

GAUTHAM MANOHARAN

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SUMMARY

Robotics and Autonomous Systems graduate with expertise in Controls, Machine Learning, and Optimization. Seeking opportunities in Controls and Robotics starting June 2023.

TECHNICAL SKILLS

Programming: Python, C, C++, Tcl/Tk, ARM Assembly, PLC Programming

Modeling Tools: MATLAB, Simulink, EAGLE, Proteus, SOLIDWORKS

Relevant Knowledge: ROS, OpenCV, Machine Learning, TensorFlow, PyTorch, Keras, Embedded Systems

PROFESSIONAL EXPERIENCE

Arizona State University, Tempe, AZ: Researcher and Teaching Assistant Nov 2021 - Current

- Researching and developing Physical Human-Robot Interaction and Rehabilitation Robotics at the ASU Neuromuscular Control and Human Robotics Laboratory.
- Spearheaded development of an Ankle Rehabilitation Robot Controller that enhanced performance by 9.85%.
- Instructed students in design, debugging, and programming in Embedded C, ARM Assembly, and MATLAB as the lab TA for Real-time Digital Signal Processing and Analog and Digital Circuit Design courses.

Indian Institute of Science, Bengaluru, India: Data Scientist Oct 2018 - Dec 2020

- Collaborated with a team from BOSCH in the development of a traffic modeling framework for Electronic City, Bengaluru and built Predictive Models to invent solutions that minimized vehicle delay in network by 29.6%.
- Developed Supervised Machine Learning Algorithms for travel time prediction from Real-Time GPS data.
- Optimized PTV Vissim microscopic traffic flow model with Genetic Algorithm in Python and MATLAB.
- Partnered with the City Transport Corporation to develop Transit Ridership Prediction Models to improve the City's public bus system through Graph-based Network Analysis in Python using Google API and QGIS.
- **Publication:** Ranju Mohan, Susan Eldhose, Gautham Manoharan, "Network-Level Heterogeneous Traffic Flow Modelling in VISSIM", *Transportation in Developing Economies* (2021).

EDUCATION

M.S. Robotics and Autonomous Systems - Electrical Engineering Graduated May 2023
Arizona State University, Tempe, AZ 4.00/4.00

Coursework: Design and Control of Robots, Multi-Robot Systems, Adaptive Control

B. Tech. Electronics and Communication Engineering Graduated June 2018
National Institute of Technology, Calicut 8.37/10.0

ACADEMIC PROJECTS

Bayesian Optimization for Robot-Aided Rehabilitation: Adaptive Variable Impedance Control of a Wearable Ankle Robot Nov 2021 - April 2023

- Developed an Adaptive 2D Variable Impedance Control algorithm for the ankle joint of a wearable robot.
- Employed machine learning techniques (Bayesian Optimization and Student-t process regression) to robustly solve controller parameter optimization problems.
- Deployed control software in a Linux environment utilizing Tcl/Tk, C, Python, and MATLAB.
- Validated user speed increase of 9.85% and accuracy improvement of 7.57% through human experiments.

Robotic Manipulation and Autonomous Local Distribution for Industrial Automation using ROS April 2022

- Simulated Motion Planning of UR5 6DOF Manipulator in ROS Gazebo for part picking on a conveyor belt.
- Implemented Vision based Autonomous Navigation of TurtleBot for local distribution using RViz navigation stack and TF package with Point Cloud Mapping using LiDAR.

Real-Time Object Detection for Autonomous Drone Navigation and Obstacle Avoidance March 2022

- Computer Vision: Leveraged OpenCV, Mediapipe, Tensorflow, and YOLO for object identification and human body pose estimation.

Multi-Robot Object Transport Using Potential Field and Symmetric Formation Control Oct 2021 - Dec 2021

- Implemented a multi-robot transportation strategy in the Robotarium simulator for MATLAB using potential field-based obstacle avoidance, navigation, and graph-based formation control.

Publication: Gautham Manoharan et al., "Design and Implementation of Micro-Controller Training Kit with GUI Support", *Proceedings of 2018 15th IEEE India Council International Conference* (2018).

- Led a team to effectuate hardware design, fabrication, and testing of a multi-microcontroller training kit utilizing Autodesk EAGLE, allowing sensor and actuator integration. Conducted compatibility validation with NXP LPC2148 and Microchip PIC18F4550.

AWARDS

Engineering Graduate Fellowship for Academic Excellence, Ira A. Fulton Schools of Engineering, ASU - Fall 2022