GAUTHAM MANOHARAN

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SUMMARY

Robotics and Autonomous Systems graduate with over 3.5 years of work experience. Expertise in Controls, Machine Learning, and Computer Vision. Seeking opportunities in Robotics and Controls starting June 2023.

TECHNICAL SKILLS

Programming: Python, C/C++, Tcl/Tk, ARM Assembly, PLC Programming (RSLogix 5000)
Modeling Tools: MATLAB, Simulink, EAGLE, Proteus, SOLIDWORKS
Relevant Skills: ROS, HMI/SCADA, OpenCV, Machine Learning, Deep Learning, Embedded Systems, RTOS, Tensorflow

PROFESSIONAL EXPERIENCE

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

- Engaged in R&D at ASU Neuromuscular Control and Human Robotics Laboratory in safety critical Adaptive, Model Predictive, and Non-linear Control applications in Physical Human-Robot Interaction and Rehabilitation Robots.
- Established algorithms in C and Simulink for real-time control, and configured TCP/IP networking over Ethernet.
- Spearheaded construction of novel Ankle Rehabilitation Robot Controller that enhanced performance by 9.85%.
- Instructed students in Circuit Design, Embedded Programming, and Troubleshooting in C, ARM Assembly, and MATLAB as lab TA for Real-time DSP on STM32F407G, utilizing communication protocols I2S, USART, etc.

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

- Communicated with clients in automotive industry and aided team in data analysis and product development.
- Collaborated with cross-functional team from BOSCH to create a traffic modeling framework for Bengaluru and invented solutions by building Predictive Models which minimized vehicle delay in network by 29.6%.
- Programmed Machine Learning Algorithm, R^2 of 0.88, for travel time prediction from GPS data using Tensorflow and optimized 12 parameter PTV VISSIM traffic flow model with Genetic Algorithm in Python and MATLAB.
- Partnered with Bengaluru Transport Corporation in data acquisition, production of transit prediction algorithms, and Software Development to improve bus system, employing ML, AWS, Google API, and QGIS.
- **Publication:** "Network-Level Heterogeneous Traffic Flow Modelling in VISSIM", *Transp. in Dev. Economies* (2021).

EDUCATION

Master of Science in Robotics and Autonomous Systems - Electrical Engineering	May 2023
Arizona State University, Tempe, AZ	4.00/4.00
Bachelor of Technology in Electronics and Communication Engineering	Jun 2018
National Institute of Technology, Calicut	8.37/10.0

ACADEMIC PROJECTS

Motion Control of KUKA LBR iiwa 14 Robot arm for AR based rehabilitation   Jul 2023 - Current

- Implemented 3 real-time motion control algorithms in C++, and path planning using MoveIt on LBR iiwa KUKA robot arm with ROS hardware interface plugin via TCP/IP over ethernet.
- Developed an ATI EtherCAT FT sensor based admittance control algorithm at 1kHz for human-robot interaction.

Rockwell Micro850 PLC and Ignition HMI/SCADA for water level control   Jun 2023 - Jul 2023

- Programmed Micro850 PLC simulator over Ethernet/IP for water level control with Connected Components Workbench in Studio 5000 like workflow and designed HMI/SCADA system using Ignition Software.

Bayesian Optimization for Robot-Aided Rehabilitation: Adaptive VIC of Ankle Robot   Nov 2021 - Apr 2023

- Engineered a learning based Adaptive 2D Variable Impedance Control algorithm for ankle joint of wearable robot.
- Employed machine learning, Bayesian Optimization, and Student-t regression to optimize 11 control parameters.
- Deployed control software in Linux with front-end programming in Tcl/Tk, Python, and back-end coding in C++, and validated user speed increase of 9.85% and accuracy improvement of 7.57% through human experiments.

System Integration: Manipulation and Autonomous Control for Industrial Automation   Mar 2022 - Apr 2022

- Simulated control architecture for Motion Planning of UR5 6DOF Manipulator in ROS Gazebo for vision based smart part picking on a conveyor belt and SLAM of TurtleBot on factory floor with LiDAR point cloud maps.

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

- Leveraged OpenCV, Mediapipe, Tensorflow, Simulink, and YOLO for deep learning convolutional neural network based computer vision for object detection, classification, and human body pose estimation on DJI Tello Drone.

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

- Effectuated design, fabrication, and testing of kit employing Autodesk EAGLE, NXP LPC2148, and PIC18F4550.

AWARDS

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