

# Qi Shutong

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## EDUCATION BACKGROUND

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### University of Toronto (UofT)

*Ph.D. Student, Electrical and Computer Engineering*

Research topic: Physics-Informed Neural Networks for Electromagnetic and Multiphysics Modeling

**Toronto, Canada**

*Sept.2020 - Now*

### Beihang University (BUAA)

*B.Eng., Electronic and Information Engineering*

Excellent Graduate

**Beijing, China**

*Sept.2016 - Jun.2020*

## RESEARCH EXPERIENCE

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### University of Toronto, Department of Electrical and Computer Engineering

*Research Assistant, Advised by Professor [Costas D. Sarris](#)*

**Toronto, Canada**

*Sep.2020 - Now*

- Introduced a Finite-Difference Automatic-Differentiation approach for time-domain electromagnetic modeling with unconditionally stable time-stepping.
- Pioneered a novel approach by combining Finite-Difference Time-Domain (FDTD) method and Physics-Informed Neural Network (PINN) for multiphysics simulation.
- Developed a deep neural network to compensate for numerical dispersion errors in the FDTD method for planar microwave circuit modeling.

### Beihang University, Department of Electronic and Information Engineering

*Research Assistant, Advised by Associate Research Fellow [Qiang Ren](#)*

**Beijing, China**

*Sep.2018 - Jun.2020*

- Utilized the Finite-Difference Frequency-Domain (FD-FD) method for generating an electromagnetic scattering database.
- Developed a deep neural network (U-net) to accelerate the resolution of 2-D and 3-D electromagnetic scattering problems using the FD-FD approach.

### Dartmouth College, Department of Computer Science

*Research Assistant, Advised by Assistant Professor [Xing-dong Yang](#)*

**Hanover, USA**

*Jun.2019 - Sep.2019*

- Conducted antenna radiation pattern simulations for optimizing communication performance.
- Formulated and executed experiments to evaluate the impact of various types of fabrics on the radiation performance of the antennas.

## Teaching Experience

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### University of Toronto

*Teaching Assistant*

**Toronto, Canada**

*Sep. 2021 - Apr.2024*

- ECE 320 *Fields and Waves*
- ECE 221 *Electric and Magnetic Fields*
- ECE 259 *Electromagnetism*

## SELECTED PUBLICATIONS

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- **Shutong Qi** and Costas Sarris, "Hybrid Physics-Informed Neural Network for the Wave Equation with Unconditionally Stable Time-Stepping," in *IEEE Antennas and Wireless Propagation Letters*, doi: 10.1109/LAWP.2024.3355896.
- **Shutong Qi** and Costas Sarris, "Electromagnetic-Thermal Analysis With FDTD and Physics-Informed Neural Networks," in *IEEE Journal on Multiscale and Multiphysics Computational Techniques*, vol. 8, pp. 49-59, 2023, doi: 10.1109/JMMCT.2023.3236946.
- **Shutong Qi** and Costas Sarris, "Deep Neural Networks for Rapid Simulation of Planar Microwave Circuits Based on their Layouts," in *IEEE Transactions on Microwave Theory and Techniques*, 2022, doi: 10.1109/TMTT.2022.3210229.
- **Shutong Qi**, Yinpeng Wang, Yongzhong Li, Xuan Wu, Qiang Ren and Yi Ren, "2D Electromagnetic Solver Based on Deep Learning Technique," in *IEEE Journal of Multiscale and Multiphysics Computational Technique*, 2020, 5: 83-88.
- Qiang Ren, Yinpeng Wang, Youngzhong Li and **Shutong Qi**, "Sophisticated Electromagnetic Forward Scattering Solver via Deep Learning," in *Springer Singapore Pte. Limited*, 2021.
- Zhiyao Tang, Liang Sun, Lu Cao, **Shutong Qi** and Yong Feng, "Reconsidering Design of Multi-Antenna NOMA Systems With Limited Feedback," in *IEEE Transactions on Wireless Communications*, vol. 19, no. 3, pp. 1519-1534, March 2020, doi: 10.1109/TWC.2019.2954386.
- Yipeng Wang, Yongzhong Li, **Shutong Qi** and Qiang Ren, "Predicting Scattering From Complex Nano-Structures via Deep Learning," in *IEEE Access*, vol. 8, pp. 139983-139993, 2020, doi: 10.1109/ACCESS.2020.3012132.
- **Shutong Qi** and Costas Sarris, "Physics-Informed Neural Networks for Multiphysics Simulations: Application to Coupled Electromagnetic-Thermal Modeling," in *2023 IEEE/MTT-S International Microwave Symposium*, San Diego, CA, USA, 2023, pp. 166-169, doi: 10.1109/IMS37964.2023.10188015.
- **Shutong Qi** and Costas Sarris, "Benchmarking Physics-Informed Neural Networks for Time-Domain Electromagnetic Simulations," in *2023 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (USNC-URSI)*, Portland, OR, USA, 2023, pp. 1619-1620, doi: 10.1109/USNC-URSI52151.2023.10237914.
- **Shutong Qi** and Costas Sarris, "Numerical Dispersion Compensation for FDTD via Deep Learnings," in *2022 IEEE International Symposium on Antennas and Propagation and USNC/URSI Radio Science Meeting*, Denver, CO, USA, 2022, pp. 671-672, doi: 10.1109/AP-S/USNC-URSI47032.2022.9886317.
- Te-yen Wu, **Shutong Qi**, Junchi Chen, Mujie Shang, et al. "Fabriccio: Touchless Gestural Input on Interactive Fabrics," in *CHI '20: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems April 2020*. Pages 1–14, <https://doi.org/10.1145/3313831.3376681>.