Ryan Zeyuan Chen

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https://ryan-zeyuan-chen.github.io/ | Toronto, ON, Canada

Education

Toronto, ON, Canada
Sep 2017 – Apr 2022

B.A.Sc in Engineering Science, University of Toronto
Robotics Engineering Major, Artificial Intelligence Engineering Minor, Engineering Business Certificate

Research Experience

Toronto, ON, Canada
May 2021 – Ongoing

Robotics Institute, University of Toronto | Research Assistant
Supervised by Prof. Jessica Burgner-Kahrs, Continuum Robotics Laboratory

- Investigating the approach to solve the forward and inverse kinematics of concentric tube continuum robots (CTCRs) utilizing machine learning, specifically artificial neural networks.

Toronto, ON, Canada
May 2019 – Apr 2020

Robotics Institute, University of Toronto | Research Assistant
Supervised by Prof. Xinyu Liu, Microfluidics and BioMEMS Laboratory

- Development of an antifreezing, ambient-stable and highly stretchable ionic skin with strong surface adhesion for wearable sensing and soft robotics.
- Evaluated existing designs of hydrogel-based ionic skins through literature review.
- Fabricated the ionic skin including elastomer synthesis, material doping, and stretchable device integration.
- Tested the mechanical, electrical, antifreezing and surface adhesion properties of the ionic skin under different working conditions.
- Demonstrated the functionality of the hydrogel-based ionic skin utilizing its piezoresistive property as the input signal to independently control the fingers of a robotic hand via Arudino.
- Published the experimental procedures and results in the *Advanced Functional Materials* journal [3].

Toronto, ON, Canada
May 2018 – Aug 2018

Department of Civil Engineering, University of Toronto | Research Assistant
Supervised by Prof. Evan Bentz and Prof. Michael Collins, Structural Testing Laboratory

- Experimental investigation of reinforced concrete members subjected to combined shear and torsion.
- Testing of Ultra High-Performance Fiber Reinforced Concrete shells under pure shear.
- Assisted in modelling the response of reinforced concrete structures using nonlinear finite element analysis software.

Industry Experience

San Jose, CA, USA
Jun 2020 – May 2021

Wired and Wireless Group, Xilinx | SerDes Application Design Intern (Remote)
FPGA software development, SerDes System Engineering Team

- Development of SDK test cases across different test suites to validate the functionality of APIs designed for the Kintex UltraScale+ FPGA using C++.
- Verification of developed software test cases on both virtual machines and physical hardware prototypes constructed by the hardware team.
- Validation of developed software test cases under various network communication protocols utilizing different network testing devices.
- Regression testing of developed software test cases in response to hardware upgrades to ensure performance consistency.

Publications

2022
1. **Chen, R. Z.**, Grassmann, R. M., Liang, N. & Burgner-Kahrs, J. Learning-Based Differential Inverse Kinematics for Concentric Tube Continuum Robots. *Manuscript in preparation* (2022).

2021
2. Grassmann, R. M., **Chen, R. Z.**, Liang, N. & Burgner-Kahrs, J. Shape Representation is All You Need: Learning the Kinematics of Concentric Tube Continuum Robots. *Manuscript in preparation* (2021).
3. Ying, B., **Chen, R. Z.**, Zuo, R., Li, J. & Liu, X. An Anti-freezing, Ambient-Stable and Highly Stretchable Ionic Skin with Strong Surface Adhesion for Wearable Sensing and Soft Robotics. *Advanced Functional Materials,* 2104665 (2021).

Honors and Awards

2021 **Faculty of Applied Science and Engineering Dean's Innovation Fellowship**, University of Toronto
The 2021 Dean's Innovation Fellowships support student research projects in the areas of "Smart Cities, Smart Health, and The Internet of Things".

2019 **Undergraduate Student Research Award**, Natural Sciences and Engineering Research Council of Canada (NSERC)
The Undergraduate Student Research Awards (USRA) are meant to stimulate undergraduate students' interest in research in the natural sciences and engineering and to encourage them to pursue a research career in these fields. Awards are granted on the basis of academic record and research aptitude.

2017 **Albert and Rose Jong Entrance Scholarship**, University of Toronto
Awarded to a student entering the first year of either Electrical Engineering or Engineering Science who demonstrates leadership in the Chinese-Canadian community.

2017 **Faculty of Applied Science and Engineering Admission Scholarship**, University of Toronto
Awarded to students entering the first year of any Engineering program based on outstanding academic achievement in the prerequisite courses.

2017 **Halton Newcomer Recognition Award**, Halton Newcomer Strategy
Honoured by the Halton Newcomer Strategy Steering Committee to residents who have had a positive impact on the community through their commitment to business, education, youth and volunteering.

Technical Skills

Robotics: ROS, Robot Modeling, Control Theory, Machine Learning, Computer Vision, Human-Robot Interaction
Software Development: Python, C, C++, MATLAB, Simulink, PyTorch, CMake, Git, GitHub, HTML
Hardware Development: Verilog, ModelSim, Assembly Language, ARM Architecture
Electrical Engineering: SPICE, Analog Circuit Design

Research Interests

Soft Robotics, **Bio-Inspired Robotics**, **Continuum Robotics**, **Microrobotics**