Bharath Gadupuri

About me

Bharath Gadupuri is in the final stage of his PhD and pre-defended his thesis at the University of Genoa, specializing in advanced modeling, simulation, and autonomous systems for Industrial and Marine Infrastructure Inspection and Protection. His doctoral research, “Autonomous Systems for Industrial and Marine Infrastructure Inspection and Protection” (ASM³IP), integrates digital twin technologies, interoperable simulation frameworks, and real-time control strategies to develop intelligent virtual environments for infrastructure monitoring and protection using unmanned aerial, ground, and underwater vehicles (UAVs, UGVs, and UUVs).

He contributed to the I4D3A2 Project with INAIL by developing comprehensive data acquisition frameworks focused on national Open Data and global datasets. Integrated statistical data from multiple sources covering social and demographic indicators and workplace accident types and frequencies. Applied Design of Experiments (DoE) methodologies to analyze the impact of various factors on work-safety trends.

He worked on data-driven modeling and analysis frameworks focused on the integration of Open Data and EU-level datasets, with applications across urban systems, infrastructure management, and environmental analysis. His experience includes handling statistical, geospatial, and administrative data to support multi-layer modeling of complex systems. Applying Design of Experiments (DoE) principles, he contributed to the creation of simulation scenarios and validation procedures aimed at exploring interactions in complex environments such as social dynamics, transportation networks, and critical infrastructure. The resulting methodologies are adaptable to Smart City contexts, supporting data-driven evaluation of decisions and policy choices, resilience strategies, and sustainable resource planning.

Prior to his doctoral studies, Bharath served as a Scientific Researcher at DIME, UniGe contributing to the DRIIM project on AI-driven autonomous systems and drones for enhancing reliability and safety in industrial operations. His industrial background encompasses SCADA/HMI system design, predictive maintenance strategies, and firmware optimization at leading firms including Tenova and Emerson.

His technical expertise spans CAD/CAE design, model-based systems engineering (MBSE), and extended and virtual reality (XR/VR) development, with demonstrated proficiency in AnyLogic, Unity 3D, AutoCAD, MATLAB, and Python. His research bridges structural and functional modeling of complex mechanical systems with immersive human-machine interfaces, directly addressing contemporary challenges in digital manufacturing, smart logistics and cyber-physical systems.

Bharath has made extensive contributions to more than twelve peer-reviewed international conferences, including four consecutive years of participation in the International Multidisciplinary Modeling & Simulation Multiconference (I3M) and involvement in NASA’s Simulation Exploration Experience (SEE). He played a key role in developing curricula for industrial plant engineering. His research focuses on virtual prototyping and digital twin methodologies aimed at advancing energy-efficient, sustainable, and adaptive manufacturing systems.

He has coordinated and taught key MIPET master’s courses, including Modeling & Simulation Industry 4.0, Smart Manufacturing, Automation, and Safety for Industrial Plants. He supervised over 80 master’s theses and led workshops, trainings, and visits to major Italian companies.

Work experience

Scientific Researcher | University of Genoa | 30/11/2020 - 29/11/2022 | Genoa, Italy

DRIIM project: Intelligent Autonomous Drones and Systems to conduct operations and surveys on Industrial Plants aimed at controlling process parameters and improving Reliability and Efficiency.

He developed an innovative solution for Industrial Plants based on Autonomous Systems, Artificial Intelligence and Modeling & Simulation. This project addresses mainly the safety within Industrial Plants.

Business or sector Professional, scientific and technical activities | **Department:** DIME, Via all'Opera Pia, 15 - 16145 Genova

MIPET Course Co-Ordinator | University of Genoa | 30/11/2020 – till date | Genoa, Italy

As a MIPET Course Co-Ordinator. He has been actively involved in the teaching activities of the MIPET Master Program from Nov 2020 to the present, contributing primarily to courses on Industry 4.0 and Smart Manufacturing, Automation in Industrial Plants, Process Engineering and Safety & Security for Industrial Plants, and Fundamentals of Modeling & Simulation and Interoperability. He contributed to curriculum development for industrial plant

engineering and supervised over 80 master's theses and organized several workshops, training sessions, and industrial visits to leading companies across Italy, including ABB and A2A Energia, for MIPET and STRATEGOS students.

Software Engineer (AI & ML) | aCRM | 02/04/2020 - 31/10/2020 | Rome, Italy

He is part of a team developing a large-scale biometric identification system that integrates facial and voice recognition. He uses tools like OpenCV, TensorFlow, PyTorch, and Neurotechnology SDKs to build secure and reliable biometric solutions. He contributed to designing a scalable, GDPR-compliant architecture that supports users nationwide and also conducts technical training for deployment and support teams.

Additionally, he developed a system employing advanced language analysis and machine learning to process resumes in various formats, creating a verification layer to cross-check data against external sources to fix inconsistencies. The system has been continuously improved using real-world resume data, with detailed reporting added for easy auditing and understanding.

He also a part of building responsive full-stack web applications featuring smooth front-end interfaces and secure PHP back-end systems managing APIs and databases.

Automation engineer | Progea (Emerson) | 02/01/2020 - 31/03/2020 | Modena, Italy

• Movicon Software: Involved in developing SCADA and HMI software system interfaces for automated systems in the manufacturing industry.

• Engineered SCADA/HMI solutions for industrial automation and process supervision.

Automation Engineer | Tenova | 05/11/2018 - 31/05/2019 | Genoa, Italy

The objectives and modalities of his work are intended to develop the skills that equate to the professional figure of a Level 2 Automation Developer. In particular, compact with the activities related to the development of Industry 4.0 in relation to the plants of strip processing for the metal and mining industry.

He involved in designing of automation software for predictive maintenance in large industrial plants.

In Tenova R&D, he involved in the redesigning of the On-Board Accelerometer (OBA) and optimized operations for Vibration Analysis for the Tenova Predictive Maintenance.

He Initiated functional description for HMI (RecEveD) software.

He Involved in developing WIDE (Tenova Internal Software) for Record Events and Data (RecEveD) and HMI for multipurpose applications.

He has good knowledge in electro-mechanical applications in the field of optimal energy management. He developed Firmware applications for Wi-Fi performance analysis.

Research Assistant | IITH | 8/03/2016 - 25/08/2016 | Hyderabad, India

Fabrication of ultrafine conducting nanofibers of polyaniline (polystyrene)/polyethylene oxide blends by electrospinning process to check the electrical conductivity of nanofibers.

Fabrication of Cost-Effective Microbolometer. In this project our team proposed a low-cost uncooled infrared microbolometer detector.

Software Engineer | People Tech Group | 02/01/2015 - 05/12/2015 | HYD, India

Software Development

Education & Training

PhD | University of Genoa | 01/11/2022 - 31/10/2025 | Genoa, Italy

He developed modeling and simulation frameworks focused on the strategic engineering and application of autonomous systems for inspecting and protecting critical marine and industrial infrastructures. His work integrates technologies including UAVs, UUVs, rotary and fixed-wing drones, and SWATH USVs to enhance inspection efficiency, reduce human risk, and deliver real-time high-quality data. A key achievement is the development of intelligent agents capable of autonomous decision-making, dynamic adaptation, and multi-domain coordination across air, surface, underwater, coastal, space, and cyberspace addressing both offensive and defensive scenarios. Human interaction is supported through an immersive gaming interface, enabling a Human-AI synergy framework that refines system performance through simulation and real-world outcome comparison. The simulation environment utilizes extended reality (XR) to model various natural, human, and cyber elements, analyzing vulnerabilities such as communication disruptions and swarm attacks. The research includes applied scenarios like coordinated SWATH USV and AUV fleet operations for offshore inspection, maintenance, and protection under challenging conditions, contributing to advancements in resilient, AI-enhanced solutions for critical infrastructure management.

Principal courses included:

Foundations of Modelling and Design of Complex Systems, Fundamentals of Linear Programming and Network Optimization, Mathematical Modeling for Continuous and Discrete Simulation, Foundations of Programming for Problem Solving in Python, International Law for Conflicts and Cyber Security-Cyber Security and Cyber Warfare, Machine Learning for Decision Making-Time Series Forecasting and Classification, Geomatics and Strategic Decision Makers, Safety, Security, and International Space Law, Data Protection in International and EU Law, and Safety and Security in International Transports Law.

Field of study Engineering, manufacturing and construction | **National classification:** 8 | **Type of credits:** ECTS | **Number of credits:** 180 | **Thesis:** Autonomous Systems for Industrial and Marine Infrastructure Inspection and Protection

Master's in Industrial Plant Engineering and Technologies | University of Genoa | 05/02/2018 - 14/02/2019 | Genoa, Italy

Principal courses included:

Fundamentals of Design and Engineering, Construction, P&ID Erection and Commissioning for Industrial Plants, Combustion Technology Foundations, Industry 4.0 and Smart Manufacturing, Automation, Safety and Security for Industrial Plants, Process Engineering and Components in Industrial Plants, Innovative Techniques and Methodologies for Industrial Plants, Fundamentals of Modeling & Simulation and Interoperability, Fundamentals of Financial Analysis for Industrial Plants, and Integrated Approach for Product and Processes with Standards and Regulations.

Field of study Engineering, manufacturing and construction | **Final grade:** 107/110 | **Level in EQF** 7 | **Type of credits:** ECTS | **Number of credits:** 60 | **Thesis:** Level 2 Automation in Industrial Plants for RecEveD (Record, Event and Data)

Bachelor of Technology in Electronics and Communication Engineering (E.C.E) | Jawaharlal Nehru Technological University, Anantapur (India)| 10/06/2010 - 15/06/2014 | AP, India

Principal courses included:

Engineering Mathematics, Physics and Chemistry, Computer Programming & Data Structures and Computer Organization, Engineering Drawing and Environmental Science, Electronic Devices & Circuits and Control Systems Engineering, Computer Programming & Data Structures Lab, Electronic Circuits and Network Analysis, Signals and Systems, Analog Communication, Digital Logic Design and Digital Communication Systems, Random Variables and Stochastic Processes, Electromagnetic Theory and Transmission Lines, Linear Integrated Circuit Applications, Pulse and Digital Circuits, Microprocessors and Microcontrollers, Antennas and Wave Propagation, Digital Signal Processing and Microwave Engineering, Electronic Measurements and Instrumentation, VLSI Design and Optical and Satellite Communication, Embedded Systems, Radar and Wireless Mobile Communications.

Field of study Electronics and Communication Engineering (E.C.E) | **Final grade:** B | **National classification:** 6.5 | **Type of credits:** JNTUA R09 Credit System | **Number of credits:** 212 | **Thesis:** Electronic Speaking Glove for Speechless Patients. A Regional Tongue to a Dumb

Publications

Innovative Extended Reality and Simulation-based Training for Control Room Operators in Industry

Bruzzone, A.G., Sinelshchikov. K., Massei.M., Gadupuri.B., et al. (2024). In Proceedings of the 36th European Modeling & Simulation Symposium (EMSS 2024).
https://hdl.handle.net/11567/1231179

Autonomous System Digital Twin to test Machine Vision

Bruzzone, A.G., Sinelshchikov. K., Gadupuri.B., Gotelli.M., Giovannetti.A., et al. (2023). (2023). MAS 2023.
https://hdl.handle.net/11567/1160240

Simulation for Space Logistics Operations on the Moon

Bruzzone, A.G., Gadupuri.B., Sinelshchikov. K., Giovannetti.A., Ferrari.R., Pernas- Álvarez. J., et al. (2023). MAS 2021.
https://hdl.handle.net/11567/1057261

Data Analytics for Safety and Security within Ports using Open Sources

Bruzzone, A.G., Giovannetti. A., Gadupuri.B., Ferrari. R., Longo. F., Filippo.M., et al. (2023).
https://hdl.handle.net/11567/1160230

Safety and Security in the Marine and Harbor Environment.

Bruzzone, A.G., Gotelli.M., Giovannetti.A., Gadupuri.B., et al. (2023).
https://hdl.handle.net/11567/1160229

Serious Games, Simulation and IoT/IIoT for Improving Harbor Performance.

Bruzzone, A.G., Giovannetti. A., Gadupuri.B., De Paoli.A., Ferrari.R., et al. (2022).
(https://hdl.handle.net/11567/1148819

Innovative Virtual Lab for Improving Safety and Port Operations
Bruzzone, A.G., Sinelshchikov. K., Massei.M., Gadupuri.B., Giovannetti.A., et al. (2022).
https://hdl.handle.net/11567/1160372

AI & Interoperable Simulation for Pandemics and Crisis Management.
Bruzzone, A.G., Gadupuri.B., Massei.M., Pedemonte.M., Nikolov.O., et al. (2021).
https://hdl.handle.net/11567/1057273

Improving Efficiency and Safety for Heat Exchangers and Water Piping by Innovative Solutions.
Bruzzone, A.G., Gadupuri.B., Giovannetti.A., Magi.E., et al. (2021).
https://hdl.handle.net/11567/1057283

Strategic Engineering Applied to Complex Systems within Marine Environment
Bruzzone, A.G., Gadupuri.B., Sinelshchikov. K., Giovannetti.A., et al. (2021).
https://hdl.handle.net/11567/1057178

COYOTE Simulator Advancing Port Operations through Integrated Simulation, XR, and AI Technologies
Bruzzone, A.G., Giovannetti, A., Gadupuri, B., Karim.J., Jiayi, H.J (2025). In Proceedings of 15th International Workshop on Applied Modelling and Simulation (WAMS 2025).

Utilizing Extended Reality for Enhanced Safety, Security, and Efficiency in Marine Environments

Bruzzone, A.G., Sciomachen, A., Gotelli, M., Cepolina, E., Giovannetti, A., Gadupuri, B (2025). International Conference on Modeling and Applied Simulation (MAS 2025). (Submitted to the conference on September 2025, To Be Published)

Development of Green Steel via Hydrogen Direct Reduction: Electrical Design and Analysis
Bruzzone, A.G., Karim. J., Gadupuri, B (2025). European Modeling & Simulation Symposium (EMSS 2025). (Submitted to the conference on September 2025, To Be Published)

PhD Thesis: Autonomous Systems for Industrial and Marine Infrastructure Inspection and Protection
Gadupuri. B (2025) To Be Done.

Conferences & Seminars

Simulation Exploration Experience (SEE) | 15/11/2020 - Current | Virtual Mode Project on interoperable simulation organized by NASA and Kennedy Space Center.

I3M Multidisciplinary Modelling and Simulation Conference | 19/09/2022 - Current | Rome, Italy
European Modeling & Simulation Symposium

Simulation Exploration Experience (SEE) | 18/11/2022 - Current | Virtual Mode

Participated to the SEE 2023 (Simulation Exploration Experience) initiative coordinated by NASA and FSI for Nasa Artemis Program.

I3M Multidisciplinary Modelling and Simulation Conference | 18/09/2023 - Current | Athens, Greece (Virtual Mode)

International Multidisciplinary Modeling & Simulation Multiconference | 18/09/2024 - Current | Tenerife, Spain (Virtual Mode)

International Conference on Harbour, Maritime & Multimodal Logistics M&S

International Multidisciplinary Modeling & Simulation Multiconference | 17/09/2025 - Current | Fes, Morocco (Virtual Mode)

International Workshop on Simulation for Energy, Sustainable Development & Environment; International Conference on Harbour, Maritime & Multimodal Logistics M&S; International Conference on Modeling & Applied Simulation

Skills

XR & Simulation: Unity 3D, Blender, VR/AR Development | Industrial Automation: SCADA, HMI, Predictive Maintenance | Data & AI: Python, SciPy, OpenCV, ML frameworks| Autonomous Systems: UGV Architecture, Logistics Optimization | Modeling and Simulation: Unity 3D, Blender and Anylogic, Interoperable Simulation (HLA)

Projects

Intelligent simulation for UW Marine infrastructure inspection and protection. | 01/11/2022 - 31/10/2025

Bharath's research focuses on using autonomous systems such as drones, underwater vehicles, and surface vessels to inspect and protect critical industrial and marine infrastructures. He works on integrating AI-driven modeling and simulation to make inspections safer and more efficient. His research includes developing intelligent agents that can make decisions independently, adapt to changing situations, and coordinate actions across different environments like air, water, land, and cyberspace. Using immersive simulations and extended reality, he studied how these systems handle real-world challenges like communication failures and swarm attacks. Through practical case studies involving fleets of autonomous vehicles working together, Bharath's work advances reliable and resilient solutions for managing and safeguarding critical marine infrastructure in tough environments.

Vehicle Routing Problem for Smart City Logistics (QGIS & Python) | 15/02/2023 - 25/10/2023

Developed a simulation model for optimizing vehicle routing in urban logistics networks using QGIS, Python, and SciPy. Applied graph theory and discrete-event simulation to represent transportation systems as nodes and arcs, enabling real-time monitoring and adaptive routing. Optimized computational performance by reducing graph complexity to ensure efficient problem-solving under high-dimensional input data. The project demonstrated how data-driven modeling and algorithmic optimization can reduce travel time, improve fleet efficiency, and enhance urban mobility within smart city frameworks.

Intelligent Autonomous Systems and Drones to conduct operations and surveys on Industrial Plants | 30/11/2020 - 29/11/2022

Bharath has been actively involved in research on intelligent autonomous systems, including both drones and ground vehicles, used for operations and surveys in industrial plants. His work focuses on monitoring process parameters and enhancing plant reliability and efficiency through advanced automation and AI technologies. His research aims to improve safety, enable predictive maintenance, and optimize processes, helping to develop cutting-edge industrial automation solutions. These systems, equipped with advanced sensors and AI navigation, provide automated inspection and data collection, boosting safety and productivity while minimizing manual work in dangerous or hard-to-reach areas.

Industrial Plant Logistics and Production Optimization | 15/05/2024 - 25/11/2024

Designed and implemented optimization models for industrial plant logistics focusing on production scheduling, resource allocation, and cost minimization. Formulated and solved multi-period production planning problems considering variable demand, production costs, and capacity constraints over a six-month horizon. Applied operations research methods to balance production schedules, inventory costs, and transport logistics, achieving cost-effective and efficient production strategies in industrial environments.

Language Skills

Mother tongue(s): **Telugu**

	Understanding		Speaking		Writing
	Listening	Reading	Spoken production	Spoken interaction	
English	C2	C2	C2	C2	C2
Italian	A2	A2	A2	A2	A1

Certifications

AutoCAD | Project Based
Network Security, Cyber Security for Leadership | online
OpenCV, Convolutional Neural Networks (CNN) and SciPy in Python | online
SEE Simulation (NASA Simulation Exploration Experience) Participation Certificate | NASA and Kennedy Space Center
General training on health and safety at work | University of Genoa | online