Abhinav Grover

ML & Robotics Software Engineer

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Education

M.A.Sc. - Robotics Eng.
University of Toronto
Robotics Institute
Graduation September 2021
Publication Link
GPA: 4.0/4.0

- State Estimation
- Perception for Robotics
- Optimal Control

B.A.Sc. - Mechatronics Eng.
University of Waterloo
Graduation April 2019
GPA: 91.5%

- Deep Learning
- Autonomous Robots
- Control Systems

Skills

PyTorch, Tensorflow	3+ YOE
OpenCV, Scikit-Learn	3+ YOE
ROS/ROS2	2+ YOE
Python	3+ YOE
GoLang	2+ YOE
Matlab	3+ YOE
C/C++	2+ YOE
Linux, Bash	3+ YOE
Nomad, Docker	2+ YOE
gRPC	2+ YOE

Interests

Badminton, Tennis, Cricket, Chess, Non-fiction Books, Sitcoms

Relevant Experience

Machine Learning Engineer II | Robotics — **09/2021 - Present**
Kindred AI/Ocado Inc., San Francisco
Manager: Gus D'Souza (recommendation on LinkedIn)
golang, python, pyTorch, gRPC, docker, nomad

- Co-lead development of **robotic manipulation** systems implementing a **Docker** based **microservice** architecture employing **nomad** and **gRPC** framework.
- Developed a **gRPC microservice in python** to generate 3D item-grasping candidates using a **pyTorch instance segmentation network** trained on custom in-house data.
- Built a **multi-threaded robot behavior controller** as a microservice in **golang** using an **event-driven architecture**, implementing complex concurrent logic.
- Training **behavior cloning policies** to do contact rich tasks, like unwrapping.
- Developed **software drivers** in **golang** and **python** for cameras, scanners, and conveyor systems, implementing **gRPC interfaces** to external hardware.
- Major contributor to **software re-architecture** efforts, improving overall system **reliability, traceability, and extensibility**.
- Co-established and contributed to a company-wide **golang coding style-guide**.

Graduate Researcher | Vector-Affiliated — **09/2019 - 08/2021**
STARS lab, University of Toronto Robotics Institute
Supervisor: Dr. Jonathan Kelly

- Developed a **novel learned approach** to detect object slip with in-expensive tactile sensors using **temporal convolution networks**.
- Presented a workshop paper at **IROS 2021** and an oral presentation at **ICRA 2022**.

Software Engineering Intern | Autonomous Vehicles — **01/2018 - 08/2018**
Nvidia Inc., New Jersey
Manager: Joyjit Daw (recommendation on LinkedIn)
C, C++, linux, Cuda

- Implemented a driving data recorder as a **linux application in C++** for a retrofit system, **increasing vehicle fleet utility** by 400%.
- **Tuned kinematics model** parameters of simulated autonomous vehicles using recorded driving data, bridging the **sim-to-real gap**.

Publications

"Learning to Detect Slip with Barometric Tactile Sensors and a Temporal Convolutional Neural Network", **A. Grover**, C. Grebe, P. Nadeau, and J. Kelly, IEEE Int. Conf. of Robotics and Automation (2022). Link to publication.

"Certifiably Optimal Monocular Hand-Eye Calibration", E. Wise, M. Giamou, S. Khoubyarian, **A. Grover**, and J. Kelly, IEEE Int. Conf. on Multisensor Fusion and Integration (2020). Link to Publication.

Relevant Projects

Accurate Road Segmentation using Camera and LIDAR Data — **Project Link**
Pytorch, OpenCV
Implemented a Fully Connected Network (FCN) based **Road Segmentation pipeline in PyTorch** on Audi's A2D2 dataset. Implemented a late and early fusion strategy published by Caltagirone et. al. and achieved an average precision of over 90%.

Invariant EKF SLAM — **Project Link**
MATLAB
Implemented an **Invariant EKF-SLAM** method by representing the robot pose as a member of the **special euclidean Lie group**, with the goal to eliminate the problem of inconsistency.