

Tianshu Kuai

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Education

Sep 2022 – 2024	Master of Science in Applied Computing, University of Toronto AI Concentration
Sep 2017 – Apr 2022	Bachelor of Applied Science in Engineering Science, University of Toronto Robotics Major , 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	University of Toronto 3D Computer Vision Researcher <i>Supervised by Prof. Igor Gilitschenski, Toronto Intelligent Systems Lab (TISL)</i> <ul style="list-style-type: none">Working on building neural representations for deformable 3D objectsRecently 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
May 2021 - Ongoing	University of Toronto Computer Vision Researcher <i>Supervised by Prof. Steven L. Waslander, Toronto Robotics and Artificial Intelligence Lab (TRAILab)</i> <ul style="list-style-type: none">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 frameworksDesigned 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 publicationUndergraduate thesis on improving feature learning processes to get more robust features and more accurate bounding box refinement for 3D object detectors
July 2021 - June 2022	aUToronto Computer Vision Engineer <i>University of Toronto Autonomous Driving Group, SAE/GM AutoDrive Challenge</i> <ul style="list-style-type: none">Research on fast and lightweight 3D perception models on collected dataWorked on deploying real-time perception models on autonomous vehicles
May 2020 - May 2021	Qualcomm Machine Learning Research Intern <i>Supervised by Dr. Shaojie Zhuo, Machine Learning Research Team</i> <ul style="list-style-type: none">Proposed several efficient deep learning models for audio processingApplied state-of-the-art methods for neural network compressionContributed to NPU software compiler pipeline development
May 2019 - Aug 2019	University of Toronto Undergraduate Researcher <i>Supervised by Prof. Deepa Kundur, Department of Electrical and Computer Engineering</i> <ul style="list-style-type: none">Implemented machine learning models for early relapse detection in Youth DepressionWorked on patients' data processing and imputations for missing dataDeveloped pipeline to track patients' facial expressions for behaviour analysis

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

Selected Projects

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

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 |