

# Bob Wei

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## Skills

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**Languages** Python, C/C++, CUDA C++, Golang, Java, JavaScript, Objective-C, Swift, C#, Scala, SQL, LaTeX  
**Technologies** Pytorch, TensorFlow, Docker, Unity3D, OpenCV, Postgres, Mongo, Django, Node.JS, Unix, Git, Google-Cloud

## Experience

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### Nvidia

Toronto, ON

#### RESEARCH SCIENTIST INTERN

January 2021 - Present

- Ongoing research supervised by **Dr. Sanja Fidler**. Developing neural networks to better optimize large **GAN**'s at scale

### Nvidia

Santa Clara, CA

#### SOFTWARE ENGINEER INTERN (COMPUTER VISION)

June 2020 - September 2020

- Reduced object detection post-processing time from **7ms** to **1.7ms** in **C++** production codebase for Tegra autonomous systems. Implemented novel probabilistic voting method with efficient **CUDA** kernels, replacing current state-of-the-art
- Proposed a novel scale-invariant loss for poly-line detection, increasing **F1 score** by **> 5%**
- Integrated scale-invariant loss functions in **Tensorflow** multi-task training, improving bounding box fscore by **> 3%**

### Uber Advanced Technologies Group

Toronto, ON

#### RESEARCH SCIENTIST INTERN

September 2019 - May 2020

- First authored a paper accepted to **IEEE ICRA 2021** ([arxiv.org/abs/2011.01153](https://arxiv.org/abs/2011.01153)); supervised by **Dr. Raquel Urtasun**.
- Spearheaded the research and development of a novel, end-to-end neural network for vehicle motion planning, making use of spatial attention mechanisms to focus computation, improving performance on planning metrics and efficiency

### Side Effects Software

Toronto, ON

#### SOFTWARE ENGINEER INTERN

January, 2019 - April, 2019

- Designed an interactive 3D terrain generation tool: [sidefx.com/tutorials/machine-learning-data-preparation/](https://sidefx.com/tutorials/machine-learning-data-preparation/)
- Developed and tuned machine learning models (**pix2pix GAN**) to apply simulated erosion to high-res terrain assets, achieving similar results (>**95%** structural similarity) **50,000×** faster than conventional erosion methods
- Engineered a full **C++** and **Python** frontend/backend for training and deploying neural networks within **SideFX Houdini**

### BlackBerry Messenger

Mississauga, ON

#### SOFTWARE ENGINEER INTERN

May 2018 - August 2018

- Redesigned user interface for BBM Channels and Official Accounts on iOS using **Objective-C** and **Swift**

## Projects

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### Flow

#### UWATERLOO COURSE RATINGS + REVIEWS

- **uwflow.com** is the primary website for course related info and reviews at uWaterloo with over **25,000** monthly active users
- Built the backend infrastructure from the ground up with **Golang**, **Postgres**, and **Hasura** at the core
- Designed a new authentication flow supporting Facebook, Google, and Email login using **OpenID** and **Oauth 2.0** protocols

### Agent Curiosity in Reinforcement Learning

#### GITHUB.COM/BOBQYWEI/CURIOSITY-DRIVEN-EXPLORATION

- Exploration of current state-of-the-art methods for encouraging environment exploration in RL agents
- Implemented baseline **Advantage Actor-Critic** algorithms and various intrinsic curiosity formulations
- Demonstrated much faster learning (>**3.0×**) in challenging **OpenAI Gym** environments with sparse rewards

### Image Inpainting

#### GITHUB.COM/BOBQYWEI/INPAINTING-PARTIAL-CONV

- Image editing tool for semantically-aware inpainting, removing undesired objects from images
- Implemented **UNet** model with partial convolutions based on Nvidia research, providing open-source **Pytorch** code

## Education

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### University of Waterloo

#### BACHELOR OF SCIENCE IN HONOURS COMPUTER SCIENCE

September 2017 - Present

- Cumulative GPA: **3.95/4.0** or **92%**