

# Christopher Agia

[christopher.agia@mail.utoronto.ca](mailto:christopher.agia@mail.utoronto.ca) | 416.836.5422  
[agiachris.github.io](https://agiachris.github.io) | [linkedin.com/in/agiachris](https://linkedin.com/in/agiachris)

---

EDUCATION	<b>B.A.Sc in Engineering Science, University of Toronto</b> (exp.) May 2021 Robotics Major, Artificial Intelligence Minor, Professional Experience Year (2020) mGPA: 3.82/4.0 <i>President's Scholarship Program, Dean's Honour List, NSERC USRA Grant</i>
SKILLS	<b>Programming</b> ( <i>Proficient</i> ) Python, Rust, C/C++, MATLAB - ( <i>Working</i> ) Java, Assembly, Bash, Latex <b>Software Tools</b> Git, Linux/Unix, Docker, Wasmtime (WebAssembly), Kubernetes <b>Libraries</b> PyTorch, TensorFlow, ROS, NumPy, PCL, OpenCV, SciPy, scikit-learn, Pandas, Jupyter
EXPERIENCE	<b>Software Engineering Intern, Google</b> May 2020 - Aug 2020 <i>Extending service mesh proxy solutions, Istio Networking Team, Google Cloud</i> <ul style="list-style-type: none"><li>Architected a <b>Proxy-Wasm ABI</b> test harness and simulator to enable proxy extensions written in any language (delivered as WebAssembly modules) to be tested in a safe and controlled environment</li><li>Code will be donated and adopted as the official ABI test harness for <b>WASI</b> - serves to benefit the <b>Istio</b>, <b>Envoy</b> and <b>Proxy-Wasm</b> open-source communities for rapid testing of language agnostic plugins</li></ul> <b>Deep Learning Research Intern, Huawei - Noah's Ark Lab</b> May 2019 - May 2020 <i>Research and development for Autonomous Vehicles, Perception and Localization Team</i> <ul style="list-style-type: none"><li>Project lead for a novel sparse CNN based on the <b>Minkowski Engine</b> achieving <b>state-of-the-art</b> performance for <b>2D/3D Semantic Scene Completion</b>. Patent pending, under review [1], 2020</li><li>Designed an F-CNN model that learns (end-to-end) to segment roads and predict surface elevation from sequential LiDAR scans at real-time speeds with over 95% accuracy. Patent pending, 2020</li><li>Supported the development of a dynamic semantic-enhanced LiDAR localization system that outperforms traditional non-semantic methods by a 20% margin. Patent pending, under review [3], 2020.</li><li>Created a custom PyTorch pipeline to construct, modify and train virtually any encoder/decoder deep CNN on three open source data sets. Used to improve over 10 leading LiDAR segmentation networks</li></ul> <b>Autonomy Engineer - Object Detection, aUToronto</b> Aug 2019 - May 2020 <i>UofT Self-Driving Vehicle Group, Object Detection Team, SAE/GM AutoDrive Challenge</i> <ul style="list-style-type: none"><li>Lead the development of a PointPillars 3D LiDAR detection pipeline (vehicle-pedestrian)</li><li>Worked collaboratively in deploying computer vision systems to reach standard level-4 autonomy</li></ul>
RESEARCH	<b>Machine Learning Researcher   Vector Institute, University of Toronto</b> May 2020 - Present <i>Advised by Prof. Florian Shkurti, Robot Vision and Learning Group</i> <ul style="list-style-type: none"><li>Research on task-driven perception; learning map representations suited for downstream control tasks with an attention/affordance operator parameterized by graph neural networks</li><li>Investigated the use of high-level state abstraction (via attention maps) in Deep Reinforcement Learning architectures (DDPG, DQN) for optimal self-driving control. Under review [2], 2020</li></ul> <b>Machine Learning Researcher   Mila AI Institute, McGill University</b> Jan 2020 - May 2020 <i>Co-Supervised by Prof. David Meger &amp; Prof. Gregory Dudek, Mobile Robotics Lab</i> <ul style="list-style-type: none"><li>Explored the benefit of dense depth prediction for direct visual odometry. Paper accepted [4], CRV2020</li></ul> <b>Robotics Researcher   University of Toronto</b> May 2018 - Aug 2018 <i>Advised by Prof. Goldie Nejat, Autonomous Systems and Biomechatronics Lab</i> <ul style="list-style-type: none"><li>Worked with a team of graduate researchers to bridge the Simulation-to-Reality gap in Deep Reinforcement Learning (A3C) for autonomous rough terrain navigation. Under review [5], 2020</li></ul>

PROJECTS	<b>IntelliCare</b>   Ontario Engineering Competition (OEC) Feb 2019
	<ul style="list-style-type: none"> <li>Full hospital ER software suite including a deep neural network for prediction of patient triage score, algorithms for allocation of resources to patients, and tracking of key hospital performance metrics</li> </ul>
	<b>eBotics</b>   University of Toronto Engineering Competition (UTEK) Jan 2019
	<ul style="list-style-type: none"> <li>Created a logistics planning algorithm that assigns mobile robots to efficiently retrieve warehouse packages - approximated solution to Travelling Salesman Problem with A* Path Planning, Clustering</li> </ul>
	<b>Autonomous Packing Robot</b>   Engineering Science Robotics Competition Jan 2018 - May 2018
	<ul style="list-style-type: none"> <li>Designed, fabricated and programmed a robot that systematically sorts and packs up to 50 pills/minute to assist those suffering from dementia. Features an efficient UI for inputting packing instructions</li> </ul>
PUBLICATIONS	[1] <b>C. Agia</b> , R. Cheng, Y. Ren, B. Liu, "S3CNet: A Sparse Semantic Scene Completion Network for LiDAR Point Clouds," <i>Conference on Robot Learning (CoRL)</i> , Massachusetts, BOS, US, 2020
	[2] <b>C. Agia</b> , R. Cheng, D. Meger, F. Shkurti, G. Dudek, "Abstraction Augmentation: Attention-based Representations in Deep Reinforcement Learning for Autonomous Driving," <i>Paper under review, 2020</i>
	[3] Y. Ren, R. Cheng, <b>C. Agia</b> , B. Liu, "Lightweight Semantic-aided Localization with Spinning LiDAR Sensor," <i>Manuscript under review, 2020</i>
	[4] R. Cheng, <b>C. Agia</b> , D. Meger, G. Dudek, "Depth Prediction for Monocular Direct Visual Odometry," <i>IEEE 2020 17th Conference on Computer and Robot Vision (CRV)</i> , Ottawa, ON, Canada, 2020, pp. 70-77, doi: <a href="https://doi.org/10.1109/CRV50864.2020.00018">10.1109/CRV50864.2020.00018</a>
	[5] K. Zhang, H. Hu, A.H. Tan, M. Ruan, <b>C. Agia</b> , G. Nejat, "A Sim-to-Real Pipeline for Deep Reinforcement Learning for Autonomous Robot Navigation in Cluttered Rough Terrain," <i>Manuscript under review, 2020</i>
AWARDS	Dean's Honour List, 2018-2019.
	1 <sup>st</sup> Place Programming, Ontario Engineering Competition (\$2,500), 2019.
	1 <sup>st</sup> Place Programming, University of Toronto Engineering Competition, 2019.
	NSERC Undergraduate Student Research Award (\$6,000), 2018.
	3 <sup>rd</sup> /50 Place, Engineering Science Robotics Competition, 2018.
	President's Scholarship Program (\$6,000), 2016.
	<b>Patents</b>
	1. "A Sparse Convolution based Semantic Scene Completion method for LiDAR Point Clouds," 2020.
	2. "Road Surface Semantic Segmentation from LiDAR Point Clouds," 2020.
INTERESTS	<b>Initiatives</b> ML4Good, <a href="#">Sustainability</a> . Building an open source, machine learning powered tool that provides practitioners with carbon footprint estimates associated with training their ML/AI models
	<b>Extracurricular</b> NSight Student Mentorship Program, Academic Teaching/Counselling, Reading (Philosophy & Finance), Varsity Blues Soccer, Health and Fitness, Music (Guitar, Bass, Drums)