

# Marcus Loo Vergara

Trondheim, Norway

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## SUMMARY OF QUALIFICATIONS

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Senior student at the Norwegian University of Science and Technology working towards a master's degree in Computer Science. Specializing in computer graphics and computer vision, with a recent focus on deep learning. Expecting graduation June 2019. Self-motivated, quick learner, and enjoy helping others.

- C/C++
- Python
- TCP & UDP
- OptiX & CUDA
- Deep Learning
- React Native
- OpenGL & GLSL
- Keras, PyTorch & TensorFlow
- JavaScript, HTML & CSS

## EDUCATION

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**Norwegian University of Science and Technology**, Trondheim, Norway Aug 2013 – Expected Jun 2019  
Master of Science in Computer Science GPA: 3.00

- Specializing in computer graphics, computer vision, and deep learning

**University of California, San Diego**, San Diego, USA Oct 2017 – Jun 2018  
Master of Science in Computer Science GPA: 3.49

- Studied at UC San Diego for a year

## WORKING EXPERIENCE

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**Graphics Software Engineering Intern**, Sony PlayStation Jul 2018 – Sep 2018  
Internship at PlayStation's Developer Technology Group (DTG)

- Created a performance analysis tool for the PlayStation 4™ that visualizes certain aspects of the performance of the GPU; with the intention of having such a tool be used by DTG to more quickly find and suggest improvements to their customers
- Implemented the metallic workflow – a physically-based shading technique – into a rendering engine that runs on the PlayStation 4™
- Trained a simple autoencoder to generate metallic, roughness and ambient occlusion textures from albedo and normal maps only
- Exposure to low-level programming for specialized hardware
- Gained experience in teamwork and good coding practices

**Software Developer**, Grabster Jul 2017 – Aug 2017  
Summer job assisting a start-up in app development

- Grabster is a sharing economy platform based on buying and selling food between individuals
- Implemented and tested screen navigation and backend functionality for the Android app
- Gained experience in using *React Native* and *Node.js*

**Teaching Assistant**, Norwegian University of Science and Technology Aug 2015 – May 2017  
On-campus part-time job assisting students

- Support and advising in solving theoretical and practical questions
- Graded assignments
- Assigned subjects:
  - Jan 2019 – May 2019: Computer vision and deep learning
  - Jan 2016 – May 2017: Procedural and object-oriented programming (C++)
  - Aug 2015 – Dec 2015: Computers and Digital Design (Assembly programming)

## RELEVANT PROJECTS

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**Reinforcement Learning for Autonomous Vehicles**, Thesis Sep 2019 – Present  
Used state-of-the-art deep reinforcement learning methods to teach a simulated car to drive itself in OpenAI's *CarRacing-v0* environment, achieving top results

- Implemented current deep reinforcement learning baseline, *Proximal Policy Optimization*, with Python and TensorFlow
- Substantially decreased training time by scaling the output mean of each action's Gaussian distributions to their respective limits
- Planning to train the same agent in CARLA – a car simulator running in Unreal Engine 4
- Video of results: [https://youtu.be/8X\\_LSy4TF84](https://youtu.be/8X_LSy4TF84)

**OptiX Soft Shadows**, CSE 274 Course project Mar 2018  
Used NVIDIA's OptiX ray tracer to implement *Axis-Aligned Filtering for Interactive Sampled Soft Shadows*

- Provided a fundamental understanding of the use of frequency analysis in ray tracing
- Achieved *interactive* framerates of about 5-30 FPS on a Nvidia GTX 970

**Deep Learning Projects**, Course projects May 2017 – Jun 2018  
Summary of some deep learning projects and paper implementations

- Implemented a *Mask R-CNN* based model to detect human joints in images of people
- Experimented with convolutional architectures *PointNet* and *PointNet++* to segment stem and leaf points in point scans of plants – with some scans having more than a million points
- Implemented a recurrent LSTM model to automatically generate captions for images
- Trained a *Faster R-CNN* model to identify and locate cars in images taken on the road

**Game Engine Programming**, Side-project 2010 – Present  
Writing a game engine from scratch in C++

- Ongoing side-project since 2010
- Uses OpenGL and Simple DirectMedia Library to render to the screen
- Intended to serve as a mode of learning the inner-workings of game engines
- Developed alongside the an infinite procedurally generated sandbox game
  - See my homepage, [bitsauce.github.io](https://bitsauce.github.io), for more information about these and other projects

## CAMPUS ACTIVITIES

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**Abakus GameDev**, Norwegian University of Science and Technology Aug 2014 – Present  
Co-founder and leader of student organization *Abakus GameDev* – a student organization for people who enjoy making games, discussing their development, design, and the industry in general

- Responsible for creating a socket-based framework that was used for AI competitions
- Participates in meetings, discussing workshop ideas and advertising
- Held a presentation on reinforcement learning for games