INDUSTRY EXPERIENCE PORTFOLIO

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INTRODUCTION

My work experience after entering the industry has been mostly in Robotics Software development. I developed robotics software in both ROS (1 & 2) and non-ROS (iceoryx, NVIDIA) environments. My responsibilities usually entails developing a new feature/functionality stack by going through the past and current literature/research on the subject matter. Additionally, I have also worked in Embedded Software development for some hardware controllers, and I've worked on circuit design for control of small components of the robots.

INDUSTRY EXPERIENCE

Tespa Robotics

Embedded Developer (R&D engineer in Robotics)

- Developed an Autonomous Mobile Robot (AMR) and brought it to the navigation stage in development.
- Worked independently on the project with help on the mechanical design and oversaw the electrical circuitry.
- Chose the required third-party components and oversaw their procurement.
- Initially created stack with ROS 1 and later switched to ROS 2, due to certain communication issues. But, created the entire software stack independently.
- Fused 2D Lidar, Optical Rotary Encoders and a 9-axis IMU for localization, mapping and navigation.
- Mapped a factory environment and auto-navigated the mobile robot throughout the factory floor.

Minus Zero Robotics

Robotics Engineer

- Developed stack for Localization, Planning, Sensor Fusion and Control for Autonomous Passenger Vehicle. Worked with cameras, 9-axis IMU and GNSS as part of the sensor stack. Created

Global Path Planner. Worked on and created Frenet Frame for path planning, PID control of vehicle, fusion of IMU and GNSS for localization.

- Developed robotics stack that was part of an Autonomous Passenger Vehicle (AV).
- Fused 2 GNSS (u-blox ZED-F9P) modules (moving rover and moving base) with a 9-axis IMU and wheel odometry.
- Used one GNSS module as moving base, that gives the global coordinates, and used the second GNSS module as moving rover for heading.
- Created a Frenet Frame path planning stack for the vehicle to track. (Local Planner)
- Created a Pure-Pursuit algorithm based tracking stack for the Autonomous Vehicle to track the planned path.
- Used OpenStreetMaps API to get the map for planning and planned on the received map using A-star algorithm. (Global Planner)
- Created and tuned the PID controller that controlled the speed and steering of the vehicle platform.
- Here is a video of a demo that we showed of our prototype in June 2023: link.

Seven Robotics
Robotic Navigation Engineer

- Responsible for a ROS based Behavior Tree (BehaviorTree.CPP) backed navigation stack.
- Worked on Lattice Planner (global planner) and TEB planner (local planner)
- Created a mathematical Dynamic Obstacle Avoidance stack.
- Worked on a State Machine (Boost SML) based machine safety stack.
- Recently created a Delayed Marginalization Visual Inertial Odometry stack.
- Started working on a Model Predictive Control (MPC) based local planner.
- Entire stack written in C++20 and Python.

INTERNSHIPS

Örebro University
Undergraduate Research

- Worked on a semi-humanoid robot - Pepper Robot by Soft Bank Robotics (Aldeberan Robotics).

· Created a Telepresence setup on the Semi-Humanoid robot.

· Created two way audio and video communication channel using the robot's tablet and camera.

· Created a tele-control setup of the robot.

· Used OpenCV, Choregraphe, GStreamer, Flask, ROS and QtCreator for the project.

Pulsars Pvt. Ltd.

Summer Project

· Created a Self Balancing Robot using Arduino microcontroller.

· Learned to collect data and calibrate accelerometer and gyroscope to make the robot stand.

· Created a rigid, working circuit board and learnt the delicate works involved: soldering components and wires