William Bonilla

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Education 🎓

Ph.D in Computer Science
Specialization: Robotics, Computer Vision,
Reinforcement Learning and Artificial intelligence

McGill University

Montreal, Quebec, Canada

Sept 2024 - Today

- Autonomous recrational vehicles
- Industrial partner : **BRP**

M.Sc in Electrical Engineering
Specialization: Computer Vision and Artificial Intelligence

University Laval

Quebec City, Quebec, Canada

Jan 2021 - July 2023

- Mouse Pain Project: Automated the pain measuring of a mouse with AI computer vision algorithm
- Project in partnership with the **CERVO** (Neuroscience Research Lab)

B.Eng in Electrical Engineering
Specialization: Electronic Design and Artificial Intelligence

University of Sherbrooke

Sherbrooke, Quebec, Canada

Aug 2016 - Dec 2020

- Problem based learning
- Co-op program: 5 Internships

Skills 💻

Programming	Python (Pandas, Tensorflow, PyTorch, OpenCV, NumPy, Scikit-learn), C/C++, Golang, CMake, C♯, Verilog
Miscellaneous	Linux (Ubuntu), Shell (Bash), LaTeX(Overleaf), Microsoft Office, Git, SVN, ARM, Altium, Confluence, STM32 IDE, Visual Studio Code
Soft Skills	Time Management, Teamwork, Problem-solving, Documentation, Engaging Presentation.

Work Experience 💼

Ph.D. Candidate

McGill University and CTA (Advanced Technology Research Center by **BRP**)

Sherbrookes, Quebec, Canada

Sept 2024 - Today

- Developed AI control systems and precise algorithms in Unity using Python and C#.
- Applied Sim2Real techniques with Unity and ROS2 for seamless transitions.
- Designed point cloud processing algorithms in C++ for LiDAR-based collision avoidance in autonomous vehicles.
- Deployed AI models on Jetson Nano for embedded robotics applications.
- Built neural networks with PyTorch for advanced robotics solutions.
- Standardized code deployment workflows using Docker for consistent development environments.
- Managed robot communication over Ethernet for real-time control.

AI and Robotics Researcher

CTA (Advanced Technology Research Center by **BRP**)

Sherbrooke, Quebec, Canada

May 2024 - Sept 2024

- Developed AI algorithms (computer vision and imitation learning) for robotics applications using PyTorch.
- Designed and implemented nodes in ROS2 for real-time robotics control and prototyping.
- Developed drivers in C++ for automotive-grade Continental radar with UDP communication.
- Managed real-time robot communication over Ethernet, optimizing latency and data reliability.
- Processed and filtered point clouds for enhanced perception capabilities in robotics systems.
- Implemented debugging and performance analysis using tools such as oscilloscopes and signal analyzers.

Robotics Systems Integration Engineer

Tesla

Palo Alto, California, United States

Nov 2023 - April 2024

- Developed firmware for STM32 microcontrollers, utilizing C and VS Code for low-level programming.
- Automated firmware testing pipelines using Python (Pytest) and Golang.
- Integrated communication protocols such as CAN, CAN-FD, and Ethernet for robot actuators.
- Designed and customized Docker environments to support scalable CI/CD pipelines.
- Configured Jenkins servers for continuous integration and automated firmware validation.
- Conducted hardware debugging and system bring-up using oscilloscopes and JTAG tools.
- Collaborated with cross-functional teams to integrate motor control algorithms and robotic actuators.

Car Computer Test and Reliability Engineer Intern   *Palo Alto, California, United States*

Tesla   *Sept 2022 - May 2023*

- Designed an I^2C driver from scratch in C for automotive-grade ASICs.
- Programmed Python scripts to automate testing on embedded Linux systems.
- Designed and debugged PCBs (Altium) incorporating high-speed interfaces like SPI, I2C, and Ethernet.
- Characterized signal integrity using oscilloscopes and logic analyzers.
- Developed embedded software for STM32F7 microcontrollers (ARM Cortex-M7).
- Implemented TCP server-host communication systems in C for real-time data transmission.
- Conducted hardware validation and debugging during board bring-up.

Computer Vision and AI Researcher (Master's Candidate)   *Quebec City, Quebec, Canada*

INO (Institut National d'Optique)   *Jan 2021 - Aug 2023*

- Designed real-time embedded AI solutions for image processing on Jetson Xavier AGX.
- Developed and optimized image segmentation algorithms using frameworks like PyTorch and TensorFlow.
- Modified and implemented advanced AI architectures: U-Net, Mask R-CNN, and DeepLabV3.
- Benchmarked multiple segmentation models to determine the best one for our application.
- Integrated Basler cameras with C++ and Python for real-time image acquisition and processing.
- Optimized AI inference pipelines for low-latency embedded systems.
- Characterized image quality and developed tools for parameter tuning.
- Designed control software for near infrared sensor systems.

Electronic Designer   *Quebec City, Quebec, Canada*

ABB   *Aug 2021 - Sept 2022*

- Updated PCB designs (schematic and layout) to address obsolescence using Altium.
- Designed and debugged high-speed PCBs and analog circuits for industrial applications.
- Characterized photodiode signal performance using oscilloscopes and other diagnostic tools.
- Participated in the board bring-up process for space-grade PCBs, ensuring high reliability.
- Developed embedded software in C and Python for hardware control and diagnostics.
- Designed cable harnesses and ensured compliance with in-house standards.
- Utilized SVN for version control and collaboration.

Achievements and Scholarships ⭐

2021   **Mitacs Acceleration Scholarship**, Mitacs   *Canada*

Publication ▤

Autonomous Optical Sensor to Study the Evolution of Snow Density in Polar   *Vancouver, British*
Environment   *Columbia,Canada*

Poster : 3D Image Acquisition and Display: Technology, Perception and Applications 2022   *January 2022*

ISBN: 978-1-957171-09-8

Poster : Development of AI tools for assessing the pain state of a mouse   *Montréal, Québec, Canada*

Photonics North 2023   *Juin 2023*