Parth Shah

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Education

K. J. Somaiya College of Engineering, Mumbai, IN **2018 – 2022**

B. Tech in Computer Engineering — GPA - 9.06/10

Research Experience

Robotics Research Center, IIIT-Hyderabad **August 2022 – Current**

Research Associate — Prof. K. Madhava Krishna *Hyderabad, India*

- **Autonomous Driving Platform**: Developing a software-stack for an *Autonomous Campus Shuttle* which will also act as a plug-and-play test-bench for autonomous vehicle algorithms
  Implemented Lego-LOAM for lidar-only SLAM ; Stanley Controller for controls ; Frenet Planner as the local planner
- **Research**: Researching on a localization algorithm for mobile robots based on neural-network enabled 2D-scan matching

Work Experience

Rightbot Technologies **October 2021 – July 2022**

Robotics Software Engineer *Bangalore, India*

- Deployed a fleet of 10 AGVs for *Quick-Commerce Robo-Warehouses* to improve the productivity by 3x and throughput by 50%
- **Navigation Stack**: Integrated algorithms for localization, planning and controls to the Robotic Software Stack of AMRs and AGVs. Integrated robot safety features such as active speed-based collision detection and corridor-breach detection
- **Sensor Interfacing**: Built ROS-wrappers for industrial-grade sensors like SICK GLS-621, Hokuyo UST lidars. Wrote a C++ library to extend ROS-interface to the CAN-bus protocol
- **Back-end Development**: Designed and developed a Micro-Service based back-end system for Robotic Warehouse Management to minimize Order-Fulfillment time, optimize Inventory Management and accordingly schedule robot missions.

Xanthus Software Solutions **January 2021 – April 2021**

Project Intern - Computer Vision, Blockchain *Mumbai, India*

- **Computer Vision Project**: Developed an License Plate Recognition Pipeline for a Drone-based Parking Management System, including license plate detection using YOLO, character segmentation using vertical profiling, and character recognition using CNNs. Explored DJI-Mavic SDK for the transmission of live video feed to a remote server for processing.
- **Blockchain Project**: Enhanced medical record security for a dental-industry clients by creating a Passive Data-Security mechanism using blockchain. Used Algorand Smart-Contracts to create chains and save the cryptographic hash of records.

Projects & Competitions

Orion Racing India | *Formula SAE — Driverless Vehicle Engineer* | [video] [report]

- Employed EKF-SLAM algorithm for mapping the racetrack; Voronoi-based planner for finding a centered path; Pure-Pursuit Controller for path-tracking.
- **Perception Pipeline**: Developed a ground-removal algorithm for LIDAR point-clouds based on RANSAC and further employed DBSCAN algorithm for clustering pointcloud into objects. Implemented YOLOv3 algorithm for object detection on video-feed of XBOX Kinect. Fused the detections from the LIDAR and Camera to minimize false-positive detections.

Team KJSCE Robocon | *ABU Robocon — Software Lead* | [video-2019] [video-2020]

- **Controls**: Developed a closed-loop position and velocity control system for Holonomic-Drive and Synchro-Drive robots using Encoders, IMU and Laser-distance for feedback. Developed a Hopping-Gait Controller for a Pneumatic-Quadruped Robot.
- **Embedded Systems**: Experienced with coding ARM Cortex-M4, AVR microcontrollers and with Communication Protocols such as SPI, UART, I2C, XBee.
- **Simulation**: Used MATLAB and Simulink to simulate throwing and kicking mechanisms on for parameter tuning.

Neuro-Controlled Wheelchair | *Texas Instruments IICDC Conclave 2019* | [video]

- Developed a Brain Signal Operated Wheelchair for self-reliant movement of paraplegic people.
- De-noised the EEG power spectrum obtained from EEG-headset and further process them to obtain control commands.

Sheet Music Player | *under Prof. Bhakti Palkar*

- Extensively tested various Deep-Learning model architectures for the task of Optical Music Recognition.
- Created a image-processing pipeline to clean and segment sheet-music to be passed through a Neural-Network consisting of a CNN followed by Bidirectional LSTM cells for transcribing music notes.

Grievance Management System

- Created a app-based Grievance classification and reporting solution for gated societies.
- Trained a CNN based image classifier to detect type of grievance such as 'Water Flooding', 'Garbage', 'Potholes', etc.
- Developed a Data-Analysis pipeline to obtain meaningful abstractions of this data usable by authorized services.

Wrist Physiotherapy Machine | *Collabration with BETIC Lab, IIT-Bombay and The Somaiya Hospital*

- Created a Continuous Passive Motion (CPM) machine for physiotherapy exercises of wrist motion section with inputs from a certified Physio-Therapist and deployed it at her clinic. Focused on small-form factor, easy usability and safety.

Additional Information

Achievements

· Ranked eight amongst of 200+ teams and won the 'Best Idea Award' in DD-Robocon 2019

· Ranked fifth amongst 200+ teams and won the 'Springer Award' (for best documentation) in DD-Robocon 2018

· Ranked fifth amongst 260+ teams in E-Yantra Robotics Competition 2022 - Berry Farming Robot with 6-DOF Arm

· Winner at Texas Instruments IICDC Conclave 2019 — Business Case for Neuro-Controlled Wheelchair

· Captain of College Table Tennis Team — led the team to victory in various inter-university competitions.

Technical Skills

· **Programming Languages**: Python, C, C++, Embedded-C, Matlab, JAVA, JavaScript

· **Frameworks/Tools**: ROS, Simulink, CoppeliaSim / V-REP, PyTorch, Tensorflow, Flask, Django, Spring, NodeJS