Kevin Ta

Robotics · Mechatronics Engineer

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Education

ETH Zürich (Swiss Federal Institute of Technology) — *Zürich, Switzerland*

M.Sc. in Robotics, Systems, and Control — *Sep. 2020 - Dec. 2022*

- GPA: 5.73 / 6.0

UBC (University of British Columbia) — *Vancouver, Canada*

B.A.Sc. in Mechanical Engineering, Mechatronics Specialization — *Sep. 2014 - May 2020*

- GPA: 3.97 / 4.0

Skills

Programming	Python, Rust, C, C++, C#, MATLAB, LaTeX, ROS
Computer Vision	calibration, SLAM, deep learning, 3D reconstruction, semantics & object detection
Robotics	controls, reinforcement learning, kinematics/dynamics, dynamic programming & optimization
Sensors	mechanical lidars, radars, ToF cameras, LWIR (thermal) cameras, event cameras, RGB cameras
Mechatronics	SolidWorks, CAD, systems modelling, solid mechanics, thermal modelling, electromechanical systems

Publications

K. Ta, E. Sandström, L. Van Gool, and M. R. Oswald, "UncLe-SLAM: Uncertainty Learning for Dense Neural SLAM," IEEE/CVF International Conference on Computer Vision Workshops (ICCVW), Paris, France, 2023.

K. Ta, D. Brueggemann, T. Brödermann, C. Sakaridis, and L. Van Gool, "L2E: Lasers to Events for 6-DoF Extrinsic Calibration of Lidars and Event Cameras," IEEE International Conference on Robotics and Automation (ICRA), London, United Kingdom, 2023.

J. Y. Bo, K. Ta, R. Nishida, G. Yeh, V. W. L. Tsang, M. Bolton, M. Ranger and K. Walus, "ATTENTIV: Instrumented Peripheral Catheter for the Detection of Catheter Dislodgement in IV Infiltration," International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Glasgow, Scotland, 2022.

M. Khalili, K. Ta, J. F. Borisoff and H. F. M. Van der Loos, "Offline and Real-Time Implementation of a Terrain Classification Pipeline for Pushrim-Activated Power-Assisted Wheelchairs," International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Guadalajara, Mexico, 2021.

M. Khalili, K. Ta, J. F. Borisoff and H. F. M. Van der Loos, "Offline and Real-Time Implementation of a Personalized Wheelchair User Intention Detection Pipeline: A Case Study," IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), Vancouver, Canada, 2021.

M. Khalili, K. T. McConkey, K. Ta, L. C. Wu, H. F. M. Van der Loos and J. F. Borisoff, "Development of A Learning-Based Terrain Classification Framework for Pushrim-Activated Power-Assisted Wheelchairs," International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Montreal, Canada, 2020.

Research

ETH Zürich Computer Vision Lab — *Zürich, Switzerland*

Master Thesis — *May 2022 - Nov. 2022*

- Developed methods for implicitly learning sensor-agnostic uncertainty from noisy depth maps to improve online neural implicit scene reconstruction and localization (SLAM).
- Fused multiple sensor observations by learning the implicit weighting from the learned uncertainty to improve neural scene reconstruction.

Semester Thesis — *Mar. 2022 - May 2022*

- Fully calibrated a perception sensor stack featuring featuring a state-of-the-art event-based camera, a traditional frame-based camera, a MEMS LiDAR, and a spinning RADAR using mutual information frameworks.
- Established direct lidar laser correspondences in bias-tuned event cameras to perform temporally-decoupled 6-DoF calibration using accumulated event activity without motion-based reconstruction.
- Enabled the collection a novel autonomous driving dataset focused on new sensing modalities for adverse conditions.

ETH Zürich Neural Control of Movement Lab — *Zürich, Switzerland*

Research Assistant — *Oct. 2020 - Jul. 2021*

- Prototyped a VR headset environment for mental performance training using pupil-based neural feedback.
- Implemented a real-time computer vision pipeline to estimate pupil size from RGB and infrared images using RANSAC-based feature extraction and ellipse fitting, achieving pupil size fits within one pixel standard deviation.

UBC Collaborative Advanced Robotics and Intelligent Systems Lab

Vancouver, Canada

Mechatronics Research Assistant — *May 2019 - Aug. 2019*

- Developed individualized ML pipelines for terrain classification and user intention detection to inform more intuitive co-control schemes using power-assisted wheelchairs, reducing user load in adverse terrain.
- Implemented sensor data acquisition algorithms for sampling linear and rotational states in real-time.
- Estimated absolute heading and terrain slope with a 9-axis IMU through Kalman filter sensor fusion and systems modelling.
- Built up sensor hardware/software for TCP/IP and Bluetooth connections with Python and C++ for kinematic data streaming at 300 Hz.

Centre for Hip Health and Mobility

Vancouver, Canada

Research Assistant — *May 2016 - Aug. 2016*

- Collected dynamic data with accelerometers in high impulse linear impact testing to determine optimal helmet padding material and configurations for preventing head trauma.
- Investigated statistical trends for x-ray machinery to determine long-term consistency for bone mass density studies.

Experience

Waabi

Toronto, Canada

Onboard Systems and Calibration | Software Developer — *Jan. 2023 - Present*

- Built out sensor extrinsic and intrinsic calibration pipelines for autonomous grade perception, evaluating accuracy at both calibration time and mission time.
- Improved quality of lidar-based sensor data for downstream perception and prediction with considerations for latency and usability.

Cruise

San Francisco, California

Calibration Hardware | Internship — *Sep. 2021 - Feb. 2022*

- Developed high accuracy calibration and signal processing for next-generation perception sensors on the Cruise Origin, a re-imagined and purpose-built autonomous vehicle platform.
- Corrected intrinsic calibrations for visible cameras, long-wave IR cameras, and indirect time-of-flight cameras to accurately address geometric distortions and reduce projective geometry errors by a factor of 10 at vendor calibration stations.
- Researched and built software tools to analyze impact of calibration errors, developing calibration verification strategies to mitigate effects on perception by limiting errors to within one pixel space.

Schneider Electric Solar

Burnaby, Canada

Solar Predictive Analytics and Modelling | Internship — *Jan. 2018 - Aug. 2018*

- Implemented ML-based anomaly detection algorithms in Python to analyze daily data logs from globally situated utility-scale inverters in a predictive reliability model, informing effective preventative maintenance on deployed utility-scale solar inverters.
- Developed a geo-spatial thermal model with probabilistic component failure to estimate installation site reliability through Monte Carlo simulations, providing baseline cost estimates for installations and service plans globally.
- Designed and fabricated modifications to airflow, insulation, and coolant systems to increase thermal stresses on the system for accelerated-life stress testing.
- Conducted thermal load tests and automated data collection of thermal and electrical inverter characteristics on durability units, informing key aspects of real-world expected failures.

Pacey MedTech

Vancouver, Canada

Mechanical Engineering | Internship — *May 2017 - Aug. 2017*

- Designed a novel urinary continence device through rapid prototyping, clinical trials, and low-quantity production to meet accelerated 3-month product development deadline.
- Created and maintained documentation and manufacturing drawings to comply with “Class 1” medical device regulations as per Health Canada and the Food and Drug Administration (FDA) using ISO 9001.

Smith + Andersen

Burnaby, Canada

Mechanical Engineering | Junior Designer — *Sep. 2016 - Dec. 2016*

- Reviewed various HVAC and plumbing standards including ASHRAE, National Building Code of Canada, BC Building Code, and Vancouver bylaws to affirm designs were sufficient in providing comfort and air quality.
- Specced electrical and mechanical HVAC equipment requirements to suppliers and on-site contractors to optimize thermal performance and building systems efficiency.
- Calculated heating, cooling, and ventilation loads based on building location, room usage, and building design.
- Collaborated with architects, contractors, and other consultants to comply with building design codes and to achieve sustainability targets.

Teaching

UBC Department of Mechanical Engineering

Vancouver, Canada

Teaching Assistant — *Jan. 2019 - Apr. 2020*

- Instructed, evaluated, and provided feedback to second year students through thermodynamic and fluid dynamic lab experiments to demonstrate core mechanical engineering topics.
- Delivered lab lectures to go over mathematical concepts and key intuitions explored in lab experiments, ensuring students understood which mechanical phenomena to note in their analyses.

Extracurricular Activity

UBC Supermileage

Vancouver, Canada

Team Captain — *Sep. 2019 - Aug. 2020*

- Achieved 2nd place at the Shell Eco-Marathon Americas and 2nd place at the SAE Supermileage Competition in 2019, requiring adaptable engineering and troubleshooting in high pressure competition environments.
- Coordinated 65 students in the technical development of two ultra-efficient vehicles driven by an internal combustion engine (ICE) and a battery electric motor in the Prototype and Urban Concept vehicle classes respectively.
- Managed a $100,000 project budget and engineering resources to construct technical road maps for building and optimizing two ultra-efficient vehicles.
- Constructed detailed development reports involving performance simulation and component optimization to showcase sound engineering and design judgement.
- Optimized for aerodynamic design resulting in 14% less drag force and for component topology resulting in 10% less component weight to increase energy efficiency of the ICE Prototype vehicle to a decade-high mileage of 2229 MPG.

Vehicle Mechanics Lead — *Sep. 2018 - Aug. 2019*

Safety Officer — *Sep. 2017 - Aug. 2018*

Aerodynamics Lead — *Sep. 2016 - Aug. 2018*

General Member — *Sep. 2015 - Aug. 2016*

Attentiv Medical

Vancouver, Canada

Project Founder & Contributor — *Sep. 2019 - Aug. 2020*

- Explored the problem of IV infiltration in vulnerable neonatal populations through extensive interviews with clinicians, regulators, and entrepreneurs to create a technically and commercially feasible user-focused design.
- Conceptualized and prototyped a sensor-embedded catheter to detect the onset of IV infiltration, validated using a variety of simulated biological and phantom models.

Honors & Awards

Competitions

2021	**Principal Award**, MDDC Biomedical Engineering Design Competition	*Vancouver, Canada*
2020	**National Winner**, James Dyson Award	*Canada*
2020	**Winner**, Microsoft Discover AI - Healthcare Stream	*Montreal, Canada*
2020	**Runner-up**, Innovation OnBoard, UBC's Premier Start-up Competition	*Vancouver, Canada*
2020	**Faculty Award**, UBC New Venture Design Showcase	*Vancouver, Canada*
2020	**Industry Award**, UBC New Venture Design Showcase	*Vancouver, Canada*
2020	**4th Place**, SAE Supermileage	*Virtual*
2019	**2nd Place**, SAE Supermileage	*Marshall, Michigan*
2018	**3rd Place**, SAE Supermileage	*Marshall, Michigan*
2017	**6th Place**, SAE Supermileage	*Marshall, Michigan*
2018	**Design Excellence Award**, SAE Supermileage	*Marshall, Michigan*
2019	**2nd Place**, Shell Eco-Marathon Americas - ICE Prototype	*Sonoma, California*
2018	**7th Place**, Shell Eco-Marathon Americas - ICE Prototype	*Sonoma, California*
2017	**20th Place**, Shell Eco-Marathon Americas - ICE Prototype	*Detroit, Michigan*

Academic Awards

2021	**Finalist**, International Conference on Robot & Human Interactive Communication Best Student Paper	*Virtual*
2020	**Mechanical Engineering Leadership Award**, UBC Department of Mechanical Engineering	*Vancouver, Canada*
2019	**Academic Achievement Award**, UBC Department of Mechanical Engineering	*Vancouver, Canada*
2018	**Trek Excellence Scholarship**, University of British Columbia	*Vancouver, Canada*
2018	**Donald J. Evans Scholarship in Engineering**, UBC Faculty of Applied Science	*Vancouver, Canada*
2018	**University of British Columbia Scholarship**, University of British Columbia	*Vancouver, Canada*
2017	**S. Cyril Maplethorp Memorial Scholarship in Engineering**, UBC Faculty of Applied Science	*Vancouver, Canada*
2016	**Talisman Energy Scholarship in Mechanical Engineering**, UBC Department of Mechanical Engineering	*Vancouver, Canada*
2014	**British Columbia Government Scholarship (Top 20)**, Provincial Government of British Columbia	*Canada*
2014	**Post-Secondary Entrance Scholarship**, Engineers and Geoscientists of British Columbia	*Canada*