GUANXIONG CHEN

M.Sc. Student · Computer Science

University of British Columbia

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Education

University of British Columbia *Vancouver, BC, Canada*

Master of Science in Computer Science *Sept. 2021 - May 2024 (expected)*

- Research focus: biomechanical simulation
- 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.* https://openreview.net/forum?id=4N6T6Rop6k

G. Chen, H. Yang and I. M. Mitchell, "ROS-X-Habitat: Bridging the ROS Ecosystem with Embodied AI," *2022 19th Conference on Robots and Vision (CRV)*, 2022, pp. 24-31, doi: 10.1109/CRV55824.2022.00012.

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.

Research Experience

Sensorimotor Systems Lab, University of British Columbia

Co-Advisors: Prof. Dinesh Pai, Prof. Helge Rhodin, Prof. Bastian Wandt *Feb. 2022 - Current*

- Attempting to build neural networks, implemented in Pytorch, to estimate inertial properties of human subjects from kinematic and dynamic data without relying on assumption of BSIP or segment geometries
- Investigating the effects of imposing various constraints (e.g. symmetric, SPD) to mass matrix estimation
- Generated large-scale synthetic datasets using complex biomechanical models simulated in MuJoCo
- Targeting submission to *Journal of Biomechanics*

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
- Mapped agents' discrete actions to continuous commands for physics-based sim, and measured performance degradation
- Verified code correctness with test suite based on rostest
- First-authored paper "ROS-X-Habitat: Bridging the ROS Ecosystem with Embodied AI" (published on *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 60 papers on sketching and haptic pen, summarized if/how each relates to our work
- Implemented a Python module for a haptic pen running on Raspberry Pi, to allow users define relations between geometric primitives (eg. lines being parallel) when composing more complex scientific/engineering sketches
- Verified code correctness with a test suite

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

Advisor: Prof. Julia Rubin *May 2019 - Aug. 2019*

- Refactored DroidNative (a malware detection tool in C++) to adapt it to our malware detection workflow
- Preprocessed benign/malware apps, and extracted their features using DroidNative
- Measured DroidNative's running time and projected the time needed to complete experiments
- Identified the scalability issue with DroidNative; optimized the tool's feature extraction by 2X+ and fixed bugs
- 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

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	**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	**UBC Opening and Move-in Day**, Move-in Volunteer
2016	**UBC AMS Bike Kitchen Daily Maintainance**, Bike Repair Volunteer