** (IG 40%: \$2,500,000.00)
 Investigators:Ivan Garibay (PI); Alexander Mantzaris (Co-PI); Stephen M Fiore (Co-PI); Michelle Taub (Co-PI)

Agency: US Department of Homeland Security, PI
 Title: Deep Data Agent (DDA), Uncovering threats hidden in large datasets and data streams by modeling the behavior changes and associations
 Role: PI
 Period: July 2020—June 2022
 Amount: **\$500,000.00** (IG 50%: \$250,000.00)
 Investigators:Ivan Garibay (PI); Alexander Mantzaris (Co-PI)

Agency: Walt Disney Attractions, Inc. (Disney), PI
 Title: Disney-UCF Lifelong Learning Program: A New paradigm in STEM and Business Workforce Development - PHASE III
 Role: PI
 Period: April 2020—May 2021
 Amount: **\$398,000** (IG 60%: \$239,000)

Investigators: Ivan I Garibay (PI); Charles E Hughes (Co-PI)

4 PROFESSIONAL ACTIVITIES

4.1 SERVICE TO THE DEPARTMENT, COLLEGE, UNIVERSITY

4.1.1 UNIVERSITY

Administrative Duty: Special Advisor to Liz Klonoff, UCF Vice President for Research and Dean of Graduate Studies

Until 2016 Summer, I was the leader of *Project Wahoo: restructuring of UCF research administration business and infrastructure*. This project was created by my office while I was Director of Technology and Innovation at ORC, and championed by me until it was approved early 2016 by the UCF Provost and was allocated approximately \$5,000,000.00 in internal funding. This is a large and complex project that involves a true study of UCF current business model and practices in the areas that support research: office of research, office of finance and accounting, office of compliance, and technology transfer. External expert consultants are currently conducting a comprehensive study of UCF current business practices and will provide recommendations in order to implement changes in UCF research support infrastructure. The goal is to bring UCF in line with the best practices in the industry, in order to enable UCF goals related to research output and provide a first class support to faculty members. My role is to serve as an advisor to Dr. Klonoff in all matters related to this project. We conduct semi-periodic meetings dedicated to discuss this project progress and provide my feedback on the decisions being made and strategic directions being considered. I receive an stipend for this administrative duty.

Learning Sciences Cluster: Search Committee Member

Serving the UCF Cluster's Initiative Debra Reinhart, Associate VP for Research and Scholarship, Director, Faculty Cluster Initiative

4.1.2 COLLEGE

Administrative Duty: Program Director of the Master of Science in Data Analytics (MSDA)

I started the MSDA program in Fall 2016 with 17 students. Currently, this Fall 2020 the MSDA is projected to have 90 students. I created the industry advisory board with currently 37 companies supporting the program, and recruited all students using usual marketing strategies as well as direct presentations to industry. I also recruited one Assistant Director, one Associate Director to help manage this rapidly growing program. Reviewed so far over 600 student applications to make admission decisions. I promote program via presentations to potential students, partners and stake holders. I convene and support the quarterly industry advisory board meetings, including the workings of the board and their

three subcommittees: internships, curricula alignment and advancement. I also created the internship program for the MSDA and actively recruit companies to provide internships. In process of creating the capstone course with industry recruitment and participation. In the capstone course we team students with industry partners to solve real world problems with the participation of industry mentors. I regularly meet with a large number of prospective students seeking information and with current students seeking advise. With the assistance of the Associate Director, I coordinate teaching assignments and teacher recruitment for the MSDA in collaboration with the Chairs of Computer Science and Statistics and Data Science. I also oversee the program logistics in collaboration with Office of Continuing Education (e.g, classroom locations, advisory board meetings, etc.) and the recruitment of GTAs for the MSDA program. I am in charge of the budget allocated for the program and to make decisions on regards of growing the program in support of UCF goals and in a responsible and sustainable manner.

4.1.3 DEPARTMENT

- IEMS Graduate Committee Member, 2016-Present.
- IEMS Faculty Search Committee Member, 2016-2017.

4.2 SERVICE TO THE PROFESSION

4.2.1 LEADERSHIP IN CREATING A NEW SCIENTIFIC DISCIPLINE: INVERSE GENERATIVE SOCIAL SCIENCE

- **Organizer of the 1st Workshop on methods for Inverse Generative Social Science (IGSS)** ⁶, MITRE, Washington, DC, January 23-25, 2020. In this workshop we were fortunate to be able to bring some of leaders of the Computational Social Sciences field to survey activities and tools, identify the main challenges (theoretical and empirical) opportunities for further advance and to establish a Working Group to maintain a critical mass of collaborators in this field:
- **Co-Organizers:**
 - Robert Axtell (GMU/SFI)
 - Joshua M. Epstein (NYU/SFI)
 - Ivan Garibay (UCF)
 - Matt Koehler (MITRE)
 - Bill Rand (NCSU)
 - David Slater (MITRE)
- **Why is this important now?**

Agent-Based Models are emerging as an important tool for studying bottom-up processes and mechanisms in the social sciences. Given a macrosocial pattern—a wealth

⁶Inverse Generative Social Science Workshop: <https://www.igss-workshop.org>

distribution, a disease time series, a spatial segregation pattern, a financial crash—the forward problem for ABMs is what rules of behavior and interactions are sufficient to generate the pattern.

The inverse problem for ABM is not to craft entire agents, but rather, to encode the space of possible agent constituents (rules, parameters) and possible mathematical and logical concatenations, and search this large space for the agent parameterizations that most closely reproduce empirical data, using Genetic Programming, Decision Trees, Causal State Modeling, Associative Rules and other techniques from Machine Learning and AI. Agents thus become outputs of the model.

During this Workshop we will (a) survey activities in this area and tools available (b) identify the main challenges (theoretical and empirical) to and opportunities for further advance, and (c) found a Working Group to maintain a critical mass of collaborators in this field. We will also design a Prospectus for an edited volume on Inverse Methods for ABMs.

4.2.2 LEADERSHIP IN EMERGING DISCIPLINE: MIS-INFORMATION DYNAMICS

- **Organizer of the 1st Workshop on Modeling and Simulation of Information and Misinformation Diffusion, Evolution and Dynamics in Social Media**, Auckland, New Zealand, May 9th, 2020. The goal of this workshop is to develop innovative approaches for (multi)agent-based modeling and simulation of (mis)information spread and evolution in the online information domain. ⁷
- **Co-Organizers** We are working with leading researchers in the field of social media modeling including two PIs of the DARPA SocialSim program:
 - Mark Orr (UVA)
 - Emilio Ferrara (USC)
 - Ivan Garibay (UCF)
 - Gita Sukthankar (UCF)
 - Niloofar Yousefi (UCF)
- **Why is this important now?**

The quality and format of public information is now subject to 24-7 news cycles on multiple media platforms alongside oppositional and supportive user-generated commentary. Information security is critical when it comes to the cyber global information environment where the internet and social media, as the primary sources of information and news, are actively used to influence opinion and activities, disseminate false information, and manipulate perception of the world. Therefore, it is crucial to study the information exchange dynamics to understand the reach of any information available in the online environment. However, modeling information exchange dynamics

⁷More information on the misinformation workshop: <https://www.cecs.ucf.edu/abm-idsms/>

is a challenging problem due to complex non-trivial individual and emergent collective human behaviors in receiving, processing, and transmitting information; and it requires the development of next generation of multi-agent modeling approaches that incorporates theory and methods from multiple disciplines including network and computational social science, behavioral psychology, cognitive and learning sciences, big data science, artificial intelligence and machine learning, communication science and information theory.

4.2.3 SCIENCE BOARDS

CAPS	Complexity And Policy Studies, The Journal for Policy and Complex Systems, Member of the Board of Directors , 2017 - 2018
CSSSA	Computation Social Science Society of the Americas, Member of the Board of Directors , 2016 - 2018
ISIT	8th Simposio Internacional en Innovacin y Tecnologia ISIT2017, Member of the Organizing Committee , 2017
CSSSA	Computation Social Science Society of the Americas, Treasurer , 2016 - 2017
ISIT	7th Simposio Internacional en Innovacin y Tecnologia ISIT2016, Member of the Organizing Committee , 2016
SDG	Swarm Development Group (Swarmfest Conference), Member of the Board of Directors , 2015 - Present

4.3 SERVICE AS EDITOR, ASSOCIATE EDITOR, OR MEMBER OF EDITORIAL BOARD

4.3.1 Journal Editorship (Editorial Board)

- Journal on Policy and Complex Systems, Editorial Board member since 2018

4.3.2 Journal Editorship (Special Edition Invited)

- Foundation of Genetic Algorithms, Special Editor for 2009

4.4 CONSULTING

- **Ricardo Palma University**, Lima Peru. Teaching a course: "INTRODUCCIÓN A LOS SISTEMAS COMPLEJOS, MODELOS BASADOS EN AGENTES Y LOS PROCESOS DE INNOVACIÓN E INVESTIGACIÓN". This course is to introduce basic research concept in complex systems and to create research capacity in complex systems topics among the students and faculty of this university. This course is intended to fulfill CECS/UCF goals: (1) create a bigger, better research enterprise and (2) increase the quality and quantity of graduate students; by fostering relationships between UCF and this academic institution that would lead to research collaborations and to attracting talented graduate students for UCF. This course is sponsored by:

- United Nations University, Institute for Advance Studies (UNU-IAS)
- Universidad Ricardo Palma
- Instituto Peruano del Pensamiento Complejo Edgar Morin -IPCEM
- Centro de Competencias en Educacin para el Desarrollo Sostenible, RCE Lima-Callao/UNU

4.5 OTHER EXTERNAL PROFESSIONAL SERVICE ACTIVITIES

- **Advisory Board Member**, California-based venture-funded technology startup : Streamlyne <https://streamlyne.com>, 2018-2019.
Role: provide strategic advise to CEO on information technology, entrepreneurship, electronic research administration, innovation, enterprise systems, sponsored research and technology transfer in the higher education sector.
- **NSF Panelist**: Invited by NSF to participate as panelist for the Innovation Corps Sites program. Reviewed proposals and participated in the discussion to make funding recommendations.
- **Reviewer for FOM**: Reviewed a proposal for the Foundation for Fundamental Research on Matter (FOM), the largest government-supported physics organization in the Netherlands.
- **Advisory Board Member**, California-based venture-funded technology startup : Vivantech, 2016-2017.
Role: provide strategic advise to CEO on information technology, entrepreneurship, electronic research administration, innovation, enterprise systems, sponsored research and technology transfer in the higher education sector.
- Judge for the Park Maitland School Science Fair, Orlando Science Center 2016
- Judge for the Park Maitland School Science Fair, Orlando Science Center 2015
- Judge for the Park Maitland School Science Fair, Orlando Science Center 2014

4.6 OTHER ACTIVITIES

- **Technical Committee Chair**: 10th International Symposium of Innovation and Technology, ISIT2019, Urubamba-Cusco, Peru, July 22-23, 2019.
- **Technical Committee Chair**: 6th International Symposium of Innovation and Technology, ISIT2015, Mar del Plata - Argentina, August 13-14, 2015.
- **Technical Committee Chair**: 5th International Symposium of Innovation and Technology, ISIT2014, Salamanca-Guanajuato. Mexico, October 20-22, 2014.
- **Technical Committee Chair**: 4th International Symposium of Innovation and Technology, ISIT2013, Urubamba-Cusco, Peru, November 25-27, 2013.
- **Chair, Organizer**: Workshop on Data Collection, Analysis and Modeling of Nanoparticle/Cell Interactions for Cancer Research, Orlando FL, October 11, 2013.

- **Chair, Organizer:** Swarmfest 2013, 17th Swarm Development Group's Agent-Based Modeling Workshop, Orlando FL, July 8-9, 2013.
- **Co-General Chair:** ISIT 2012, 3rd International Symposium on Innovation and Technology. Cusco, Peru, November 26-28, 2012.
- **Special Sessions Chair:** ISIT 2011, 2nd International Symposium on Innovation and Technology. Lima, Peru, November 28-30, 2011.
- **Technical Program Co-Chair:** ISIT 2010, 1st International Symposium on Innovation and Technology. Ica, Peru, November 29 - December 1, 2010.
- **Co-Chair:** FOGA X : Foundations of Genetic Algorithms. Sponsored by ACM SIGEVO. Orlando, Florida USA, January 9-11, 2009.
- **Co-Chair:** Complexity through Development and Self-organizing Representations Workshop, Genetic and Evolutionary Computation Conference (GECCO-2006), Seattle, Washington, USA, July 8-12, 2006.
- **Co-Chair:** Second Workshop on Self-organization in Representations for Evolutionary Algorithms: Building Complexity from Simplicity, Genetic and Evolutionary Computation Conference (GECCO-2005), Washington, D.C., USA, Jun 26, 2005.
- **Chair:** Workshop on Self-organization in Representations for Evolutionary Algorithms, Genetic and Evolutionary Computation Conference (GECCO-2004), Seattle, Washington, USA, Jun 27, 2004.

5 RECOGNITIONS AND AWARDS

- **Best Paper Award**, Conference of the Computational Social Science Society of the Americas, Santa Fe, NM, USA (2019).
- **Preeminent Postdoctoral Program**, Awarded \$25,000.00 to support a postdoctoral student, College of Graduate Studies, UCF, (2019).
- **Preeminent Postdoctoral Program**, Awarded \$25,000.00 to support a postdoctoral student, College of Graduate Studies, UCF, (2018).
- **Predictive Analytics Innovation Fellow**, Awarded \$5,000.00 stipend, Center for Higher Education Innovation in the Office of the President, UCF, (2017).
- **Preeminent Postdoctoral Program**, Awarded \$25,000.00 to support a postdoctoral student, College of Graduate Studies, UCF, (2017).
- **Mentoring Program**, accepted at the VP for Research and Dean of Graduate Studies faculty mentoring program, College of Graduate Studies, UCF, (2017).
- **Best Paper Award Nomination**, Genetic and Evolutionary Computation Conference, Washington, DC, USA (2005).
- **Hillman Fellowship Award** for Excellence in Ph.D. Research, University of Central Florida, Orlando FL, USA (2003).