Pranay Junare

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EDUCATION

COLLEGE OF ENGINEERING PUNE — Pune, India
B.Tech Electronics and Telecommunication, 2nd degree in Computer Science; CGPA: 8.54 — *Aug. 2018 – May 2022*

PUBLICATIONS

1. **Pranay Junare**, Mihir Deshmukh, Mihir Kulkarni, Prashant Bartakke, "Deep Learning based end-to-end Grasping Pipeline on a lowcost 5-DOF Robotic arm.", IEEE 19th India Council International Conference (INDICON), 2022. *(Link)*
2. Mihir Kulkarni, **Pranay Junare**, Mihir Deshmukh, Priti P. Rege, "Visual SLAM combined with Object detection for autonomous indoor navigation using Kinect V2 and ROS", IEEE 6th International Conference on Computing, Communication and Automation (ICCCA), 2021. *(Link)*
3. **Pranay Junare**, Shaunak Mahajan, Prithvish Taukari, Anirudh Nallawar, Dr. Shantipal Ohol, "Development of Robotic Arm Manipulator mounted on Self Balancing Two Wheeled Mobile Robot", Aerospace and Defence Related Mechanisms Symposium (ARMS-DRDO), 2021. *(Link)*

RESEARCH & INDUSTRIAL EXPERIENCE

Software Developer — June 2022 – Present
ION Trading — *Pune, India*
- Working in ION's Treasury Product which serves the needs of major Fortune-100 Companies & top Central banks in capturing their high value transactions of FX, Derivatives, Futures, Swap, Options, etc.
- Responsible for design, development and enhancement of low-latency "Trade & Risk Management" Module.

Research Intern - NTU-India Connect Research Fellowship — June 2021 – Aug 2021
Nanyang Technological University, Singapore — *Nanyang Avenue, Singapore*
- Under guidance of *Dr. Xie Ming* worked on Collaborative UAV-UGV system for Search and Rescue Task.
- Implemented a Octomap based 3-D mapping approach using UAV and built a 2-D occupancy grid map of the surrounding which can further be used by UGV for navigation.
- Built a Human Detection system on the UAV using Yolo v3 tiny model in order to detect persons to be rescued.

Research Intern - Mitacs Globalink Internship Program — May 2021 – Jul 2021
Ontario Tech University, Canada — *Oshawa, Canada*
- Under guidance of *Dr. Scott Nokleby* worked on the project of developing an Autonomous Electric Wheelchair for children with physical disability.
- Built a simulation model of a wheelchair, added gazebo sensor plugins, implemented complete navigation stack, used RTABMap & Octomap mapping approach, and built a system for detecting negative obstacles.

Undergraduate Research Member — Mar 2019 – June 2022
Centralized Robotics and Automation Lab, COEP — *Pune, India*
- Under guidance of *Dr. Shantipal Ohol* worked on different collaborative projects, published research paper, conducted various workshops & participated in robotics competitions such as ABU Robocon.
- Briefly worked on path-planning of 3-wheel Omni-directional mobile robot, implementation of FreeRTOS, State-estimation, Perception & Control of mobile robot and also explored NAO-6 Humanoid Robot.

Robotics Intern Nov 2020 – Jan 2021

Binary Robotics *Pune, India*

- Worked from proof of concept to development of ROS navigation stack for Autonomous Mobile Robot(AMR) capable of navigation in a dynamic environment such as warehouse and healthcare facility.
- Performed simulation on Gazebo, designed PCB, used Lidar point clouds & wheel odometry information in order to implement and assess Gmapping and Hector SLAM algorithms.

Intern Apr 2020 – Apr 2020

Exa Mobility *Pune, India*

- Worked on MEMS motion sensor calibration & implemented sensor fusion algorithms on IMU data.
- Also worked on GPS & Kalman filtering to develop & implement GPS-Aided inertial navigation system.

PROJECTS

Deep Learning based Robotic Grasping | *Robotics, Computer Vision* | Video | Report | Paper

- Objective is to optimally grasp objects autonomously using low-cost 5-DOF robotic arm. Built a Deep Learning based robotic grasping model which predicts the 5-D grasp configuration with an accuracy of 83.3 %.
- Full end-to-end grasping pipeline is established right from capturing RGB-D image, prediction of rotated bounding boxes, ROS and Moveit support for the robotic arm, 3D grasp pose determination from predicted grasp configuration, Transforms from 2D image to the base link and finally the trajectory planning of Robotic arm.

Visual SLAM & Object Recognition for Autonomous Mobile Robot | *Robotics, Perception* | Video | Paper

- Implemented RTABMap SLAM algorithm on gazebo simulator and in real world using Kinect v2 RGB-D camera
- In addition to that alongside Yolo V3 object detection model was implemented in order to achieve task of robust perception in autonomous navigation.

Robust Control of Inverted Pendulum Robot | *Robotics,Automation* | Link

- Inverted Pendulum Robot - A two-wheeled robot capable of navigating and balancing on its own was built.
- It has MEMS Motion sensors and Atmega-32 at its core which pass downs PID controlled signal to the motors
- Tested different IMU Sensor Fusion Algorithms such as Complementary filter, Mahony filter & Madgwick filter.

Simulation and Design of Cubalance | *Robotics,Automation* | Link

- Simulated a robotic cube on Matlab & Simulink capable of multi-terrain locomotion and can balance on an edge.
- Implemented Control Algorithms such as PID and LQR in order to achieve stability.

Semi-Autonomous Omni-directional Mobile Robot for ABU Robocon | *Robotics,Automation*

- Worked on perception, optimal control of basedrive & different trajectory generation for efficient path planning by interfacing IMU sensor,Encoded Motors,Laser sensors, etc. Also worked on actuation of pneumatic mechanisms.
- Implemented FreeRTOS on STM32 ARM Cortex M4 Micro-controller for efficient real-time operations.

TECHNICAL SKILLS

Programming Languages: C++, C, Python

Developer Tools: Git, Docker, Jenkins, LaTeX

Frameworks and Tools: PyTorch, OpenCV, ROS, MATLAB, CMake, Gazebo, Altium PCB Designer

Hardware: Cameras, LiDAR, Encoders, MEMS Motion Sensors, Microcontrollers, I2C/ UART/ SPI Protocols.

NOTABLE ACHIEVEMENTS

- Won "Best Final Year BTech Project Award" for the project "Deep Learning based Robotic Grasping", 2022
- Won 3rd prize at "M-Exhibit UG Project Competition'22" among 40+ teams, 2022
- Won Consolation prize at "Directorate of Technical Education's Project Competition'22" among 110+ teams, 2022
- Secretary of "The Robotics Society, India - COEP Chapter" for Academic year 2021-2022.
- Mitacs Globalink Research Internship Award with Scholarship of $15,000 for future Graduate Studies, 2021
- Won "Judge's special Award" at National ABU Robocon'20 among 155 teams across India, 2020
- Winner of Search & Destroy robotics competition at Mindspark'19(Tech. event with footfall of 20K+ people), 2019