

Vishal Gattani

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EDUCATION

University of Maryland College Park, MD

Aug 2021 - May 2023

Master of Science, Systems Engineering

3.762/4 CGPA

International Institute of Information Technology, Bangalore (IIIT-B)

Aug 2015 – Sept 2020

Integrated Master of Technology, Electronics and Communication Engineering

3.54/4 CGPA

RESEARCH AND INTERNSHIP

Graduate Research Assistant

Nov 2021 – May 2023

Simulation-based System Design Lab (SBSDL), UMD

College Park, MD

- Employed scenario descriptive language Scenic for Unity simulator to probabilistically generate scenarios for rapid operational environment development and testing.
- Implemented dynamic time of day feature to test and evaluate the simulator capabilities in high exposure settings.

Master's Thesis

Jan 2023 – April 2023

Experimental Design using Bayesian Network Simulation-based Assurance Cases, UMD

College Park, MD

- Executed a Bayesian framework to determine experimental designs to support the development of assurance cases.
- Performed Design of Experiments (DoE) to determine parameters that increase belief in a system's capabilities.

Research Associate

Oct 2020 – July 2021

Surgical and Assistive Robotics Lab (SARL), IIIT-B

Bangalore, India

- Analyzed human motion capture with Microsoft Kinect V2 and Azure Kinect to achieve efficient motion capture.
- Managed a team to develop a dual-arm robotic system through depth cameras for biomimetic control.

PUBLICATIONS

V. Gattani and M. Rao, (2021), "An integrated system design interface for operating 8-DoF robotic arm", Published in 2021 ICCAS.

ACADEMIC PROJECTS

Simulation

- **Self-Driving Car Sim** - Created a simulator incorporating a **Hybrid A*** path-finding algorithm, combined with a PID controller, using Voronoi Field and Euclidean distance as heuristics for a self-driving car.
- **Humanoid Arm Control** - Created a teleoperation system to visualize, program, and control upper-limb motion in real-time through Motion Capture with a precision of 0.1° using Blender Game Engine. (Link)

Motion Planning

- Implemented **Dijkstra**, **A***, and **RRT** for holonomic robots.
- Generated a 3D trajectory for UAVs using **Probabilistic roadmaps (PRMs)** with **A*** in response to emergencies in urban environments through voxelization of obstacle space using Trimesh library.

Computer Vision

- **Sign Language Detection** - Designed a gesture recognition system for ASL using **Google's Mediapipe** and **LSTM** networks to detect real-time sign language gestures.
- **Stereo Disparity** - Estimated pixel-wise depth by computing Disparity Map using sliding-window approach.
- **Lane Detection** - Detected lanes using a curve fitting approach and estimated road curvature.
- Created a panorama using Homography estimation and feature point matching of pair of images.

Systems Engineering

- Executed a simulation system to model, verify and validate how a self-replicating robotic system performs based on its system configuration, attributes, and operating environment.

TECHNICAL SKILLS

Languages: Python, C++, C, C#

Software: Blender, Unity3D, MATLAB, LTSpice, MultiSIM, Arduino, Cameo Systems Modeler

Developer Tools: ROS, Git, VS Code, Processing

Operating Systems: macOS, Windows, Linux