ARTI ANANTHARAMAN

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EDUCATION

Carnegie Mellon University (CMU), School of Computer Science Pittsburgh, PA
Master of Science, Robotic Systems Development (MRSD) | QPA: 4.08/4.33 May 2021
Coursework: Planning and Decision-making in Robotics; Underactuated Robots; Robot Autonomy; Robot Localization & Mapping; Manipulation, Estimation, & Control; Introduction to Computer Vision

R.V. College of Engineering (RVCE) Bangalore, India
Bachelor of Engineering, Electronics and Communication Engineering | CGPA: 9.70/10 July 2019

SKILLS

Programming Languages C/C++, Python, MATLAB
Libraries/Frameworks NumPy, SciPy, PyKDL, OpenCV, Robot Operating System
Robotics Motion Planning, PID Control, Optimal Control, Spatial Kinematics, SLAM

PROFESSIONAL EXPERIENCE

Johnson & Johnson Redwood City, CA
Robot Software Test Automation Intern, Robotics & Digital Surgery May 2020-July 2020
- Defined functional requirements for robotic arm to clip & unclip bronchoscope devices and developed a working prototype
- Wrote scripts to automate testing of faults associated with joint limit, joint velocity, gravity compensation, collision detection and autonomous navigation of a robotic bronchoscope

Robert Bosch Manufacturing Solutions GmbH Stuttgart, Germany
Robotics Software Engineering Intern June 2018-July 2018
- Collaborated in the research of dynamic multi-agent planning for scheduled deployment of robotic fleets
- Programmed work plans of collaborative robots for customized applications to fit end-user requirements

Industry 4.0 Intern June 2017-July 2017
- Programmed TwinCAT3 modules for PLC-systems, in accordance with IEC 61131-3
- Designed hardware architecture and developed software to test internal prototypes

ACADEMIC & RESEARCH PROJECTS

Augmented Reality for Minimally Invasive Surgery [website] Sept 2019-present
Robotic surgical system built atop the da Vinci Research Kit and incorporating methods in registration, organ motion compensation, force sensing to autonomously localize liver tumors
- Registered robot and stereo camera coordinate frames within 4 mm RMSE using Horn's method
- Developed a motion planner for robot arm to scan region of interest on silicone liver and yield 3D point cloud
- Registered 3D point cloud to ground truth within 3 mm RMSE using Iterative Closest Point algorithm
- Estimated motion frequency of silicone liver within 0.05 Hz of ground truth using Principal Component Analysis and Fast Fourier Transform

Robotic Bin Picking Feb 2020-May 2020
- Implemented a manipulation system for robot arm to grasp objects using 6-DoF poses obtained from wrist camera
- Implemented RRT algorithm in task space for robot arm to transfer objects from source bin to target bin

3D Dense Reconstruction using ICP and Point-based Fusion Mar 2020-Apr 2020
- Implemented point-to-plane ICP to estimate 6DoF pose of RGB-D sensor relative to scene
- Reconstructed 3D dense model of scene using point-based fusion algorithm

Path Planning on Constraint Manifolds Feb 2020-Mar 2020
- Implemented RRT algorithm to generate collision-free trajectory for robotic arm to reach target configuration
- Projected C-space samples onto constraint manifold to keep end-effector in vertical orientation

Spatial Kinematics of a 7-DoF Robotic Arm Jan 2020-Feb 2020
- Computed inverse kinematics of Franka Emika robot using Jacobian transpose method
- Implemented collision detection of two oriented bounding boxes using Separating Axis Theorem

Extended Kalman Filter for 2D SLAM Jan 2020-Feb 2020
- Derived measurement Jacobians with respect to robot pose and landmark in analytical form
- Implemented EKF algorithm to get robot trajectory and landmark positions from control input and measurements

Control and Trajectory Generation of a Quadcopter Sept 2019-Oct 2019
- Developed elementary state machine to simulate quadcopter takeoff, hover and trajectory tracking
- Implemented PD controller and LQR controller to enable robot to track trajectory, and compared their performances

Object Tracking Sept 2019-Oct 2019
- Implemented Lucas-Kanade algorithm to track a moving car with template correction
- Optimized the algorithm by using Inverse Compositional Algorithm