AMRO AL-BAALI

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EXPERIENCE

Software Engineer - Localization and mapping **Pickle Robot**
02/2024 – Present Cambridge, MA

Leading the effort on state estimation, localization, and mapping for a robot equipped with cameras and 2D LIDARS. The primary tools used in this job are **ROS**, **Python**, VIO, state estimation.

Software Developer - Robotics Team **Vention**
05/2023 – 02/2024 Montreal, Canada

Developed and tested the robot API that allows clients to write custom software that controls the robot operation, both in simulation and on the physical robot. The primary tools used in this job are **ROS**, **C++**, **Python**, **JavaScript**, and **Docker**.

Software Developer - Localization and Mapping **Avidbots**
09/2021 – 03/2023 Kitchener, Canada

Developed and tested calibration, localization, and mapping algorithms for a robot equipped with a 2D LIDAR and a monocular camera. The primary tools used in this job are **ROS**, **C++**, **Python**, **OpenCV**, and nonlinear least squares (e.g., **Ceres**). The algorithms were tested in simulation and on robots, both in-house and on clients' robots.

Graduate Student - SLAM **DECAR group (McGill University)**
05/2019 – 08/2021 Montreal, Canada

Collaborated with Voyis and Sonardyne to develop a SLAM back-end algorithm for an AUV equipped with a third-party INS treated as a black box and the Voyis Insight Pro high-precision laser scanner. The primary tools used in the project are: Lie groups, state estimation, optimization (convex, on-manifold), **MATLAB**, and **C++**.

Mechanical Engineering Intern **MY01**
05/2018 – 04/2019 Montreal, Canada

Designed and executed mechanical tests on the MY01 device to pass the medical certification. This included programming the testing platform using **Python**, which involved designing a GUI for the user. Furthermore, I also customized the CAD storage tool Autodesk Vault using **C#** to generate reports in MY01's standards.

EDUCATION

M. Eng Mechanical **McGill University**
05/2019 - 08/2021

- CGPA: 3.77/4.00. Supervisor: Prof. J. R. Forbes.
- Thesis title: *Augmenting Sensor Measurements with INS Estimates in a Graph Based SLAM Problem*.
- Publication: A. Al-Baali, T. Hitchcox and J. R. Forbes, "Combining DVL-INS and Laser-Based Loop Closures in a Batch Estimation Framework for Underwater Positioning," in *IEEE Journal of Oceanic Engineering*, doi: 10.1109/JOE.2023.3286854.

B. Eng Honours Mechanical, Minor in Computer Science **McGill University**
09/2014 - 04/2019

- CGPA: 3.83/4.00. Supervisor: Prof. J. R. Forbes.
- Thesis title: *Parallel Feedforward Control Using Linear Matrix Inequalities*.

AWARDS

- Best Seminar Award 2021
- MEUSMA Award, 2019
- NSERC-USRA Award, 2019
- McGill SURE award, 2017
- Habib Abou-Fayssal Prize, 2018
- Dean's Honour List, 2015, 2018
- Rio Tinto-Evans Exchange Award, 2018

SKILLS

Theory

Linear Algebra
Numerical Optimization
Probability
SLAM
State Estimation
Kalman filtering
Particle filtering
Factor graphs
Computer Vision
Multiview Geometry
Matrix Lie Groups
Control Systems

Programming

C++
Python
Julia
Bash
MATLAB
LaTeX

Software

Linux
ROS
ROS 2
Eigen
Ceres
GTSAM
OpenCV
Docker

LANGUAGES

English
Arabic