

# AMRO AL-BAALI

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## 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*.

## EXPERIENCE

### Software Developer - Robotics Team Vention

05/2023 - Present Montreal, Canada

Mainly responsible for developing and supporting the robot API that allows clients to write custom software that controls the robot operation, both in simulation and on the real 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 maintained the calibration, localization, and mapping algorithms for a robot equipped with a 2D LIDAR and a camera such that it is well localized within a pre-defined map. The primary tools used in this job are ROS, C++, Python, OpenCV, and nonlinear least squares (mainly using Ceres).

### 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.

### Teaching Assistant McGill University

09/2017 - 04/2021 Montreal, Canada

- MECH 513 (Control Systems) (Winter 2021)
- MECH 309 (Numerical Methods) (Fall 2019)
- MECH 412 (System Dynamics and Control) (Fall 2017)

## 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  
L<sup>A</sup>T<sub>E</sub>X



### Software

Linux  
ROS  
ROS 2  
Eigen  
Ceres  
GTSAM  
OpenCV  
Docker



## LANGUAGES

English  
Arabic

