Antoine Dangeard

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Education

McGill University — Montreal, CA
B.Eng. in Software Engineering, GPA 3.85/4.0 — *Expected, May 2025*

- Participated in 2.5 years of undergraduate research under the guidance of Prof. Joseph Vybihal, Prof. Jackie Cheung, and Prof. Isabeau Prémont-Schwarz.
- Capstone project: Development of a Humanoid Robot with IMU-based Dynamic Motion Planning

Lycée International Georges Duby — Aix-en-Provence, FR
Scientific Baccalaureate with IB Option, 16/20 — *June 2020*

- Concentration in Computer Science

Research Experience

McGill N.L.P. Lab — Montreal, CA
Advisors: Prof. Jackie Cheung, Ines Arous, Ph.D

- *May 2024 - Present*: Working directly with Ines Arous on the continuation of the TaxoComplete (Self-Supervised Taxonomy Completion) paper. Optimized taxonomy evaluation script to run about 20x faster. Responsible for analysis of related works to find potential improvements and/or other research directions. Work ongoing.

Neuro AI — Montreal, CA
Advisor: Isabeau Prémont-Schwarz

- *August 2024 - Present*: Research project focusing on the development of an enhanced version of the previous AnimalAI Environment, targeting the NeurIPS conference. Along with one other undergraduate student, responsible for implementing baseline RL algorithms in custom environment, optimizing simulation for faster training times, and writing research paper summarizing our efforts.

Prometheus Lab — Montreal, CA
Advisor: Joseph Vybihal

- *January 2024 - Present*: Led humanoid robot research project in lab. Implemented ROS infrastructure and simulation environments, trained deep learning policy for locomotion, implemented analytical control policy using inverse dynamics, and explored research directions using the humanoid as a research platform.
- *May 2024 - Present*: Formulated independent research project on domain knowledge-based pre-training for reinforcement learning control policies. After reviewing prior work, I proposed the project to Prof. Vybihal and am currently implementing and evaluating the algorithm. Work is ongoing.
- *September - December 2023*: Re-designed and implemented server infrastructure for multi-agent inter-robot communication and control. Reduced number of lines of code in the server from 5000+ to less than 300 whilst preserving functionality and improving maintainability and compatibility with robot hardware.

- *May - September 2023*: Technical lead for multi-agent robotic delivery project. Obtained $7500 TechAccel Summer Stipend from McGill Engine and implemented control, mapping, and planning ROS packages for vehicle from scratch.

Research Interest

My research interests broadly encompass:

- Motion planning for under-actuated robots in uncertain environments.
- Computer vision for state estimation and scene understanding in autonomous agents.
- Multi-robot coordination.

Overall, I enjoy exploring analytical or machine learning techniques to solve complex problems in robotics.

Awards

Tomlinson Engagement Award for Mentoring for my role as a mentor in MECH 360 (Principles of Manufacturing)

TechAccel Summer Undergraduate Stipend Award ($7500) for my leadership in a multi-agent robotic delivery system developed in Summer 2023. The award was granted to our project for its technological innovation and strong business case.

Advising Experience

Prometheus Lab – Humanoid *September 2024 - Present*

- Overseeing an undergraduate student tasked with continuing previous efforts implementing SLAM on the humanoid robot for state estimation. Providing technical support as well as guiding effort. Depending on preliminary results, project might be expanded to include basic computer vision for scene understanding and/or autonomous decision-making framework.

Prometheus Lab – Multi-Agent Server *December 2023 - Present*

- Serving as advisor for all students with questions or concerns with the multi-agent server for inter-robot communication. Regularly met with students to explain the architecture of the system, help with debugging, etc.

Prometheus Lab – Humanoid *May - August 2024*

- Overseeing an undergraduate student for the implementation of SLAM on the humanoid robot. Helping student understand theoretical concepts, and validating and integrating work into the humanoid software and hardware.

Neuro AI – Testbench for Animal Cognition *May - September 2024*

- Provided guidance and technical advice for an undergraduate research project; the development of an enhanced version of the previous AnimalAI Environment. Regularly met with the student implementing the research effort to answer questions and help with problems encountered during implementation.

MECH 360 – Principles of Manufacturing *September - December 2023*

- Assisted students with the printing and viability assessment of part designs for a course assignment. Provided through the EUS Cube 3D printing service.

Industry Experience

H.i.L. Software Engineer Intern Montreal, CA

Torc Robotics *May - August 2024*

- Researched, designed and implemented data injection infrastructure for HiL (Hardware-in-the-loop) test benches. Design supported manual and automatic (CI/CD) testing of ROS components with MCAPs.
- Created ROS2 MCAP replay and recording tool from scratch in C++ with

Python bindings. Enabled developers to replay and record any ROS2 messages without requiring prior knowledge of custom ROS message types.
- Simplified testing procedure from requiring custom ROS2 builds and about 15-20 commands to a single docker container and under 5 commands.

Robotics Intern Montreal, CA
Vention *May - August 2023*
- Optimized joint speed limiting method for Cartesian linear movements of 6-D.O.F. robotic arms, resulting in increased maximum speed of linear movements and improved U.X. Decreased cycle time for pick-and-place tasks by about 20%.
- Added CAD U.I. to view and modify end-of-arm tool offsets and implemented self-collision checking for end-of-arm tools.
- Built connection status detection and corresponding UI for UR arms.

Publications

[ACCEPTED] **Neuro AI Testbench for Animal Cognition** NeurIPS OWA Workshop
[NAME TBD] **TaxoComplete Follow-up Study** Ongoing, Targeting ACM
[TBD] **Heuristic Pre-Training for Control Policy Reinforcement Learning** Ongoing

Skills

Languages: Fluent in English and French
Programming: Python, C++/C, Bash, Javascript, Java, C#, Lua
Frameworks: ROS (1 & 2), Pandas/NumPy, CUDA, PyTorch, TensorFlow, Unix, HTTP/TCP/UDP/DDS Networking Protocols, React.js, Node.js
Developer Tools: Colab/Jupyter, Docker, Git/GitHub/GitLab, AWS, Slurm

References

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