

# Chris Agia

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

---

EDUCATION	<b>B.A.Sc in Engineering Science</b> , University of Toronto (exp.) May 2021 Robotics Major, Artificial Intelligence Minor, Professional Experience Year (2020) <i>President's Scholarship Program, Dean's Honour List, NSERC USRA Grant</i>
EXPERIENCE	<b>Google</b>   Software Engineering Intern 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 Proxy-Wasm ABI 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></ul> <b>Noah's Ark Lab, Huawei Canada</b>   Deep Learning Research Intern 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 Minkowski Engine achieving state-of-the-art performance for 2D/3D Semantic Scene Completion. Patent pending, paper accepted [2], CoRL2020</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>aUToronto</b>   Autonomy Engineer 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>Vector Institute &amp; University of Toronto</b>   Robotics / ML Researcher May 2020 - Present <i>Advised by Prof. Florian Shkurti, Robot Vision and Learning Group</i> <ul style="list-style-type: none"><li>Thesis on task-driven perception; learning scene graph (hierarchical map) representations suited for downstream robot planning and control tasks with graph neural networks</li><li>Investigated the use of attention state representations in Deep Reinforcement Learning architectures (DDPG, DQN) for optimal self-driving control. Under review [1], 2021</li></ul> <b>Mila AI Institute &amp; McGill University</b>   Robotics / ML Research Intern 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>University of Toronto</b>   Robotics Research Intern May 2018 - Aug 2018 <i>Advised by Prof. Goldie Nejat, Autonomous Systems and Biomechanics 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>SfMLearner on Mars</b>   Space and Terrestrial Autonomous Robotics Dec 2020 <ul style="list-style-type: none"><li>Adapted the Unsupervised Learning of Depth and Ego-motion from Video framework (SfMLearner) for autonomous rover tracking in low-textured martian environments from monochrome image sequences</li></ul> <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 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	<p>[1] <b>C. Agia</b>, R. Cheng, D. Meger, F. Shkurti, G. Dudek, "Attention-based Representations in Deep Reinforcement Learning for Autonomous Driving," <i>Paper under review</i>, 2021</p> <p>[2] <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</p> <p>[3] Y. Ren, R. Cheng, <b>C. Agia</b>, B. Liu, "Lightweight Semantic-aided Localization with Spinning LiDAR Sensor," <i>Manuscript under review at IEEE Transactions on Intelligent Vehicles (T-IV)</i>, 2020</p> <p>[4] R. Cheng, <b>C. Agia</b>, D. Meger, G. Dudek, "Depth Prediction for Monocular Direct Visual Odometry," <i>IEEE 17th Conference on Computer and Robot Vision (CRV)</i>, Ottawa, ON, Canada, 2020</p> <p>[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>Under review</i>, 2020</p>
HONOURS / AWARDS	<p>Dean's Honour List, 2018-2020</p> <p>1<sup>st</sup> Place Programming, Ontario Engineering Competition (\$2,500), 2019</p> <p>1<sup>st</sup> Place Programming, University of Toronto Engineering Competition, 2019</p> <p>NSERC Undergraduate Student Research Award (\$6,000), 2018</p> <p>3<sup>rd</sup>/50 Place, Engineering Science Robotics Competition, 2018</p> <p>President's Scholarship Program (\$6,000), 2016</p> <p><b>Patents</b></p> <p>1. "A Sparse Convolution based Semantic Scene Completion method for LiDAR Point Clouds," 2020</p> <p>2. "Road Surface Semantic Segmentation from LiDAR Point Clouds," 2020</p>
SKILLS	<p><b>Programming</b> (<i>Proficient</i>) Python, Rust, C/C++, MATLAB, <del>LaTeX</del>- (<i>Working</i>) Java, Assembly, Bash</p> <p><b>Software Tools</b> Git, Linux/Unix, Docker, Wasmtime (WebAssembly), Kubernetes</p> <p><b>Libraries</b> PyTorch, TensorFlow, ROS, NumPy, PCL, OpenCV, SciPy, scikit-learn, Pandas, Jupyter</p>
INTERESTS	<p><b>Initiatives</b> ML4Good, Sustainability. Building an open source, machine learning powered tool that provides practitioners with carbon footprint estimates associated with training their ML/AI models</p> <p><b>Extracurricular</b> NSight Student Mentorship Program, Academic Teaching/Counselling, Reading (Philosophy &amp; Finance), Health and Fitness, Music (Guitar, Bass, Drums)</p>