Varun Nayak

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EXPERIENCE

DEXTERITY.AI Warehouse Robotics, Redwood City, CA

Senior Robotics Engineer July 2022 – Present

- I **lead the application team** for Dexterity's flagship truck-loading product, driving feature development across multiple domains.
- Fully responsible for the interface to Dexterity's **motion planning and control stack** and the **orchestration & behavior planning** layers.
- Designed and implemented a novel algorithm (patent pending) for **multi-robot coordination and collision avoidance**, that improved robotic throughput by over 40%.
- Played a key role in **re-architecting** Dexterity's robotics application stack, transitioning to an **event-driven framework (using Python asyncio)** and consolidating microservices into a modular monolith.
- Developed **publish-subscribe (pub/sub) infrastructure (Python/Golang)** and tools for **visualization and introspection** using replay functionality, seamlessly integrating with **Foxglove**, a third-party data visualization platform.

Robotics Engineer July 2020 - July 2022

- (Early Stage hire) Developed **robot control** (force, torque, position, velocity) using the operational space control framework, **optimization** techniques such as TOPPRA and classical path planning and grasp algorithms (Python/C++), up-leveling dexterity's robotics stack. Worked on the **state machine, error handling, metrics, and gripper/sensor integration**.
- Contributed to **CI/CD, simulation, tracing/logging** & deployment infra using **gitlab CI**, Google Cloud, jaeger, ansible, and other custom Python tools.
- Successfully deployed **30+ robots and sustained operations for over 3 years** for kitting, palletizing, and depalletizing robots.

AURIS HEALTH, INC. Surgical Robotics, Redwood City, CA

Robotics Software Intern | Summer 2019

- Implemented, tested and deployed an **impedance-based control** mode for a multi-DoF robot arm **in C++**, complying to FDA regulations. This control mode **saved over 20%** of preparation time for surgeons while performing docking i.e. arm positioning.

SELECTED PROJECTS

ROBOTICS

- Delivery Robot: Implemented autonomous exploration, **A-Star, EKF-SLAM (using LiDAR)** on a **Turtlebot** using **ROS (Python)** for navigation in a mock environment.
- Crokinole-Playing Robot: Implemented perception, planning & control algorithms on a 7-DoF Robotic Arm.

MACHINE LEARNING / A.I.

- **RL Planner**: Implemented Q-Learning & SARSA algorithms to learn a velocity planner for **simulated off-road vehicle**.
- **Vehicle Odometry**: Localization using CNN-based optical flow and stereo depth on the KITTI dataset.

EDUCATION

STANFORD UNIVERSITY

Master of Science, Robotics (2020)
Coursework: Robot Control, Motion Planning, Computer Vision, Machine Learning, Optimization, Mechatronics.

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI, NDIA

Bachelor of Science, Mechanical Engineering (2018)

SKILLS

PROGRAMMING LANGUAGES

Python • Golang • C/C++

FRAMEWORKS / TECHNOLOGY

asyncio • numpy • scipy • pytorch
git • kubernetes • docker • poetry • Linux/UNIX
ROS • REST/FastAPI • gRPC • redis
elasticsearch/kibana • SQL/BigQuery • prometheus/grafana • jaeger

PATENTS/PUBLICATIONS

Patent (System & Software): Multiple robot simultaneous and synchronous pick and place
Patent (System & Software): Tray handling autonomous robot
Patent (Design): Multi-mode robotic end effector
Thesis: Design and control of an aerial manipulator for contact-based inspection

TEACHING/VOLUNTEERING

Teaching Assistant: Introduction to Robotics with Dr. Oussama Khatib, Stanford University (2020)
Teaching Assistant: Dynamic Systems, Vibration & Control, Stanford University (2019)
Robotics Workshop Instructor, cybermath.org (2019): Taught middle school students the fundamentals of robotics through demos on a Lego®kit.