

OSWALDO FERRO

Mechatronics Engineering

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SKILLS

LANGUAGES: Python, C, C++, C#, Java

TOOLS: OpenCV, PyTorch, Keras, TensorFlow, ROS, Docker, MATLAB, CMake, Git
CUDA, Eigen, Bazel, BuildKite, gRPC, OpenGL, SolidWorks, Unity3D

EDUCATION

University of Waterloo: Candidate for BAsC in Mechatronics Eng. (GPA 3.83/4) **SEPT. 2016 – PRESENT**
Specialization in Artificial Intelligence

WORK EXPERIENCE

SICKKIDS | MACHINE LEARNING RESEARCHER – TORONTO, ON **MAY 2019 – AUG. 2019**

- Developed a multi-class semantic segmentation U-Net model (**PyTorch**) with a ResNet50 encoder capable of identifying anatomical features with a **98% pixel-wise accuracy** from endoscopic video with a **<200 image dataset**
- Implemented a real-time localization algorithm (**PyTorch, OpenCV**) for determining the position of medical instruments within airways of patients at **millimeter precision** within deformable dynamic environments
- Deployed above program for use by emergency medical services to **decrease errors during time-critical tracheal intubations**
- Developed binary segmentation model to perform high-resolution **3D reconstruction** from MRI scans (**98.2% acc**)
- Implemented program capable of performing real-time 3D reconstruction from monocular endoscopic video in patients' airways using optical flow and matching semantic features to pre-constructed static 3D model

LYFT INC. | LEVEL 5 SELF-DRIVING SOFTWARE ENGINEER – PALO ALTO, CA **AUG. 2018 – DEC. 2018**

- Developed Hardware-in-the-Loop (HIL) testing framework (**C++, Python**) to automate hardware-software integration
- Improved bug detection rate from 3 days to 5 min (3000% increase) and **decreased deployed bugs by 25%**
- Set up local server capable of handling concurrent requests (**gRPC, ProtoBuf**) and scheduling HIL tests to run on various hardware setups within Docker containers (**Buildkite, Bazel**)
- Developed timing-board applications (**C++**) using PTP to synchronize sensors to nanosecond level accuracy
- Developed device drivers relying on CAN, UDP and TCP/IP protocols for communication with STM32 board

MICROSOFT CORPORATION | AZURE DEVOPS SOFTWARE ENGINEER – REDMOND, WA **JAN. 2018 – APR. 2018**

- Developed feature used by **200,000+** users to import/export "VSTS Processes" across accounts (**C#, Node.js**)
- Architected and implemented feature to be scalable and satisfy needs of enterprise customers
- Created open-source libraries and RESTful APIs used by **1000+ teams** worldwide (**C#, TypeScript**)
- Selected from over 200 interns to present to **350+ managers** at training boot-camp

INTERAPTIX INC. | COMPUTER VISION & VR ENGINEER (STEALTH MODE) – TORONTO, ON **APR. 2017 – AUG. 2017**

- Developed computer vision algorithms (**OpenCV, C++**) to isolate foreground from background using **stereo cameras** for real-time dense 3D reconstruction (**OpenGL**)
- Calibrated cameras and ran demonstrations for 25+ potential investors, resulting in successful Series A closure
- Created real-time human 3D model reconstruction and depth estimation program (**CUDA, C++**)

RELEVANT EXPERIENCE

PROJECT LAIKA | AUTONOMOUS ROBOTIC DOG **SEPT. 2018 - PRESENT**

- Creator, lead-researcher and lead-designer of Laika, an autonomous quadruped with **13 DOF**
- Programmed path-planning (dynamic A*) and footstep planning modules to autonomously navigate environments
- Developing control systems to maintain balance under disturbances and uneven terrain

WATONOMOUS SELF-DRIVING CAR | PATH PLANNING SUB-TEAM **SEPT. 2017 - PRESENT**

- Worked with team and researchers to develop a Level 4 self-driving car for SAE AutoDrive challenge
- Developed obstacle trajectory prediction algorithm (**Python, ROS**) using **Extended Kalman Filters**
- Employed **ROS** (Robot Operating System) in a **Linux** environment to allow communication between sub-systems

EVOLUTIONARY SELF-BALANCING INVERTED PENDULUM **JAN. 2018 – JUL. 2018**

- Developed evolutionary neural network algorithm (**C#**) to train self-balancing inverted pendulum and replace control systems
- Ran simulations (**Unity3D**) to train and validate networks prior to building physical prototype

3D PRINTER DEVELOPMENT **JUN. 2016 – AUG. 2016**

- Built and calibrated an **FDM 3D** printer after researching available technologies
- Employed root cause analysis to solve problems, achieving a **resolution of 0.05mm/layer**

4-AXIS ROBOTIC ARM PROJECT **Nov. 2016 – DEC. 2016**

- Designed (**SolidWorks**) and developed electromechanical arm to repeat user-taught tasks
- Wrote inverse kinematics solver and embedded C software to control the arm

ACCOMPLISHMENTS AND AWARDS

- HACK THE NORTH (CHALLENGE WINNERS):** Developed a Machine Learning (**Python, Caffe**), computer vision program for CANSOFCOM (Army) to identify critical information in security footage **2017**
- IEEE HACKATHON (2ND PLACE):** Wireless communication and hardware integration with Arduino for remotely operated musical instrument **2017**