Neeraj Basu

Master's Student

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About

I have four years of experience in robotics, controls and mechatronics engineering. My focus has evolved from industrial applications to developing research driven robotic solutions. I am currently seeking full time positions in the robotics software and computer vision space.

Technical Skills

Python, Computer Vision, OpenCV, Jupyter, Linear Algebra, Deep-Learning, ROS, Linux, LaTeX, MATLAB, Sensors, Microcontrollers, EAGLE, SolidWorks

Relevant Coursework

Computer Vision
Machine Learning
Robot Autonomy
Manipulation, Estimation & Control
Robot Mobility
Statistical Techniques for Robotics

Additional Projects

Neural Net for Letter Recognition
Variable PWM/Freq. Driver Circuit
Mobile Robot, Power-Monitoring PCB
Shortest Path Robot w Obstacles
AR with Planar Homographies

Awards/Qualifications

5 P&G Power of You Awards
Best ECE Senior Design Award
Finalist Intel Cornell Cup
Dean's List 2015/2016
Low Voltage Qualified

Education

2020 - 2022 **Carnegie Mellon University - Robotics Institute** — Pittsburgh, PA
M.S. in Robotic Systems Development, 3.9/4.0

2012 - 2016 **Boston University - College of Engineering** — Boston, MA
B.S. in Electrical Engineering

Experience

May 2021 - August 2021 **SpaceX - Robotics Intern, Computer Vision (FL)**

- Developed algorithm in Python using depth images generated from 3D cameras to orient Starship heat-shields prior to robot pickup.
- Calculated robot offsets by projecting 2D centroids in image space to 3D points in robot frame to meet strict x/y/theta requirements.
- Fabricated and installed turntables using servos and motor controllers to orient heat-shields within 1° accuracy.
- Collected and labeled images to train neural net using Cognex's ViDi suite for defect detection and heat-shield classification.

Jun 2019 - July 2020 **SharkNinja - Senior Robotic Development Engineer (MA)**

- Architected and validated electrical, mechanical and navigation requirements for SLAM based robotic vacuums.
- Utilized ROS to compare intrinsic robot trajectory with external camera tracking to improve navigation performance.

Dec 2016 - Mar 2019 **P&G - Power, Controls & Information Systems Engineer (WV)**

- Developed simulation platform using virtual machines to host PLC, HMI & Batch software to train team prior to hardware delivery.
- Led the installation and power-up of $2M of equipment for electrical panels, industrial transmitters, IO/Ethernet cards and PLCs.

Sep 2016- Dec 2016 **Amazon Robotics - Mechatronics Co-Op, Advanced Robotics (MA)**

- Created testing protocol to compare point cloud data collected from 3D camera candidates using Python and Jupyter Notebooks.
- Designed functions to compare characteristics across cameras such as temporal pixel noise and depth projection accuracy.

May 2015 - Aug 2015 **View Inc. - Electrical and Software Engineering Intern (CA)**

- Designed and conducted electrical test protocols to determine the total power consumption of controllers for smart windows.
- Utilized Python to solve for factors such as current, voltage drops and power consumption, eliminating need for manual calculations.

Academic Projects

Sep 2020 - Present **Project Salus, COVID-19 Disinfection Robot - Thesis Project**

- Designing algorithm to decrement grid cells in occupancy grid that fall within LiDAR array FOV for obstacle avoidance.
- Implemented dead-reckoning kinematics and unit tests in C++ ROS framework to supplement existing IPS localization subsystem.

May 2021 - Present **Autonomous Chess Robot - Detection and Estimation**

- Trained supervised neural net on YOLO-V4 architecture to achieve individual chess piece classification and 2D centroid calculation.
- Estimated 3D position of chess pieces relative to manipulator using Intel RealSense camera projection to ensure successful grasps.