GAUTHAM MANOHARAN

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SUMMARY

Robotics and Autonomous Systems MS graduate. Expertise in Controls, Embedded Systems, and Machine Learning. Seeking opportunities starting August 2023.

TECHNICAL SKILLS

Programming: Python, C/C++, Tcl/Tk, ARM Assembly, PLC Programming
Modeling Tools: MATLAB, Simulink, EAGLE, Proteus, LTspice, SOLIDWORKS
Relevant Skills: ROS, OpenCV, Machine Learning, Deep Learning, Embedded Systems, RTOS, Tensorflow, Git, Docker

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 and Programming in Embedded C, ARM Assembly, FreeRTOS and MATLAB as lab TA for Real-time DSP on STM32F407G, utilizing communication protocols I2S, SPI, 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 Algorithms for travel time prediction from Real-Time GPS data using Tensorflow.
- Optimized PTV VISSIM microscopic traffic flow model with Genetic Algorithm in Python and MATLAB.
- Partnered with the City Transport Corporation in data acquisition, production of transit prediction algorithms, and Software Development to improve bus system, employing ML, AWS, Google API, and QGIS.

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 June 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, and set up Docker image on Ubuntu.
- 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

- Designed control architecture and state machine for UR5 6DOF Manipulator in ROS Gazebo for vision based manipulation and TurtleBot SLAM 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 hardware design, fabrication, and testing of microcontroller training kit employing Autodesk EAGLE.
- Coordinated product compatibility validation and JTAG debugging on NXP LPC2148 and Microchip PIC18F4550.

AWARDS

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