

# Christopher Agia

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EDUCATION	<b>B.A.Sc in Engineering Science, University of Toronto</b> (exp.) 2021 Robotics Major, AI and Eng. Business Minors, Professional Experience Year (2020) GPA: 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 - August 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 in task-driven perception; learning map representations suited for downstream control tasks with an attention/affordance operator parameterized by a graph neural network</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>Paper under review, 2020</i>
	[2] <b>C. Agia</b> , R. Cheng, D. Meger, F. Shkurti, G. Dudek, "Abstraction Augmentation: Attention-based Representations for Deep Reinforcement Learning," <i>Paper under review, 2020</i>
	[3] Y. Ren, R. Cheng, <b>C. Agia</b> , B. Liu, "Semantic-aided LiDAR-based Localization for Autonomous Vehicles," <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)

## REFERENCES

***"Chris was a student who worked as intern in my team on deep learning related applications e.g. semantic segmentation. He is smart and hard working. I will be more than happy to recommend him for a machine learning researcher/engineer position."***

"He is very excellent, we are very impressed by his performance during the time working with us, I highly recommend anyone who looks at this message to give him the highest remark, he deserves it!"

### **Bingbing Liu**

Technology Specialist / Project Manager (Autonomous Vehicles)

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Huawei - Noah's Ark Lab

***"Christopher is one of few with the coupled ability of diving deep into business challenges yet is nimble enough to quickly pick up new and advanced concepts when required. During his time in my team, he identified strategies to improve the efficiency of client side system upgrade processes, as well as internal firmware and software defect tracking mechanism. He shows great potential as a future leader, and is a pleasure to work with."***

### **Liga Ele**

Senior Customer Applications Engineering Manager

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General Electric