

Chathura Jayalath

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Shadertoy <https://www.shadertoy.com/user/deamonpog>
ObservableHQ <https://observablehq.com/@deamonpog>

Honors and Awards

- 2019, 2023  **Graduate Presentation Fellowship** *University of Central Florida* – Competitive fellowship awarded for excellence in research communication to international audiences.
- 2014  **First Class with Honors** *University of Colombo* – Awarded for graduating with the highest academic distinction in Computer Science at the University of Colombo.

Education

- 2018 – 2024  **Ph.D., University of Central Florida (UCF)** Industrial Engineering, **GPA: 3.9/4**
Dissertation title: *Models of Information Diffusion and the Role of Influence*
Advisor: Dr. Ivan Garibay (UCF)
Co-Advisor: Dr. William Rand (NC State University)
Committee Members: Dr. Luis Rabelo, Dr. Timothy Kotnour, Dr. Thomas O'Neal
- 2009 – 2014  **B.Sc., University of Colombo, Sri Lanka** Computer Science with Honors, **GPA: 3.5/4**
Thesis title: *Modelling of Group Behaviours within Crowd Simulations: An Agent Based Approach*
Advisor: Dr. Prasad Wimalaratne (University of Colombo, Sri Lanka)
Co-Advisor: Dr. Asoka Karunananda (University of Moratuwa, Sri Lanka)

Certifications

- 2017  **Certificate in Teaching in Higher Education** – Successfully completed at the Staff Development Centre, University of Colombo; *SEDA (Staff and Educational Development Association, UK) Accredited.*

Employment History

June 2024 - Present

■ **Postdoctoral Researcher** | *Complex Adaptive System Lab (CASL) in the Industrial Engineering and Management Systems (IEMS) Department at the UCF*

- Co-authored the submitted research proposal for **DARPA-funded (Defense Advanced Research Projects Agency, U.S. Department of Defense) MAGICS program (Methodological Advancements for Generalizable Insights into Complex Systems)**, on integrating Transformer architectures with Evolutionary algorithms to enhance Evolutionary Model Discovery in complex systems.
- **Teaching** graduate-level courses: COP5711 Parallel and Distributed Database Systems, CNT5805 Network Science, CAP5610 Machine Learning.
- **Syllabus Planning:** Participating in the development of syllabus for **Machine Learning (ML)** courses for upcoming UCF's Masters in Artificial Intelligence degree program.
- Taught the topic **Agent-Based Models of Information Diffusion** as part of the course **Computational Analysis of Social Complexity** for the MS Data Analytics (MSDA) Program.
- Instructor for graduate level capstone course **CAP6942 Capstone Project**
- **Writing proposals:** for funding opportunities at National Science Foundation (NSF), National Institute of Health (NIH), and Defense Advanced Research Projects Agency (DARPA)

2022 - Present

■ **Visiting Scholar** | *Complexity, Analytics, and Data Science (CADS) Lab of the Poole College of Management, North Carolina State University (NCSU)*

- **Mentor undergraduate and graduate students at the CADS Lab** in research methods, data analysis, and scientific writing.
- **Actively contribute to maintaining a sustained research partnership between UCF and NCSU** through the DARPA-funded Modeling Influence Pathways (MIPs) initiative and follow-up projects.
- **Co-author publications** and ongoing projects spanning cross-institutional efforts between the NCSU and the UCF's Complex Adaptive Systems Lab.

Employment History (continued)

Aug 2021 – May 2024

■ **Graduate Research Assistant / PhD Candidate** | *Complex Adaptive System Lab (CASL) in the IEMS Department at UCF*

- **DARPA - MIPS (Modeling Influence Pathways) funded project** : **Developing methodology and creating Interactive Dashboard** using transfer entropy based methods for identifying inter and intra influence pathways of information diffusion environments.
- **Developed the Python Package brandpy** to facilitate Brandwatch API queries.
- **Developed the Python Package Influence Network Generator (ING)** to generate influence network based on online social media data.
- **Lead a interdisciplinary team of four graduate students** (two computer science major, one industrial engineering major, one operation research major) at CAS Lab under the guidance of co-PI Dr. Ivan Garibay from the Department of Industrial and Management Systems
- **Collaborate with PIs and graduate research assistants** from the North Carolina State University (NCSU) and Massachusetts Institute of Technology (MIT) on the Modeling Information Pathway (MIPS) <https://www.darpa.mil/program/modeling-influence-pathways> project funded by Defense Advanced Research Project Agency (DARPA).
- **Co-mentor multidisciplinary team of five undergraduate students** with a PhD student majored in Statistics from NCSU (two business major, two statistics major, one computer science major) for data science research. This work is under the guidance of co-PI Dr. William Rand from the Poole College of Management at NCSU.
- Help to write **grant proposal** for **NSF-SaTC (Security, Privacy, and Trust in Cyberspace)** program.
- Help to write grant proposal for Predictive Intelligence for **NSF-Pandemic Prevention Phase II (PIPP Phase II Centers Program)**
- **Technical Lead of the lab:** designing, coding and engineering the architectures for all the projects at CASL Lab (2021-2024)

Employment History (continued)

- Aug. 2018 - July 2021  **GRA / PhD Student** | *CASL in the IEMS Dept. at UCF*
- **DARPA - SocialSim (Social Simulation for Evaluating Online Messaging Campaigns) program funded project: Developing frameworks** for information spread and evolution in Social Networks
 - **Developed** a programming framework for simulating multiple social media platforms including Twitter, Reddit, Github, Youtube, and Telegram in **NetLogo**
 - **Developed** multiple action cascade model (MACM) in a team of two in **NetLogo**
 - **Developed** MACM for **CUDA** environment using **Python**, in the same team of two.
 - Competed and **exceeded the DARPA - SocialSim challenge** for four consecutive years to be one of the few teams that secured the funding to the end cycle.
- Dec. 2016 – Aug. 2018  **Lecturer** | *University of Colombo, Sri Lanka*
- The only faculty member with a bachelor's degree appointed as Lecturer** in the Department of Communication and Media Technologies, University of Colombo.
- Instructor of Record for Sri Lanka's first undergraduate course in Game Development** (SCS3113/IS3012), developed and taught at the nationally recognized undergraduate level.
- Instructor of Record for some of the most academically rigorous courses in the university**, including SCS2101 Data Structures and Algorithms III, SCS2112 Automata Theory, SCS 4106 Computer Graphics II
- Spearheaded the end-to-end redevelopment and publication of the University's Undergraduate and Postgraduate academic handbooks**, a comprehensive reform that standardized course documentation and improved institutional transparency.
- Organized and led orientation programs for incoming undergraduate cohorts**, coordinating faculty, staff, and student mentors to support academic onboarding and community integration.
- June 2014 – Dec. 2016  **Assistant Lecturer** | *University of Colombo School of Computing, Sri Lanka*
- Instructor of record for courses:** SCS3113/IS3012 Game Development, SCS3105/IS3016 Computer Graphics I
- Tutorials, Assignments and Mentoring** for : F101 07 Internet and Communication , SCS1108 Data Structures and Algorithms II , SCS1109 Programming II , SCS2008 Numerical Computing , SCS2102/IS2002 Software Development Group Projects Assignment
- Feb. 2014 – June 2014  **Instructor** | *University of Colombo School of Computing, Sri Lanka*
- Tutorials, Assignments and Mentoring** for: SCS1101 Data Structures and Algorithms I, IS2004 Web Application Development, SCS2102/IS2002 Software Development Group Projects Assignment

Employment History (continued)

April 2012 – Sep. 2012

■ **Software Engineer** | *SimCentric Technologies* <https://www.simct.com/>
Worked in **VBS2Fusion development team** (VBS, C++, DirectX, HLSL, Win32API). Developed algorithms for game object physics, shadow mapping graphics, and a novel drag and drop system for DirectX based UI.

Publication

Book

Chapter

■ Garibay, I., Barham, C., Abdidizaji, S. and **Jayalath, C.** (2025). Future Directions and Applications of Artificial Intelligence. In *Advances in Artificial Intelligence Applications in Industrial and Systems Engineering* (eds W. Karwowski, V. Duffy and G. Salvendy) (pp.355-370). Wiley.

Article

■ Champon, X. Staicu, A. Weishampel, A. **Jayalah, C.** Rand, W. (2026) Clustering Social Media Users Using Categorical-Valued Functional Data Analysis. *Journal of the American Statistical Association*. 1–11. <https://doi.org/10.1080/01621459.2026.2672226> (Tayler & Francis)

■ **Jayalath, C.**, Champon, X., Rand, W., Jasser, J., Garibay, O., & Garibay, I. (2026) Comparing community-based interventions versus population-wide response in information diffusion on social media platforms. *Data & Policy* (Cambridge University Press), 8, e4.

■ Abdidizaji, S., Baekey, A., **Jayalath, C.**, Mantzaris, A., Garibay, O. O., & Garibay, I. (2024, September). Analyzing X's Web of Influence: Dissecting News Sharing Dynamics Through Credibility and Popularity with Transfer Entropy and Multiplex Network Measures. In *International Conference on Advances in Social Networks Analysis and Mining* (pp. 124-138). Cham: Springer Nature Switzerland.

■ Champon, X., **Jayalath, C.**, Rand, W. , Jasser J., Garibay, I., Garibay, O., Comparing Social Media Communities using Functional Data Analysis, 57th Annual Hawaii International Conference on System Science (HICSS), 2024

■ **Jayalath, C.** Gunaratne, C., Rand, W., Senevirathne, C., Garibay, I. (2023). A Generalization of Threshold-based and Probability-based Models of Information Diffusion. *Advances in Complex Systems*

■ Garibay, O. O., Yousefi, N., Aslett, K., Baggio, J., Hemberg, E., **Jayalath, C.**, Mantzaris, A., Miller, B., O'Reilly, U., Rand, W., Senevirathna, C., & Garibay, I. (2022, December). Entropy-Based Characterization of Influence Pathways in Traditional and Social Media. In *2022 IEEE 8th International Conference on Collaboration and Internet Computing (CIC)* (pp. 38-44). IEEE.

■ Senevirathna, C., Gunaratne, C., Rand, W., **Jayalath, C.**, & Garibay, I. (2021). Influence Cascades: Entropy-Based Characterization of Behavioral Influence Patterns in Social Media. *Entropy*, 23(2), 160. <https://doi.org/10.3390/e23020160>

Publication (continued)

- Baral, N., Gunaratne, C., **Jayalath, C.**, Rand, W., Senevirathna, C., & Garibay, I. (2021). Negative influence gradients lead to lowered information processing capacity on social networks. In Proceedings of the 2019 International Conference of The Computational Social Science Society of the Americas (pp. 265-275). Springer International Publishing.
- Garibay, I., Oghaz, T. A., Yousefi, N., Mutlu, E. Ç., Schiappa, M., Scheinert, S., Anagnostopoulos, G., Bouwens, C., Fiore, S., Mantzaris, A., Murphy, J., Rand, W., Salter, A., Stanfill, M., Sukthankar, G., Baral, N., Fair, G., Gunaratne, C., Hajiakhoond, N., Jasser, J., **Jayalath, C.**, Newton, O., Saadat, S., Seneviratna, C., Winter, R., & Zhang, X. (2021). Deep agent: Studying the dynamics of information spread and evolution in social networks. In Proceedings of the 2019 International Conference of The Computational Social Science Society of the Americas (pp. 153-169). Springer International Publishing.
- Gunaratne, C., Baral, N., Rand, W., Garibay, I., **Jayalath, C.**, & Senevirathna, C. (2020). The effects of information overload on online conversation dynamics. Computational and Mathematical Organization Theory, 26, 255-276.
- Gunaratne, C., Baral, N., Rand, W., Garibay, I., **Jayalath, C.**, & Senevirathna, C. (2019). A theory of extended working memory and its role in online conversation dynamics. arXiv preprint arXiv:1910.09686.
- Senevirathna, C., Gunaratne, C., **Jayalath, C.**, Baral, N., and Garibay, I. (2019). Evidence of influence hierarchies in Github's cryptocurrency community. Santa Fe, NM. Computational Social Science Society of the Americas.
- **Jayalath, D. D. A. C. J.**, Wimalaratne, G. D. S. P., Karunananda, A. S., (2016) Modelling Goal Selection of Characters in Primary Groups in Crowd Simulations. International Journal of Simulation Modelling, 15(4), 585-596. Doi:10.2507/ijssimm 15(4)1.323

Conference
Presentation

- **Jayalath, C.**, Rand, W., & Garibay, I. (2026) Measuring Equifinality: Conformal Rule Identification in Agent-Based Models. Accepted and to be presented at the Conference of the Computational Social Science Society of the Americas (CSS). Santa Fe, NM.
- Senevirathna, C., Gunaratne, C., **Jayalath, C.**, Garibay, I., & Baral, N. (2019) Evidence of Influence Hierarchies in GitHub's Cryptocurrency Community. Presented In 5th International Conference on Computational Social Science, URL <https://2019.ic2s2.org/oral-presentations/>
- **Jayalath, C.**, Champon, X., Seneviratne, C., Rand, W., & Garibay, I. (2019) Quantifying the Effect of Clustering Coefficient on Models of Information Diffusion. Presented at the Conference of the Computational Social Science Society of the Americas (CSS). Santa Fe, NM. URL <https://computationsocialscience.org/conferences/css2023/>

Publication (continued)

- Gunaratne, C., Senevirathna, C., **Jayalath, C.**, Baral, N., Rand, W., & Garibay, I. (2019). A multi-action cascade model of conversation. In 5th International Conference on Computational Social Science, URL https://www.researchgate.net/profile/Chathika-Gunaratne-3/publication/332912188_A_Multi-Action_Cascade_Model_of_Conversation/links/5cd1dd1e92851c4eab897906/A-Multi-Action-Cascade-Model-of-Conversation.pdf
- Poster ■ **Jayalath C.**, Gunaratne, C., Rand, W., Senevirathna, C., & Garibay, I., Final States of Information Diffusion on Directed Scale-Free Networks, (2020) Poster session presented at Tenth International Conference on Complex Systems. URL <https://necsi.edu/iccs-2020-program#posters>
- **Jayalath, C.** Gunaratne, C., Senevirathna, C., & Garibay, I. (2019, July). A Path Dependent Equivalence of the Independent Cascade Model and the Linear Threshold Model. Poster session presented at the 5th International Conference on Computational Social Science. Amsterdam, NL. URL <https://2019.ic2s2.org/posters/>
- Senevirathna, C., Gunaratne, C., **Jayalath, C.**, Baral, N., Garibay, I. (2019) Hidden Patterns in Influence Hierarchies in GitHub's Cryptocurrency Community. Poster session presented at Conference of the Computational Social Science Society of the Americas (CSS). Santa Fe, NM.
- In preparation ■ **Jayalath, C.**, Champon, X., Rand, W., Senevirathna, C., Garibay, I., Quantifying the Effect of Clustering Coefficient on Models of Information Diffusion
- **Jayalath, C.**, Champon, X., Dicky, D. Rand, W., Garibay, I., Characterizing Influencer's Stability through Cascade Growth
- **Jayalath, C.**, Rand, W., Garibay, I., Certified Behavioral Rule Discovery in Agent-Based Segregation Models via Conformal Prediction.

Professional Services

- **Invited peer reviewer** for **Communications Earth & Environment** (<https://www.nature.com/commsenv/>), a selective **Nature Portfolio** journal with a 2025 impact factor of **9.3**.
- **Invited peer reviewer** for **NeurReps** (*Symmetry and Geometry in Neural Representations*), the workshop co-located with **NeurIPS** in **2025** and **2026** (<https://www.neurreprs.org/>), refereeing double-blind submissions to both the archival **Proceedings Track**, published in a dedicated volume of *Proceedings of Machine Learning Research*, and the Extended Abstract Track.
- Invited by the editors to review for **International Journal of Information Security** (2025 impact factor **5.0**, <https://link.springer.com/journal/10207>) and for the **Nature Portfolio** journals **Scientific Reports** (**4.9**, <https://www.nature.com/srep/>) and **Humanities and Social Sciences Communications** (**4.8**, <https://www.nature.com/palcomms/>).

Professional Services (continued)

- Invited Peer reviewer for the **Springer Nature** journals:
 - **Social Network Analysis and Mining** (<https://link.springer.com/journal/13278>)
 - **International Journal of Data Science and Analytics** (<https://link.springer.com/journal/41060>)
 - **EPJ Data Science** (<https://link.springer.com/journal/13688>)
 - **Applied Network Science** (<https://link.springer.com/journal/41109>)
 - **Society** (<https://link.springer.com/journal/12115>).
- Invited Peer reviewer for the **ICTer Conference (2014–2018)** (<https://icter.lk/history/>).
- Member of the **UCF-CECS Judge panel for Senior Design Showcase** since 2024.
- Professional Memberships: **ACM (2014-2018)**, **IEEE (2014-2016, 2017-2018)** including **IEEE Computer Society** and **IEEE Young Professionals**
- **A proctor** for **IEEE Xtreme international programming competition** from 2014 to 2018.
- Participated in the **IEEE Xtreme 6.0 international programming competition** as a **competitor** in 2012.
- **Member of the Judge panel** of **Young Computer Scientist**, a **national competition in Sri Lanka** (<https://fitis.lk/young-computer-scientist-competition/>) from 2014 to 2018.
- **Invited as a subject matter expert on a live radio broadcast** by the **Sri Lanka Broadcasting Corporation (National Radio, 2010)** to discuss emerging computer-security threats.
- Writing **tutorials on computer graphics and game development** (<https://www.youtube.com/@ChathuraJayalath>, <https://www.shadertoy.com/user/deamonpog>).

Research related Software Projects

catfda

R Package

- **Co-developed** an R package for categorical functional data analysis, implementing methods for latent-process estimation and clustering of densely observed categorical longitudinal data using GAM-based modeling and functional principal component analysis. Available in CRAN. <https://cran.r-project.org/web/packages/catfda/index.html>

funviewR

R Package

- **Sole Developer:** Developed and published an open-source R package for analyzing and interactively visualizing function-call dependencies in R codebases, helping users understand code structure, identify dependencies, and document complex R projects. Available in CRAN. <https://cran.r-project.org/web/packages/funviewR/index.html>

Influence

Network

Research related Software Projects (continued)

- Generator (ING)  **Sole Developer:** Developed an open-source Python package for generating influence networks from online social media data. The tool supports large-scale diffusion modeling and has been adopted in DARPA-funded research on information propagation. <https://github.com/UCF-MIPs/ing>
- Transfer Entropy
Interactive
Dashboard  **Lead Developer:** Conceived the methodology and designed and developed an analytical tool implementing transfer-entropy-based methods to identify inter- and intra-community influence pathways in information-diffusion environments. **Led all core algorithm design, system architecture, and visualization** components. **Presented as the official final deliverable to the DARPA-MIPS program**, demonstrating the project's methodological advances. https://github.com/UCF-MIPs/demo_v2
- brandpy  **Sole Developer:** Python package interfacing with Brandwatch API, enabling automated data retrieval and preprocessing for social-media analytics. <https://pypi.org/project/brandpy/>
- SocialSim
Framework  **Lead Developer:** DARPA-funded multi-platform social media simulation environment. **Sole developer** of the simulation framework covering Twitter, Reddit, GitHub, YouTube and Telegram. **Co-originated**, in a team of two, the **Multi-Action Cascade Model (MACM)** — a framework in which each action type exerts a distinct influence on the receiver — contributing the behavioral premise that influence varies by relationship and content domain, and jointly implemented it in **NetLogo** and subsequently in **CUDA**, reducing execution time from **15 days to 3 hours**. **Sole developer of MACM from 2021 onward**, independently extending the model with **Bayesian inference of influence parameters** and **Markovian context handling**, so that influence estimates update as evidence accumulates and an agent's response depends on the recent history of its interactions rather than on each message in isolation. Presented as a major component of the final deliverable to the **DARPA-SocialSim** program, which the team exceeded for **four consecutive years**. Additional implementations in C++/Repat.

Invited Talk

- 2025  Seminar titled **Numerical and Categorical Approaches to Time Series Analysis** for the M.S. in Data Analytics (MSDA) program at the UCF.
- 2024  Seminar titled **Agent-Based Models of Information Diffusion** for the M.S. in Data Analytics (MSDA) program at the UCF.
- 2023  Seminar titled **Social Media Research: Exploration, Data Retrieval, and Features of Data** at the Department of Statistics, North Carolina State University, NC.

Invited Talk (continued)

- 2015  Keynote speech on Information Technology Day event, titled **Mixed and Augmented Reality** for Isipathana College, Colombo, Sri Lanka.
- 2010  Hands-on workshop on **Introduction to Game Development with Unreal Engine** at the IFO++ public exhibition organized by the University of Colombo School of Computing (UCSC), Sri Lanka.

Consulting

- 2016-2018  Taught **Forensic Digital Image Processing** to law-enforcement officers at the **Computer Crime Investigation Division**, Sri Lanka Police.
-  **Curriculum design: Graphic Design** course syllabus for **national high schools**, **National Institute of Education**, Sri Lanka.

Skills

-  **AI & Simulation:** Agent-Based Modeling, Evolutionary Computing, Complex Adaptive Systems, Crowd Simulations.
-  **Programming and Software Engineering:** C/C++, C#, Python, NetLogo, Javascript, Java, MATLAB, R, Unrealscript, CUDA, UML, Design Patterns, AWS
-  **Computer Graphics & Visualization:** Ray Tracing/Marching, Photon Mapping, Unreal engine, Unity, DirectX, OpenGL, WebGL, HLSL, GLSL, D3, Maya, Blender

References

- PhD Advisor  Dr. Ivan Garibay, igaribay@ucf.edu
- PhD Co-Advisor  Dr. William/Bill Rand, wmrاند@ncsu.edu