FRANCIS JOSEPH

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WORK

Machine Learning Engineer Cruise LLC, San Francisco, CA — July 2024 - Present
RL fine-tuning for trajectory generation and scoring of the driving model.
Reward and cost development for targeted improved driving behavior.
Inferring safe state estimate of the autonomous vehicle using VLM/VLA.
Improving train and evaluation data pipelines for faster iteration cycles.

Engineer AutoX, San Jose, CA — July 2018 - July 2024
Trained models for forecasting obstacle trajectories.
Deployed models in C++ to run using TensorRT built on CUDA compiler driver.
Worked on developing conditional and joint predictions for simulation of agents.
Worked on data pipelines for multi model training and evaluation.
Developed occlusion detection and handling of occlusion in planning.

Intern PlusAI, Palo Alto, CA — June 2017 - September 2017
Built a data driven model to calibrate steering of the autonomous vehicle parameterized over speed.
Wrote an ACC controller in C++ to handle highway driving with the control law handling cut-in of vehicles.

Software Engineer ESI, Bengaluru, India — August 2012 - July 2016
Developed features for the pre-processor for a finite element method solution involving linear algebra.
Worked on applying transformations to loads onto meshed surfaces.
Wrote run-time code in C++ and python for automated testing scripts.

PROJECTS

Learning based approach to control a self-assembling robot — September 2016 - June 2018
Self-assembling robot moving based on vibration (Published in IROS 2017).
Determined motion prediction using neural network function approximation.
Compared closed loop PID with a MDP using the learned model for trajectory tracking.

Autonomous Mail Delivery — January 2018 - June 2018
Bring up Autoware with Dataspeed drive by wire unit.
Built 3D maps and semantic maps offline for online localization.
Wrote and tuned a throttle, brake and steering controller with a dp planner for trajectory following.

Learning Control of a Two-Link Arm — April 2017 - June 2017
Learned the controls of two link arm without knowledge of the model of the arm using DDPG.
Optimized the network to learn in less than 10,000 random demonstrations using MuJoCo for simulation.

EDUCATION

Master of Science University of California San Diego — September 2016 - June 2018
Course Work: Principles of Artificial Intelligence: Probabilistic Reasoning and Decision Making, Estimation and Sensing, Linear Control Systems, Optimal Control, Robot Manipulation, Robot Motion Planning, Design and Analysis of Algorithms

Bachelor of Engineering PES Institute of Technology, Bengaluru, India — September 2008 - June 2012
Course Work: Computer Programming, Kinematics of Machinery, Automotive Transmissions, Design of Machine Elements, Operations Research

SIDE PROJECTS / SKILLS / SOFTWARE

• Street parking detector • Gaussian model to detect red barrels • Kalman filter to track the pose of the camera • Particle filter to localize and map for SLAM • Strain sensors to map internal coral reef • RRT & RRT* planner for a 2D configuration space • JPS incremental planner for a 2D space • Contributed to the Autoware open source projects

• C++ • Python • Rust • Pytorch • TensorRT/CUDA • Onnx • Eigen • OpenCV • MATLAB • CMake • Bazel • ROS • ROS2 • gRPC • Docker • LaTeX • GIT • SVN • Pybullet • OpenAI Gym • MuJoCo