Ismail Ouazzani

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Education

University of Toronto September 2020 – May 2025
Engineering Science, Major in Robotics Engineering *Toronto, Canada*

Experience

Research Intern May 2022 – Aug 2022
MIST Lab *Montreal, Canada*

- Contributed to the development of an open-source drone for swarm robotics experiments
- Developed code on Linux embedded platform (Raspberry Pi) to integrate range sensors for obstacle detection
- Designed & 3D-printed structural components to accommodate a 45% increase in the drone's weight
- Independently designed a screw support that reduces the time required for mounting a motor on the drone by 70%
- Enhanced drone's stability in challenging environments by mechanically integrating an Intel RealSense camera
- Documented contributions and improved the troubleshooting guide on the open-source Github repository

Projects

Chess AI | *PyTorch, Numpy, Leadership, Communication* Feb 2023 – Apr 2023

- Led a team of 4 students to build an AI capable of playing the chess varient Atomic Chess
- Designed and trained a heuristic function using convolutional neural networks to estimate the value of a move
- Researched state-of-the-art approaches to chess heuristics by reviewing papers on deep learning applied to chess
- Used cloud GPUs to train the model, resulting in a 5-fold acceleration of the training and validation processes
- Developed and automated data processing to efficiently preprocess a dataset of 3,000,000 datapoints

Balancing Robot | *C++, Dynamics, Arduino* Feb 2023 – Apr 2023

- Collaborated with 4 classmates to build a 3-wheeled robot that can balance on a basketball
- Obtained and used motion & velocity input equations by doing a litterature review on balancing robots
- Implemented a Proportional controller in C++ to maintain stability of the robot

Parallel Hyperpameter Tuning | *Python, Autograd, NumPy* March 2023

- Built a neural network from scratch and trained it with my implementation of stochastic gradient descent
- Utilized the Autograd package to simplify backward propagation and facilitate implementation of more layers
- Experimented with multiprocessing to train models in parallel during hyperparameter grid search

Mail Delivery Robot | *Linux, ROS, Localization, Controls, State estimation* Sep 2022 – Dec 2022

- Developed the state estimation and control algorithms of a ground robot for a mail delivery task
- Implemented a Particle Filter to track the robot's position after starting from a random location
- Achieved smooth line following by programming and tuning a PID controller
- Improved localization of the robot by fusing LiDAR and odometry measurements using a Kalman Filter

Study Planner | *Python, Google Calendar* Apr 2022 – June 2022

- Automated my studying schedule using Python, which improved both my motivation and time-management
- Built a customizable cost-function to distribute practice and consider my preferences such as work hours
- Interfaced the solution with the Google Calendar API to prevent conflicts with my other activities

Skills

Programming: Python, C, MATLAB, Bash, Assembly
Tools: Git, Linux, Docker, Simulink, ROS (Robot Operating System), Fusion360, Autodesk Eagle
Equipment: Soldering, Machine shop power tools, Oscilloscope, Function Generator
Libraries: PyTorch, NumPy, Pandas, Matplotlib, Sklearn
Languages: English (Fluent), French (Native), Spanish (Intermediate), Arabic (Beginner)

Interests: Salsa dancing, Surfing, Kung Fu, Muay Thai, Guitare