Will Thibault

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Education

- **PhD, Mechatronics Engineering (Expected Graduation: Aug 2026)**
  University of Waterloo, 1st Year
  - Research on humanoid whole-body motion generation and control using combined model-based and model-free 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
- **MASc, Mechatronics Engineering** Sept 2020 to Aug 2022
  University of Waterloo, 93.25% 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
  - Designed standing during manipulation and pick and carry testbeds and performance indicators to benchmark humanoid robot whole-body manipulation and loco-manipulation for EUROBENCH project
  - Developed whole-body manipulation and loco-manipulation motions with REEM-C (ROS based) on robot and in simulation using MoveIt!, OpenCV, optimal control and Stack of Tasks techniques
  - Performed bimanual workspace analysis for REEM-C and TALOS manipulating objects to inform motion planning based on extended manipulablilty and dynamic stability metrics
  - Analyzed human motion capture with Vicon for object manipulation motions
- **Publications**

[1] William Thibault, Francisco Javier Andrade Chavez, and Katja Mombaur. "A standardized benchmark for humanoid whole-body manipulation and loco-manipulation," Poster presented at EUROBENCH Summit, Jun 21-22, 2022, Madrid, Spain.

[2] William Thibault, Francisco Javier Andrade Chavez, and Katja Mombaur. A standardized benchmark for humanoid whole-body manipulation. *Under Review*, 2022.

[3] William Thibault, Vidyasagar Rajendran and Katja Mombaur. Bimanual Manipulation Workspace Analysis. *Under Review*, 2022.

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Work Experience

- **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
  UWaterloo, 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 over 200 pages of PLC control schematics with new analog and digital I/O cards in AutoCAD for Rockwell PLC retrofit while improving organization and clarity
  - 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

Technical Skills

- **Engineering Software and Programs**
  - Coding Languages: C++, Python, MATLAB, C
  - Robotics: ROS, Gazebo, RViz, MoveIt! (motion planning), OpenSoT (stack of tasks), EXOTica (motion planning), RBDL (Rigid Body Dynamics Library), ROS ArUco Marker Detection (OpenCV based)
  - General: Ubuntu (Linux), Docker, Git
  - Motion Capture: Vicon Nexus
  - CAD: SolidWorks, OnShape
  - Other: MUSCOD (MUltiple Shooting CODe for Optimal Control), TensorFlow, Scikit-learn

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- **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

Awards and Scholarships

- **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

Extra-curricular Activities

- **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
- **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
  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