GUANXIONG CHEN

PH.D. STUDENT · COMPUTER SCIENCE

University of British Columbia

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Education

University of British Columbia *Vancouver, BC, Canada*
DOCTOR OF PHILOSOPHY IN COMPUTER SCIENCE *Sept. 2024 - Current*
- Research focus: AI-enhanced physical simulation
- Supervised by: Prof. David I.W. Levin, Prof. Dinesh K. Pai

University of British Columbia *Vancouver, BC, Canada*
MASTER OF SCIENCE IN COMPUTER SCIENCE *Sept. 2021 - May 2024*
- Research focus: biomechanical simulation
- Supervised by: Prof. Dinesh K. Pai
- GPA: 93%

University of British Columbia *Vancouver, BC, Canada*
BACHELOR OF APPLIED SCIENCE IN COMPUTER ENGINEERING *Sept. 2015 - May 2021*
- GPA: 89%

Publications

PUBLISHED

Wu, Z., Song, C., **Chen, G.**, Guo, S., & Huang, W. (2022). Completeness and Coherence Learning for Fast Arbitrary Style Transfer. *Transactions on Machine Learning Research.* OpenReview

G. Chen, H. Yang and I. M. Mitchell. (2022). ROS-X-Habitat: Bridging the ROS Ecosystem with Embodied AI. *19th Conference on Robots and Vision (CRV).* CRV

Kianzad, S., **Chen, G.**, & MacLean, K. E. (2021). PAL: A Framework for Physically Assisted Learning Through Design and Exploration With a Haptic Robot Buddy. *Frontiers in Robotics and AI*, 298. Frontiers

PREPRINTED

Chen, G., Suri S., Wu Y., Vouga E., Levin D., & Pai, D. (2025). Learning Simulatable Models of Cloth with Spatially-varying Constitutive Properties. *ArXiv.* ArXiv

THESES

Chen, G. (2024). Data-driven models of human body inertia. *Master's thesis dissertation, University of British Columbia.* UBC

Research Experience

Sensorimotor Systems Lab, University of British Columbia

CO-ADVISORS: PROF. DAVID I.W. LEVIN, PROF. DINESH K. PAI *Nov. 2023 - Current*
- Developed a framework that learns spatially-varying constitutive properties of cloth from motion data, using a differentiable simulator (NVIDIA Warp). Achieved higher reconstruction accuracy, shorter training time than prior work, and better immunity to membrane locking
- Poster "Learning Simulatable Models of Cloth with Spatially-varying Constitutive Properties for Robotics" accepted by *CoRL 2025 Learning to Simulate Robot Worlds Workshop*.

Sensorimotor Systems Lab, University of British Columbia

CO-ADVISORS: DR. BASTIAN WANDT, PROF. HELGE RHODIN, PROF. DINESH K. PAI   *Feb. 2022 - May 2024*

- Estimated joint-space inertia matrix of human lower body in motion, using differentiable simulation, from kinematic and dynamic data. Achieved better physical plausibility than inertia matrix construction in prior work
- Submitted to *Journal of Biomechanics* in July, 2025; under review

Lab of Computational Intelligence, University of British Columbia   ⋆ *Paper & Code*

ADVISOR: PROF. IAN MITCHELL   *May 2020 - Aug. 2021*

- Built "ROS-X-Habitat", a Python-based interface between AI Habitat and ROS, allowing 1) RL-based agents to access ROS' vast hardware and visualization support, 2) ROS-packaged planners to access photorealistic and physically-realistic Habitat Sim, without introducing excessive run-time delays
- Presented paper "ROS-X-Habitat: Bridging the ROS Ecosystem with Embodied AI" in *CRV 2022*

SPIN (Sensory, Perception and Interaction) Lab, University of British Columbia

CO-ADVISORS: DR. SOHEIL KIANZAD, PROF. KARON MACLEAN   *Sept. 2019 - July 2021*

- Contributed to paper "PAL: A Framework for Physically Assisted Learning through Design and Exploration with a Haptic Robot Buddy" (accepted by *Frontiers in Robotics and AI* in August 2021) — reviewed prior work, implemented Python module to allow users to define geometric primitives with a haptic pen

RESESS (Reliable, Secure, and Sustainable Software) Lab, University of British Columbia)

ADVISOR: PROF. JULIA RUBIN   *May 2019 - Aug. 2019*

- Preprocessed benign/malware apps, and extracted their features using DroidNative (a malware detection tool in C++)
- Analyzed performance issues of DroidNative — running time and RAM usage
- Wrote Python scripts to automatically deploy experiments inside VM clusters hosted on Linux servers

Coursework and Personal Projects

MP-Conjugate Gradient Solver for Cloth Simulation   ⋆ *Source*

COURSEWORK FOR MATH 607E: NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS   *Nov. 2021 - Dec. 2021*

- Implemented a cloth simulator in Python based on work by Baraff & Witkin 98'
- Implemented the Modified Preconditioned Conjugate Gradient Method for speeding up the simulation

Deep Learning-based Road Damage Detection System   📷 *Media*

COURSEWORK FOR CPEN 491: COMPUTER ENGINEERING CAPSTONE DESIGN   *Sept. 2020 - May 2021*

- Prepared a literature review on over 20 existing road damage detection techs, well-received by our client
- Established system specs based on limitations of existing techs and stakeholder needs
- Trained a novel CNN model on a remote cluster to classify and localize road damages from RGB images
- Analyzed the model's architecture with generalization theory to explain its performance

Simple Ray Tracer   ⋆ *Source*

COURSEWORK FOR CPSC 314: COMPUTER GRAPHICS   *Nov. 2020 - Dec. 2020*

- Modified the C++-implemented rendering engine by Peter Shirley in *Ray Tracing in One Weekend*
- Implemented geometries including triangles, cubes and torus
- Implemented ray-traced shadows and Blinn-Phong shading model

Simple Image Processing SoC

COURSEWORK FOR CPEN 311: DIGITAL SYSTEMS DESIGN   *Mar. 2018*

- Implemented independently an accelerator used for accelerating affine rotations of 2D images on a FPGA chip
- Built the system with EDA tools from basic blocks - a soft-core CPU, memories, and the accelerator
- Wrote code in C to evaluate the accelerator's speed-up

Awards, Fellowships, & Grants

President's Academic Excellence Initiative PhD Award

UNIVERSITY OF BRITISH COLUMBIA   *2024*

- The award "recognizes the significant contributions of PhD students to the research activities of the university".

The Faculty of Science PhD Tuition Award

FACULTY OF SCIENCE, UBC   *2024, 2025*

- Tuittion award offered to students "on the recommendation of Faculties or graduate programs in consultation with the Faculty of Graduate and Postdoctoral Studies".

NSERC Canada Graduate Scholarships – Master's program

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL   *2021*

- The award is given to Canadian Master's students who "demonstrate a high standard of achievement in undergraduate and early graduate studies."

NSERC Undergraduate Student Research Award

NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL   *2021, 2019*

- The award intends to develop Canadian students with outstanding academic backgrounds as potential researchers.

Jim and Helen Hill Memorial Service Award

DEPT. OF ELECTRICAL AND COMPUTER ENGINEERING, UBC   *2019*

- The award is given to students who demonstrated leadership through volunteerism.

Trek Excellence Scholarship

UNIVERSITY OF BRITISH COLUMBIA   *2017*

- The Scholarships are offered every year to students in the top 5% of their undergraduate year, faculty, and school.

Chancellor's Scholar Award

UNIVERSITY OF BRITISH COLUMBIA   *2015*

- Award for students who enter the UBC Vancouver campus with outstanding academic backgrounds.

Teaching Experience

Spring 2022/23/24	**CPSC 314: Computer Graphics**, Senior Teaching Assistant	*UBC*
Fall 2021/23	**CPSC 314: Computer Graphics**, Graduate Teaching Assistant II	*UBC*
Fall 2022	**CPSC 259: Data Struct. and Alg. for Elec. Engineers**, Graduate Teaching Assistant II	*UBC*
Fall 2020	**CPEN 331: Operating Systems**, Undergraduate Teaching Assistant	*UBC*
Fall 2018	**CPEN 311: Digital Systems Design**, Undergraduate Teaching Assistant	*UBC*

Outreach & Professional Development

SERVICE AND OUTREACH

2021/23	**UBC Enrolment Services / Alumni UBC**, Broad-based Admissions Alumni Reader
2016/17/21/22	**UBC Opening and Move-in Day**, Move-in Volunteer
2016	**UBC AMS Bike Kitchen Daily Maintenance**, Bike Repair Volunteer