Abhinay Paladugu

1971 Neil Ave, Room 210, Columbus, OH 43210 | +1 (404) 642-7757 | abhinaypaladugu96@gmail.com | https://www.linkedin.com/in/apaladugu/

EDUCATION

Ph.D. in Cognitive Engineering | The Ohio State University | Aug. 2021 – Dec. 2024 | GPA: 4

Courses: Models and Methods; Human-Centered Machine Learning; Computational Linguistics; Behind Human Error; Visual Analytics;
Dissertation: [Computational Simulation of Work as a Discovery Tool for Envisioning Future Distributed Work Systems](#),

Chair: Dr. Martijn Ijtsma; Committee Members: Dr. David Woods, Dr. Michael Rayo

Master of Science in Computer Science | Pennsylvania State University | Aug. 2018 - Dec. 2019 | GPA: 3.87

Courses: Algorithms; Distributed Systems; Neural Networks; Advanced Database Management; Computer Graphics; AI;

Master's Project: Humor Analysis using Convoluted Neural Networks and Bidirectional Encoder Representations from,

Advisors: Dr. Jeremy Blum and Dr. Hyuntae Na

Bachelor of Technology in Computer Science and Engineering | Indian Institute of Technology, Patna | June 2018 | GPA: 3.0

Relevant Courses: Object Oriented Programming; Data Structures and Algorithms; Database Management Systems;

Undergraduate Project: Computational Modelling and Simulation to Verify and Validate the Use of an Autonomous Fetch Robot

Advisor: Dr. Samrat Mondal; External Advisor: Dr. Amy Pritchett

RESEARCH EXPERIENCE

Post Doctoral Researcher | Cognitive Systems Engineering Lab (Modeling and Discovery Tools)   Dec. 2024 – present
- Responsible for leading and conducting research on multiple projects in the lab using modeling and simulation as a discovery tool.
- Developing new methods of using modeling techniques and frameworks for cognitive systems engineering.
- Developing new techniques to visualize and report computational simulation results for a discovery process.
- Mentoring graduate and undergraduate students.

Graduate Research Associate | Cognitive Systems Engineering Lab (Human-Automation Teaming)   Aug. 2021 – Dec. 2024
- Led and participated in the design of multiple Human-in-the-Loop (HITL) studies focusing on Human-Human and Human-Robot Teaming. Actively recruited participants and conducted comprehensive HITL studies.
- Developed computational models and simulations for various urban air mobility scenarios, capturing emergent system properties such as information exchanges, workload distribution, and mismatches in authority and responsibility between humans and automation.
- Conducted in-depth analysis of different coordination costs using qualitative and quantitative data from HITL studies and computational simulations to identify areas for improvement and enhance overall system efficiency.

Ph.D. Research Intern| Oilcan (Human Subjects Study for On-Call Engineers)   July. 2023 – Aug. 2023
- Conducted a semi-structured interview study to deeply understand the experiences and challenges of on-call work in the software industry, focusing on user needs and frustrations.
- Performed interviews and observations of conversations between 10 different Incident Commanders (ICs) and the CEO of Oilcan.
- Analyzed qualitative data from the study and transformed these insights into actionable recommendations and practical solutions to improve the safety and efficiency of on-call work. (Qualitative Data Analysis and Encoding)

Cognitive Engineering Intern| Cognitive Engineering Center (Computational Modeling)   June. 2017 – Aug. 2017
- Computational modeling and simulation of work are used to evaluate the different function allocations of a human-robot team. These evaluations specifically account for the authority responsibility mismatch and try to account for failures in the autonomous agent and how that affects human teammates.
- A case study of on-orbit maintenance of panels on the International Space Station (ISS) is chosen to demonstrate the work dynamics.
- The results of this are published in the paper, "Modelling and evaluating failures in human-robot teaming using simulation. doi: 10.1109/AERO.2018.8396581."

TEACHING AND INDUSTRY EXPERIENCE

Graduate Teaching Associate | The Ohio State University (Intro to Cognitive Systems Engineering)   Dec. 2021 – Apr. 2023
- Designed assignments and examinations for the course.
- Taught 20% of classes and analyzed assignments to identify areas of concern
- Graded and provided constructive feedback for the students and the professor.

Associate Systems Engineer| Dell Boomi (JavaScript, MySQL, PostgreSQL)   Feb. 2020 – April. 2021
- Designed, developed, and implemented an end-to-end synchronization process between databases and Salesforce to enhance managing a large corporate maintenance system, ensuring seamless user experience and operational efficiency.

- Conducted workshops on Boomi integration platforms(iPaaS), effectively communicating insights, and training others to develop new integration solutions.
- Developed multiple custom data handling scenarios using JavaScript, utilizing qualitative and quantitative data analysis to improve and optimize SaaS-based integration processes.

PROJECTS

Cognitive Systems Engineering to Support Anomaly Response in Space (C++, Python, VenSim)   Sept. 2024 – present
- Modeling and simulating micrometeorite showers on Smart Habitats to discover and gather more information for designers.
- Case study of an envisioned Smart Habitat based on documentation from NASA
- Modeling the heat and energy dynamics in VenSim for determining equilibrium.
- Computationally modeled and simulated the case study using models of physics for heat and other life support systems.
- Next step is to create a set of metrics that can communicate patterns of interaction in the envisioned space anomaly response.

Alternate Architectures for Air Mobility Contingency Management (C++, Python)   Sept. 2022 – June 2025
- Modeled alternate architectures or alternate distributions of authority and responsibility.
- Case study of an envisioned Dallas Forth Worth airspace to evaluate the alternate architectures.
- Computationally modeled and simulated the case studies for alternate architectures and analyzed the output for emergent properties like coordination and overall workload.
- Evaluated alternate architectures and created visualizations (graphs and networks) to show tradeoffs, like high information exchange vs. faster contingency detection.
- Some of the results of this work are published in the Journal of Cognitive Engineering and Decision Making (JCEDM). https://doi.org/10.1177/15553434251327698

Urban Air Mobility (UAM) Contingency Diagnosis Toolkit (JAVA, JS, Python).   May. 2023 – Sept. 2024
- Created a BlueSky simulation environment for a Columbus, Ohio UAM airspace.
- Participated in developing visualizations in JavaScript and the display design containing automated agents.
- Communicated with stakeholders and led efforts for stakeholder engagement.
- Designed human-in-the-loop testing scenarios and experiments to test the designed visual displays.
- The results of this project are part of the proceedings of Digital Avionics Systems Conference (DASC). doi: 10.1109/DASC62030.2024.10748968.

Strategies Analysis (Human-in-the-loop studies, Strategy selection, Contextual Control, Python, R)   Jan. 2022 – Aug. 2022
- Designed a HITL study to observe and analyze how human teams adapt to changes in external factors like time pressure.
- Used Contextual control model to capture the individual and team adaptations using quantitative and qualitative methods.
- The initial results of this project are published in the paper "Strategy Selection in Teams: Exploring How Teams Coordinate Responses to Time Pressure. doi: 10.1177/1071181322661360" and the final results are published in Human Factors Journal. https://doi.org/10.1177/00187208241292669

Computational Modeling of Coordination Strategies (C++, Python).   Aug. 2021 – Jan. 2022
- Computational modeling of different human-machine coordination strategies spread over a spectrum between fully explicit and implicit coordination.
- Simulated the computational models to evaluate the strategies in an envisioned unmanned aircraft systems contingency scenario.
- The results of this work are published in the Journal of Aerospace Information Systems (JAIS). https://doi.org/10.2514/1.I011239

PUBLICATIONS

Manuscripts

Paladugu, A., Fernandes, A., & IJtsma, M. (2025). *Computational simulation of distributed work as a discovery tool for envisioning future operations*. *Journal of Cognitive Engineering and Decision Making*. https://doi.org/10.1177/15553434251327698

Kannally, C., Paladugu, A., Nijveldt, R., McSherry, L., & IJtsma, M. (2024). *An exploratory study of contextual control modes in teamwork*. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, Advance online publication. https://doi.org/10.1177/00187208241292669

Barrett, E., Paladugu, A., & IJtsma, M. (2024). *Multi-agent simulation to envision communication strategies in future air mobility operations*. *Journal of Aerospace Information Systems*, 1–11. https://doi.org/10.2514/1.I011239

Conference Proceedings

Paladugu, A., Post, A., & IJtsma, M. (2023). Two tools for analyzing coordination problems to design for distributed work: A case study in urban air mobility. In *23rd International Symposium on Aviation Psychology*. https://doi.org/10.5399/osu/1188

Fernandes, A., Zabara, K., Epps, K., IJtsma, M., Paladugu, A., & Calhoun, S. (2025). Use of model-based systems engineering to drive UAM contingency management procedure design. In *AIAA Scitech Forum, AIAA 2025-2529*. https://doi.org/10.2514/6.2025-2529

Kannally, C., Furl, I., McSherry, L., & Paladugu, A. (2024). Towards informing joint contingency diagnosis for autonomous low-altitude flight. In *2024 AIAA DATC/IEEE 43rd Digital Avionics Systems Conference (DASC)* (pp. 1–8). https://doi.org/10.1109/DASC62030.2024.10748968

Paladugu, A., Fernandes, A., & IJtsma, M. (2024). The use of computational modeling and simulation to design and evaluate a distributed work system. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 68*(1), 243–249. https://doi.org/10.1177/10711813241276450

Fernandes, A., Wilson, S., IJtsma, M., Paladugu, A., Davis, T., & Lichty, J. (2023). Contingency planning toolkit for emerging air mobility ecosystems. In *AIAA Aviation 2023 Forum, AIAA 2023-3552.* https://doi.org/10.2514/6.2023-3552

Paladugu, A., Fernandes, A., Wilson, S., Davis, T. J., Lichty, J., & IJtsma, M. (2023). Evaluating envisioned air mobility architectures using computational simulations of work. In *22nd International Symposium on Aviation Psychology*, 2. Retrieved from https://corescholar.libraries.wright.edu/isap_2023/2

Paladugu, A., Nijveldt, R., Cassidy, K., & IJtsma, M. (2022). Strategy selection in teams: Exploring how teams coordinate responses to time pressure. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 66*(1), 2208–2212. https://doi.org/10.1177/1071181322661360

Ma, L. M., IJtsma, M., Feigh, K. M., Paladugu, A., & Pritchett, A. R. (2018). Modelling and evaluating failures in human–robot teaming using simulation. In *2018 IEEE Aerospace Conference* (pp. 1–16). https://doi.org/10.1109/AERO.2018.8396581

AWARDS AND GRANTS

NASA University Student Challenge Grant for "UAM Contingency Diagnosis Toolkit" 2023 for USD 80,000: Awarded to the biggest aviation engineering challenges.

Finalist for the best student paper at the International Symposium on Aviation Psychology, 2023: Awarded to the top 6 student papers based on a panel review.

Pennsylvania State University Harrisburg Computer Science Outstanding Graduate Student for academic year 2019-2020: Awarded to the graduate student with the highest-grade point average.

SERVICES AND MEMBERSHIPS

HFES CEDM Program Chair Assistant, 2022-2024, responsible for the review process and CEDM program for the annual meetings.
HFES Member 2021-present
AIAA Member 2024-present
HFES Ohio State University Student Chapter Secretary 2023-2024.
Fest Coordinator and Convener, 2017-2018, for Anwesha, the annual festival for the Indian Institute of Technology Patna
Created and ran a mentorship program from 2017 to 2018 at the Indian Institute of Technology Patna.

STUDENTS MENTORED

Jake Browning (UG CSE'26)
Shivani Patel (UG CSE'24)
Aarav Pininti (OSU CCP)
Antoine Creamer (UG ISE'27)
Jaiden Stratton (UG ISE'27)
Joseph Jideonwo (UG CSE'27)

REFERENCES

Dr.Martijn Ijtsma, Assistant Professor, Ohio State University
Ijtsma.1@osu.edu | +1 6787046361
Dr. Ijtsma can discuss my abilities to lead research projects and maintain a lab. He can also provide testimonials about my teaching skills and lecturing skills.

Dr. Alicia Fernandez, R&D Business Unit Lead, Mosaic Air Traffic Management
afernandes@mosaicatm.com | +1 5712932056
Dr. Fernandez can discuss my interest in research and my abilities to move research forward. She can also speak to my interest in operationalizing research.

Mark Chripczuk, Presales Manager, Boomi
markchripczuk@gmail.com | +1 2155708141
Mark can discuss my fast-paced technology development skills and visualizing a complex data path. Mark can provide testimonies about my teaching from the classes we taught together in my professional time at Boomi.