

# Joshua Max Manela

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## EDUCATION

### Michigan Technological University

Fall 2011 - Spring 2016

Graduated Magna Cum Laude BS Computer Engineering with a Minor in Computer Science, GPA: 3.74

## WORK EXPERIENCE

### Senior Perception Software Engineer, Waymo LLC (Formerly the Google Self-Driving Car Project)

January 2021 - Present

- Responsible for the development, integration, and maintenance of novel radar fusion algorithms.
- Work with the research team to push the state-of-the-art in long range sensor fusion.
- Lead the Radar Trucking Perception working group composed of hardware, software, and systems engineers.
- Tech lead for Long-Range Stereo-Radar Sensor Fusion Algorithm Development.

### Senior Software Engineer, Special Projects (Perception), Argo AI

March 2017 - January 2021

- Lead all aspects of the development and deployment of shipping a deep lidar object detection model.
- Designed, implemented, and integrated a deep stereo algorithm published at CVPR. (See Publications)
- Optimized a deep image segmentation system to run in real time and in production.
- Implemented hardware-level camera and lidar drivers which cross all levels of the stack.
- Designed and implemented a Gaussian Process based ground surface segmentation with cm-level precision.
- Optimized C++17 computer vision primitives to run faster than existing libraries.

### Software Engineer, Machine Learning and Prediction, Uber Advanced Technology Group (ATG)

May 2016 - March 2017

- Worked with the motion planning team to develop deep-learning based controls algorithms.
- Wrote real-time visualizations for on-car debugging of our models.
- Architected onboard software architecture for long-horizon actor prediction.

### Hardware Validation Engineering Intern, Facebook

Summer of 2015

- Designed and tested custom network switches (at the SOC level).
- Wrote custom libraries to interface with the switches and run various network and stress tests.
- Optimized network switch placement in Facebook data centers.

### Software Development Engineering Intern, Amazon

August 2014 - November 2014

- Thorough preparation of software design with rigorous agile-centered design evaluations.
- Implemented RESTful APIs interfacing with a NoSQL database.
- Designed a service that validates security certificates between microservices across the Amazon stack.

### Software and Controls Engineering Co-op, Mercury Marine

January 2013 - August 2013

- Extensively used MatLab and Simulink to write Engine Controller Unit (ECU) code.
- Soldered, crimped, designed, and built engine harness for production and test designs.
- Wrote CAN, RFID, and IO libraries in C for an ATMEL AT90CAN128 processor for engine security firmware.

### Simulation Engineering Intern, Applied Manufacturing Technologies

Summer 2012

- Laid out and simulated industrial robot performance using the Delmia I-GRIP CAD/Sim Package.
- Collaborated with other Simulation Engineers and wrote macros to improve CAD and simulation speed.

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## Lead Instructor, The Robot Garage

Summer 2011, 2012

- Wrote K-12 curriculum and led robotics classes and camps for the robot garage.
- Focused on the integration of mechanical and software design.
- Created the “Sumo Bot” stand-alone customizable robotics system still in use today.

## Software Engineer, User Friendly EMR (Electronic Medical Record)

August 2013 - April 2014

- Developed various modules for an Electronic Medical Record system with the intent of organizing patient data.
- Designed a module to store employee signatures and credit card information in a MySQL database.

## ACADEMIC EXPERIENCE

### Undergraduate Researcher, Michigan Technological University

September 2013 - April 2016

- Designed and fabricated peripheral hardware kit for a robotic quadcopter to survey highways and bridges.
- Reconstructed a real-life bridge after having been flown over by a drone SLAM algorithm.
- Researched PSO (Particle Swarm Optimization) variants and published a novel meta-optimization for PSO.

### Learning Center Coach, Michigan Technological University

May 2015 - May 2016

- Tutored students in both the Electrical Engineering and the Computer Science learning centers.
- Taught and tutored students in several classes including, Intro to Circuits I & II, Signal Processing, Electronics, Linear Systems, Intro to Computer Science, Data Structures, Discrete Structures, Data Structures, and any other course on the undergraduate catalog in either the ECE or CS departments.

### Student Research Assistant, University of Miami

Summer of 2010

- Participated and helped analyze information for heart-rate and stress testing.
- Wrote software to analyze the radial dimensions of arteries from an ultrasound machine.

## Publications

Hwang, J. J., Kretzschmar, H., **Manela, J.**, Rafferty, S., Armstrong-Crews, N.: CramNet: Camera-Radar Fusion with Ray-Constrained Cross-Attention for Robust 3D Object Detection. In: ECCV (2022)

Methods and systems for constructing map data using poisson surface reconstruction  
HU Xiaoyan, M Happold, **JM Manela**, G Hotson - US Patent App. 16/722,641, 2021

G. Yang, **J. Manela**, M. Happold, D. Ramanan. Hierarchical Deep Stereo for High Res Imagery. Computer Vision and Pattern Recognition Conference 2019 (CVPR)

**J. Manela** and T.C. Havens. Histogram particle swarm optimization (HistPSO): evolving non-parametric acceleration distributions. IEEE Conf. Evolutionary Computation

H. Deilamsalehy, **J. Manela**, and T.C. Havens. Heterogeneous Multi-Sensor Fusion for Mobile Platform 3D Pose Estimation. ASME Journal of Dynamic Systems, Measurement and Control

## Volunteer Work

### FIRST Robotics Mentor, FIRST Robotics Teams 27, 2194, and 2586

2011 - 2015

- Mentored three different high-school and two different middle school robotics teams.
- Taught students the basics of engineering design, application, and programming.
- Helped students create presentations and organize events to promote their team and gain funding.