

Parth Ganeriwala

SOFTWARE ENGINEERING INTERN · PH.D. CANDIDATE · GRADUATE RESEARCH ASSISTANT

ASSIST Research Lab, Florida Institute of Technology | Avidyne
Melbourne, FL 32901

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Education

Florida Institute of Technology

PH.D. IN COMPUTER SCIENCE: GPA - 4.0/4.0

- Research Interests: Formal Methods, Artificial Intelligence, Machine Learning, Deep and Transfer Learning, LLMs and Automation
- **Dissertation:** What is Common Knowledge Across Domains? Investigating Shared Representations in Transfer Learning (Advisor: Dr. Siddhartha Bhattacharyya)

Melbourne, Florida

January 2023 - May 2026

Florida Institute of Technology

M.S. IN COMPUTER SCIENCE: GPA - 4.0/4.0

- Core subjects: Artificial Intelligence, Database Systems, Formal Methods, Advanced Software Engineering, Speech Recognition.

Melbourne, Florida

May 2022 - December 2023

Skills

Programming

Java, C/C++, Python, Visual Basic, Bash, MATLAB, MySQL, MongoDB, LaTeX

Web & API Development

Django, FastAPI, Node.js, PHP/Apache, REST APIs

Frontend

HTML5, CSS3, JavaScript, React.js, JQuery

Data Analytics

Jupyter, pandas, Dask, Statsmodels, Seaborn, MySQL Workbench, Neo4j, ElasticSearch

Machine Learning Libraries

scikit-learn, XGBoost, OpenCV, nltk, pandas, scipy

Deep Learning / LLMs

TensorFlow, PyTorch, Keras, Cuda, TensorRT, BERT, GPT, Hugging Face Transformers

Formal Verification

NuSmv/NuXmv, Uppaal, AGREE, TLA+ - Coq (Class Projects)

Robotics & Systems Engineering

Robot Operating System (ROS), AADL, SysML, Gazebo, RViz, Agile Software Development

Other Tools

Docker, Git, Perforce, GitHub Actions, NLP Modules, SparkAR Studio, Android Studio, Arduino

Project Tools

Jira, Trello, Miro, Notion, Slack, Teams

Experience

ASSIST Research Lab, Florida Institute of Technology

Melbourne, FL

RESEARCH PROFESSIONAL

- Working with a team of research professionals for formal methods of verification and run-time assurance, ML, IoT, robotics, and cyber security.
- Contributed with **professors on the development of research proposals** on diverse topics, including cognitive agents on human behavior, the assurance of artificial intelligence in safety-critical systems, and the fine-tuning of LLMs for domain-specific queries.
- Collaborating on NASA's **University Leadership Initiative (Round 8)** as part of a **Florida Tech**-led multi-university/industry team to develop a framework for **trustworthy, increasingly autonomous aviation safety systems**; partners include **Penn State, NC A&T State, UF, Stanford, Santa Fe College, Uni of New Mexico, Collins Aerospace, and ResilienX**; part of awards totaling up to \$6.9M over three years.
- Collaborating with **Collins Aerospace, Iowa State University, RTX Technologies Research Center (RTRC), and Smart Information Flow Technologies (SIFT)**, funded by **DARPA** with the task of formally modeling human cognitive behavior representation with respect to cyber-sickness in AR/VR systems.
- Collaborated with **Penn State University** on the application of **Large Language Model (LLM) translation** for cognitive architectures, focusing on enhancing the integration of LLMs to facilitate communication and knowledge transfer within cognitive systems.
- Contributed with **Critical Frequency Design**, funded by **Naval Air Systems Command**, with the task of developing a modeling approach for designing, maintaining, and supporting air and sea platform fiber optic communications technology.
- Collaborated with **Rockwell Collins and Soar Tech**, funded by **NASA** with the task of formally verifying the autonomous agent to assure safety as well as the logical correctness of the safety-critical system.
- Advising a Ph.D. student and undergraduate students on transfer learning, automated data labeling, and assurance frameworks for vision-based classification in autonomous aircraft systems funded by **NASA**, addressing safety and reliability challenges in aviation technologies.
- Advised **5 groups of computer science students** on the design, development, and deployment of software for their senior projects
- Mentoring **undergraduate and high school students** on machine learning engineering approaches in the aerospace and systems domains, leading to **conference publications** that addressed real-world challenges in these fields.
- Investigated the development of a **cognitive-enhanced agent** for automatically piloting aircraft in dense urban environments which emphasized safe and reliable takeoff/landing among aerial traffic without human intervention.
- Collected and presented **AssistTaxi**, a novel dataset for runway and taxiway analysis, contributing to autonomous operations.
- Developed an **autonomous aircraft perception system** for accurately detecting and labeling line markings on an airport taxiway.
- Assisted with the **formulation of quizzes and homework projects** for the courses: Python, Database Systems, Web Applications, Big Data and Management, and Software Metrics.
- Recognized with multiple honors and leadership roles, including **Outstanding Student of the Year** at Honors Convocation 2025, **Inducted Member of Phi Kappa Phi**, and **President of the Florida Tech Badminton Club**.

Software and Systems Engineering, Avidyne

Melbourne, FL

SOFTWARE ENGINEERING INTERN

May 2025 – Present

- Designed and executed **end-to-end (E2E) test and evaluation (E2TE)** workflows for **aviation simulation software**, increasing test coverage across navigation, communication, and flight display systems by 25%.
- Developed, integrated, and debugged **C-based flight software modules** in the avionics stack, ensuring compliance with real-time, safety-critical, and **DO-178C** guidelines.
- Created and optimized **50+ system-level and flight-specific test cases** in simulation environments, reducing verification cycle time by 15%.
- Automated regression and validation processes by writing **Visual Basic and C test scripts**, accelerating simulation turnaround by 20%.
- Led integration of multiple avionics product test suites into a **common extensible E2TE framework**, improving scalability and enabling rapid onboarding of new flight platforms.
- Built and maintained **embedded Linux software images** for avionics hardware using **Poky/Yocto build systems**, supporting cross-compilation and deployment across multiple flight product lines.
- Performed **low-level firmware flashing, hardware bring-up, and software deployment** onto flight test boxes, ensuring reliable integration between embedded targets and avionics simulation environments.
- Executed **hardware-in-the-loop (HIL) simulations**, diagnosing runtime and interface-level issues to improve simulation-to-aircraft fidelity by 10%.
- Supported avionics certification efforts by contributing to the **ASTM TFC compliance process** for **Vantage12 certification**, aligning embedded workflows with industry verification standards.
- Contributed to flight code development for Avidyne's **Quantum Open Avionics Platform**, supporting rapid prototyping of **customizable, next-generation avionics solutions**.

L3Harris Institute for Assured Information, Florida Institute of Technology

Melbourne, FL

GRADUATE RESEARCH ASSISTANT

May 2024 – July 2024

- Developed a **decentralized framework** enabling **multiple autonomous agents**—robotic dogs, drones, and mobile robots—to coordinate, communicate, and reach shared goals.
- Collaborated with **developers and professors** to rigorously test the system in both **simulation** and **real-world environments**.

IRI Research, Florida Institute of Technology

Melbourne, FL

GRADUATE RESEARCH ASSISTANT

May 2023 - August 2023

- Proposed and **implemented a framework using AI language models** to automatically extract software requirements from source code.
- Supervised and coordinated with undergraduate students towards the development process.

Publications

Translating Cognitive Architectures to Formal Verification

Under Review

P GANERIWALA, C CHAMBERS, S BHATTACHARYYA, S GILBERT, J BABAR, M DORNEICH, MAH KHAN AND I AMUNDSON

NASA Formal Methods 2026

Modular Test-time Input-Space Refinement for Few-Shot Segmentation

Under Review

MAH KHAN, P GANERIWALA, A ALVAREZ AND S BHATTACHARYYA

IEEE Trans on Emerging Topics in Computational Intelligence

Surveying the Landscape of Transfer Learning: Common Knowledge and Beyond

Under Review

P GANERIWALA, N NEOGI AND S BHATTACHARYYA

IEEE Trans on Pattern Analysis and Machine Intelligence

Formalizing Natural Language Specifications for MBSE with an NLP-Based Grammar for Automated System Architecture Generation

Under Review

C CHAMBERS, P GANERIWALA, S MUELLER, S BHATTACHARYYA AND C SEN

IEEE Systems Journal

Compositional Reasoning over System Architectures with Integrated Cognitive Model

Accepted

P GANERIWALA, C CHAMBERS, S BHATTACHARYYA, I AMUNDSON, AND J BABAR

IEEE SysCon 2026

Correlation-Threshold Feature Selection for Internet of Things (IoT) Device Identification under Domain Shift

Accepted

A DHANAWADE, P GANERIWALA, AND S BHATTACHARYYA

ISAIM 2026

AssistTaxi-v2: A Scalable Dataset for Taxiway/Runway Scene Understanding Under Diverse Conditions

Accepted

P GANERIWALA, MAH KHAN, A ALVAREZ, S BHATTACHARYYA, N NEOGI AND S LEHMAN

AIAA SciTech 2026

Explainable Assurance through Compositional Verification with Cognitive Models

Accepted

P GANERIWALA, C CHAMBERS, S BHATTACHARYYA, AND J BABAR

IEEE RTSS/ESRA 2025

Evaluating LLM Translation for Prompt-Enhanced ACT-R and Soar Models	Accepted
P GANERIWALA, S WU, S BHATTACHARYYA AND F RITTER	BRIMS 2025
Enabling Formal Verification in a Common Model of Cognition	Accepted
P GANERIWALA, M MATSUMURO, F RITTER AND S BHATTACHARYYA	BRIMS 2025
Integrating Reconfigurable Accelerators with Quantum Computing	Accepted
PRATIBHA, P GANERIWALA AND N MAHMUD	IEEE QCE QCORE Workshop 2025
Adapt, But Don't Forget: Fine-Tuning and Contrastive Routing for Lane Detection under Distribution Shift	Accepted
MAH KHAN, P GANERIWALA, S LEHMAN, A ALVAREZ, S BHATTACHARYYA AND N NEOGI	ICCV 2COOOL Workshop 2025
AI Driven Differentiation and Quantification of Metal Ions Using ITIES Electrochemical Sensors	Accepted
M AHMED, P GANERIWALA, A SAVVIDOU, N BREEN, S BHATTACHARYYA, P PATHIRATHNA	Journal of Sensor and Actuator Networks 2025
FLAIR: Few-Shot Learning for Grapheme Recognition in Ancient Scripts	Accepted
P GANERIWALA AND D MITRA	CVPR SINT4CH Workshop 2025
Few-Shot Learning for Grapheme Recognition in Ancient Scripts	Accepted
P GANERIWALA AND D MITRA	ACM Journal on Computing and Cultural Heritage 2025
Can Someone Prove Your Operator Won't Get Distracted? A Gentle Introduction to Formal Methods in Human Factors	Accepted
S GILBERT, P GANERIWALA, J LATHROP, A NEWENDORP, S FIEFFER, P WU, I AMUNDSON, C CHAMBERS, A KOHL, S KHAN, M SANAEI, J BABAR, T WANG, D MUSLINER, R GOLDMAN, J GOTTLIEB, S GILBERT, E WINER, M DORNEICH AND S BHATTACHARYYA	HFES 2025
Modeling and Formal Analysis of High-Assurance Mixed-Reality Systems	Accepted
I AMUNDSON, J BABAR, H HERENCIA-ZAPANA, S F ROLLINI, B BRUSSEE, P WU, T WANG, D MUSLINER, R GOLDMAN, J GOTTLIEB, A NEWENDORP, A KOHL, S FIEFFER, S KHAN, M SANAEI, M MUSCALA, S GILBERT, E WINER, M DORNEICH, J LATHROP, P GANERIWALA, C CHAMBERS AND S BHATTACHARYYA	AIAA DATC/IEEE DASC 2025
Systems Engineering with Architecture Modeling, Formal Verification and Human Interactions for Learning-Enabled Autonomous Agent	Accepted
P GANERIWALA, R JONES, M MATESSA, S BHATTACHARYYA, J DAVIS, S ROLLINI, H PUROHIT, N NEOGI	INCOSE Systems Journal
Design and Validation of Adaptive Learning-Enabled Increasingly Autonomous Systems	Accepted
P GANERIWALA, M MATESSA, S BHATTACHARYYA, R JONES, J DAVIS, P KAUR, S ROLLINI, N NEOGI	IEEE SysCon 2025
Automating Physics-Based Reasoning for SysML Model Validation	Accepted
C CHAMBERS, S MUELLER, P GANERIWALA, S BHATTACHARYYA AND C SEN	IEEE SysCon 2025
Runway vs. Taxiway: Challenges in Automated Line Identification and Notation Approaches	Accepted
P GANERIWALA, A ALVAREZ, A ALQAHTANI, S BHATTACHARYYA, MAH KHAN, N NEOGI	IEEE SysCon 2025
Exploring Machine Learning Engineering for Object Detection and Tracking by Unmanned Aerial Vehicle (UAV)	Accepted
A GUNA, P GANERIWALA, AND S BHATTACHARYYA	IEEE ICMLA 2024
ALINA: Automated Line Identification and Notation Algorithm	Accepted
MA H KHAN, P GANERIWALA, S BHATTACHARYYA, N NEOGI AND R MUTHALAGU	CVPR VDU Workshop 2024
AssistTaxi: A Comprehensive Dataset for Taxiway Analysis and Autonomous Ops	Accepted
P GANERIWALA, S BHATTACHARYYA, S GUNTHER, B KISH, MA H KHAN, A DHADOTI AND N NEOGI	IEEE ICMLA 2023

Towards Knowledge Extraction and Parsing of XML Metadata for SysML System Architecture Modeling

C CHAMBERS, P GANERIWALA, S BHATTACHARYYA, C SEN AND N NUR

Accepted

IEEE UEMCON 2023

Automated Framework to Extract Software Requirements from Source Code

C MISKELL, R DIAZ, P GANERIWALA, K SLHOUB, F NEMBARD

Accepted

ACM NLPIR 2023

Assuring Learning-Enabled Increasingly Autonomous Systems (ALEIAS)

N NARAYAN, P GANERIWALA, R JONES, M MATESSA, S BHATTACHARYYA, J DAVIS, H PUROHIT AND S ROLLINI

Accepted

IEEE SysCon 2023

IPAssess: A Protocol-Based Fingerprinting Model for Device Identification in IoT

P GANERIWALA, S NANDANWAR, A GUPTA, S BHATTACHARYYA AND R MUTHALAGU

Accepted

SAI IntelliSys 2023

Cross Dataset Analysis with Network Architecture Repair for Transfer Learning

P GANERIWALA, S BHATTACHARYYA, R MUTHALAGU AND N NEOGI

Accepted

IEEE T-IV 2023

Functional Reasoning of System Architecture in the System Modeling Language (SysML) With XML Representation

P GANERIWALA, C CHAMBERS, C SEN AND S BHATTACHARYYA

Accepted

ASME IDETC-CIE 2023

Modeling IoT Behavior for Enforcing Security and Privacy Policies

A GUPTA, D CAMPOS, A DCOSTA, P GANERIWALA, S BHATTACHARYYA AND T OCONNOR

Accepted

SAI Computing Conference 2022

Towards Generating System Arch and Formal Functional Description in AADL

A CHAUHAN, P GANERIWALA, C SEN AND S BHATTACHARYYA

Accepted

ASME IDETC-CIE 2022