Will Thibault

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Education

- **PhD, Mechatronics Engineering (Expected Graduation: Aug 2026)** Sept 2022 to Present
  University of Waterloo, 3rd Year, 93% GPA
  - Research on humanoid whole-body motion generation and control using reinforcement learning, transformer and model predictive control approaches with the REEM-C and TALOS humanoid robots
  - Courses include: Cognition-enabled Robot Manipulation (EASE Fall School 2022 – University of Bremen, Germany), Reinforcement Learning, Optimal and Learning-based Control, Deep Learning
- **MASc, Mechatronics Engineering** Sept 2020 to Aug 2022
  University of Waterloo, 93% GPA
  - Research on whole-body manipulation and loco-manipulation with the REEM-C humanoid robot
  - Courses include: Statistical Learning – Classification, Human Movement Neuromechanics, Modelling/Simulation/Optimization in Robotics and Biomechanics, Humanoid Robotics
- **BASc, Mechatronics Engineering** Sept 2015 to April 2020
  University of Waterloo, Degree Honours: With Distinction and Dean's Honours List, 90% GPA
  - Projects include: drone battery swapping station (Capstone), magnetic wall-climbing robot
  - Courses include: Robot Manipulators- Kinematics/Dynamics/Control, Autonomous Mobile Robots, Multi-sensor Data Fusion, Digital Control Applications

Research and Publications

- **Research Assistant in Humanoid Robotics** Apr 2020 to Present
  University of Waterloo, HCRMI
  - Developing loco-manipulation motions with REEM-C using reinforcement learning techniques
  - Created whole-body bimanual motions for REEM-C manipulating objects using an extended manipulability-stability metric for improved manipulation abilities
- **RoboHub Specialist in Humanoid Robotics** Apr 2024 to Present
  University of Waterloo, RoboHub
  - Developing humanoid robot motion generation and control tools to enable research on humanoids
  - Supporting research and development on the TALOS humanoid robot
- **Publications**

[1] **W. Thibault**, V. Rajendran, W. Melek and K. Mombaur. Learning Skateboarding for Humanoid Robots through Massively Parallel Reinforcement Learning. *40th Anniversary of the IEEE International Conference on Robotics and Automation (ICRA@40),* 2024.

[2] **W. Thibault**, W. Melek, and K. Mombaur. Learning Velocity-based Humanoid Locomotion: Massively Parallel Learning with Brax and MJX. *International Conference on Climbing and Walking Robots and the Support Technologies for Mobile Machines (CLAWAR 2024),* 2024.

[3] **W. Thibault**, F. J. Andrade Chavez, and K. Mombaur. "A standardized benchmark for humanoid whole-body manipulation and loco-manipulation," Poster presented at EUROBENCH Summit, Jun 21-22, 2022, Madrid, Spain.

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[4] **W. Thibault**, F. J. Andrade Chavez, and K. Mombaur. A standardized benchmark for humanoid whole-body manipulation. *IEEE-RAS International Conference on Humanoid Robots,* 2022.

[5] **W. Thibault**, V. Rajendran and K. Mombaur. Bimanual Manipulation Workspace Analysis of Humanoid Robots with Object Specific Coupling Constraints. *IEEE-RAS International Conference on Humanoid Robots,* 2022.

Work Experience

- **Software Engineer Intern (Motion Control and Planning Team)** May 2023 to Aug 2023
  Apptronik Inc
  - Created distributed reinforcement learning framework for development of bimanual manipulation and locomotion for humanoid robots for parallelization on Oracle Cloud Infrastructure resources
  - Developed bimanual pick and place motions for box manipulation using off-policy reinforcement learning techniques including a Hindsight Experience Replay buffer and offline pre-training
- **Hardware and Systems Developer Co-op (RF)** Jan 2019 to Aug 2019
  ON Semiconductor (Medical, Wireless and Signal Processing)
  - Developed automated RF measurement and reporting system in Python to characterize up to 12 Bluetooth Low Energy (BLE) devices and generate performance reports for device certification
  - Measured BLE device and antenna characteristics using equipment including radio communication tester (CMW 500), spectrum analyzer, vector, network analyzer, over-the-air anechoic chamber
- **RF Propagation Testing System Developer Co-op** May 2018 to Aug 2018
  University of Waterloo, EmRG
  - Designed modular antenna positioning system with OnShape 3D CAD software to tilt and rotate a 256-element array in an anechoic chamber for 5G communication radio frequency propagation experiments
  - Developed software for the antenna positioning system's stepper motors to calibrate, monitor and control the antenna position via MATLAB using an Arduino microcontroller and a custom C++ library
- **Control Systems Software Design Co-op (Life Sciences)** Sept 2017 to Dec 2017
  ATS Automation Tooling Systems Inc
  - Developed web plug-in for ATS OEE Toolkit to control and monitor product flow using autonomous intelligent vehicles that transport carts of material during assembly stages to increase production rates
  - Created user-friendly interface for web plug-in using AngularJS and Bootstrap to execute operator procedures and display real-time data from SQL Server database with ASP.NET MVC C# server
- **Control Systems Design Co-op** Jan 2017 to Apr 2017
  Powerhouse Controls Ltd
  - Updated PLC control schematics with new I/O cards in AutoCAD for Rockwell PLC retrofit
  - Upgraded PLC and HMI programs with Rockwell Studio5000 and FactoryTalk to double product yield
- **Engineering CAD Systems Co-op** May 2016 to Aug 2016
  Skyjack Inc
  - Repaired over 9000 SolidWorks assemblies' references while leading 7 coworkers and recording errors
  - Provided training and instructional documents to improve the team's efficiency in repairing references

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Technical Skills

- **Engineering Hardware**
  - Robots: REEM-C and TALOS (humanoid robots by PAL Robotics), TurtleBot
  - Motion Capture: Vicon Vantage, Bertec Force Plates, Delsys EMG, Xsens suit
  - Measurement Tools: Oscilloscope, Multimeter, Spectrum Analyzer, Vector Network Analyzer, CMW
- **Engineering Software and Programs**
  - Coding Languages: C++, Python, MATLAB, C
  - Robotics: ROS, Gazebo, RViz, OCS2, Pinocchio, MoveIt!, OpenSoT, EXOTica
  - Reinforcement Learning: MuJoCo, MJX, JAX, PyTorch, Stable Baselines3, RLlib, Gymnasium
  - General: Ubuntu (Linux), Docker, Git
  - Motion Capture: Vicon Nexus
  - CAD: SolidWorks, OnShape

Awards and Scholarships

- **NSERC Postgraduate Scholarship – Doctoral (national) - $40,000/year** Sept 2023 to Aug 2026
  Awarded to top graduate students based on academic excellence, research potential and leadership
- **President's Graduate Scholarship (institutional) - $10,000/year** Sept 2023 to Aug 2026
  Awarded to top graduate students who hold major national or provincial awards (ex. NSERC)
- **Dean's Entrance Award (institutional) - $5,000** Sept 2020, Sept 2022
  Awarded to top graduate students based on academic excellence (85%+ average)
- **Engineering Excellence Master's Fellowship (institutional) - $25,000/year** Sept 2020 to Aug 2022
  Awarded to top MASc students based on academic excellence and research potential
- **Graduate Studies Conference Assistantship - $500** Jun 2022
  Awarded to support travel for conferences related to research
- **President's Scholarship of Distinction (institutional) - $5,000** Sept 2015
  Awarded to top undergraduate students based on academic excellence (95%+ average)
- **Waterloo County Entrance Scholarship (institutional) - $4,000** Sept 2015
  Awarded to top undergraduate students from Waterloo Region based on academic excellence

Teaching Experience and Extra-curricular Activities

- **Teaching Assistant (TA)** Sept 2022 to Apr 2024
  University of Waterloo, Department of Mechanical and Mechatronics Engineering
  - Communicated key information and deadlines to students through emails and class announcements
  - Led tutorial sessions by presenting and solving problems for large classes of students
  - Developed and graded course related assessments and supervised lab sessions
- **Humanoid Robotics Youth Outreach** Aug 2022
  University of Waterloo, HCRMI
  - Provided presentation on humanoid robotics to students (grades 5-12)
  - Demonstrated capabilities of REEM-C humanoid robot including face recognition, grasping and walking

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- **Academic Representative** Sept 2015 to Apr 2020

  University of Waterloo, Mechatronics Engineering 8-stream, Class of 2020

  - Communicated with faculty on behalf of class during student faculty meetings
  - Organized class surveys and administered course critiques

- **UW Robotics Project Lead** May 2017 to Feb 2018

  University of Waterloo, UW Robotics Mars Rover, Mechanical Team

  - Designed, machined, and assembled 3 axis robotic arm in SolidWorks for manipulation tasks
  - Managed team members for the machining and assembly phase of the arm

- **Engineering Ambassador** Sept 2016 to Aug 2017

  University of Waterloo, Engineering Student Ambassador Team

  - Led groups of up to 20 people on tours of Waterloo engineering buildings
  - Hosted high school students on Mechatronics engineering shadow days