

# Tianshu Kuai

✉ tkuai@cs.toronto.edu      ☎ 647-671-2214  
🌐 <https://tianshukuai.github.io>      📍 Toronto, Canada

## Education

Sep 2022 – 2024	<b>Master of Science in Applied Computing, University of Toronto</b> <b>AI Concentration</b>
Sep 2017 – Apr 2022	<b>Bachelor of Applied Science in Engineering Science, University of Toronto</b> <b>Robotics Major</b> , Artificial Intelligence Minor <i>University of Toronto Excellence Award, NSERC Undergraduate Student Research Awards, Dean's Honour List for all academic semesters</i>

## Experience

May 2022 - Ongoing	<b>University of Toronto</b>   3D Computer Vision Researcher <i>Supervised by Prof. Igor Gilitschenski, Toronto Intelligent Systems Lab (TISL)</i> <ul style="list-style-type: none"><li>Working on building neural representations for deformable 3D objects</li><li>Recently proposed a template-free method [3] for building animatable 3D models for arbitrary types of articulated and deformable objects from a collection of monocular videos, which allows users to animate reconstructed objects in 3D for content creation.</li></ul>
May 2021 - Ongoing	<b>University of Toronto</b>   Computer Vision Researcher <i>Supervised by Prof. Steven L. Waslander, Toronto Robotics and Artificial Intelligence Lab (TRAILab)</i> <ul style="list-style-type: none"><li>Currently working on self-supervised LiDAR semantic segmentation, and contributed to the development of a novel method [2] that outperforms state-of-the-art 2D-to-3D representation learning frameworks.</li><li>Designed and supported the development of high-performance LiDAR 3D object detection models for autonomous vehicles. PDV [1] achieved state-of-the-art multi-class 3D object detection results on Waymo Open Dataset upon publication</li><li>Undergraduate thesis on improving feature learning processes to get more robust features and more accurate bounding box refinement for 3D object detectors</li></ul>
July 2021 - June 2022	<b>aUToronto</b>   Computer Vision Engineer <i>University of Toronto Autonomous Driving Group, SAE/GM AutoDrive Challenge</i> <ul style="list-style-type: none"><li>Research on fast and lightweight 3D perception models on collected data</li><li>Worked on deploying real-time perception models on autonomous vehicles</li></ul>
May 2020 - May 2021	<b>Qualcomm</b>   Machine Learning Research Intern <i>Supervised by Dr. Shaojie Zhuo, Machine Learning Research Team</i> <ul style="list-style-type: none"><li>Proposed several efficient deep learning models for audio processing</li><li>Applied state-of-the-art methods for neural network compression</li><li>Contributed to NPU software compiler pipeline development</li></ul>
May 2019 - Aug 2019	<b>University of Toronto</b>   Undergraduate Researcher <i>Supervised by Prof. Deepa Kundur, Department of Electrical and Computer Engineering</i> <ul style="list-style-type: none"><li>Implemented machine learning models for early relapse detection in Youth Depression</li><li>Worked on patients' data processing and imputations for missing data</li><li>Developed pipeline to track patients' facial expressions for behaviour analysis</li></ul>

## Publications

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| 2022 | <div>[3] T. Kuai, A. Karthikeyan, Y. Kant, A. Mirzaei, and I. Gilitschenski, "CAMM: Building Category-agnostic and Animatable 3D models from Monocular Videos," <i>Under Review</i>, 2022.</div> <div>[2] A. Mahmoud, J. S. K. Hu, T. Kuai, A. Harakeh, L. Paull, and S. L. Waslander, "Self-Supervised Image-to-Point Distillation via Semantically Tolerant Contrastive Loss," <i>Under Review</i>, 2022.</div> <div>[1] J. S. K. Hu, T. Kuai, and S. L. Waslander, "Point Density-Aware Voxels for LiDAR 3D Object Detection," <i>CVPR</i> 2022.</div> |
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## Honors

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| Jan 2020 | <b>University of Toronto Engineering Competition</b> <ul style="list-style-type: none"><li>Awarded the second prize in the senior design competition</li></ul>  |
| Mar 2019 | <b>NSERC Undergraduate Student Research Awards</b> <ul style="list-style-type: none"><li>Undergraduate student research awards by Natural Sciences and Engineering Research Council of Canada (NSERC)</li></ul> |
| Feb 2019 | <b>University of Toronto Excellence Award</b> <ul style="list-style-type: none"><li>Awarded to University of Toronto undergraduate students based on research aptitude</li></ul>                                |
| Sep 2017 | <b>University of Toronto Engineering Entrance Scholarship</b> <ul style="list-style-type: none"><li>Scholarship for top engineering candidates pursuing studies at the University of Toronto</li></ul>          |

## Selected Projects

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| 2021 | <b>Real Time Audio Denoiser</b> <ul style="list-style-type: none"><li>A model built using convolutional neural networks with an encoder-decoder structure</li><li>The model takes the noisy speech as input and produces a de-noised speech as the output</li><li>Achieved good performance on various types of signals with only around 33k parameters</li></ul>  |
| 2020 | <b>Deep Learning Based COVID-19 Diagnosis Tool</b> <ul style="list-style-type: none"><li>A finetuned ResNet18 for COVID-19 diagnosis using Lung CT scan</li><li>Finetuned U-Net for labelling the infection area on raw CT scans for COVID-19 patients</li><li>Great potential to be a commercial software product for hospitals where COVID-19 testing kits are unavailable</li></ul>   |
| 2019 | <b>Autonomous Ball Dispensing Mobile Machine</b> <ul style="list-style-type: none"><li>Started from literature and market survey, through professional engineering decision-making tools to successfully converge to a fully autonomous ball dispensing machine prototype</li><li>Used PIC18F4620 with MPLAB X and Arduino Nano to enable movement of its components, real-time clock, user Interface, and IR Remote Control</li><li>Can potentially be used for automatic delivery and dispensing in warehouses</li></ul> |

## Skills

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| Languages | (Proficient) Python, C/C++, MATLAB, LaTeX - (Working) PostgreSQL, Bash, Java, Verilog      |
| Tools     | Git, Linux/Unix, Docker, Anaconda, Docker, AutoCAD, OpenFace, OrCAD Pspice                 |
| Libraries | PyTorch, TensorFlow, TensorFlow Lite, ONNX, ROS, NumPy OpenCV, SciPy, Scikit-learn, Pandas |