

Nikolaas Bender

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Education:

University of Colorado Boulder

Expected graduation: May 2021

Degree: BA – Computer science

Focus: robotics

Work Experience:

Undergraduate Research Assistant I; DARPA SubT team MARBLE October 2019 – present

- Constructed and developed remote management tools for robotic fleet in accordance with the needs of the human operator
- Designed and upgraded visualization to better understand where artifacts and robots exist in adversarial environments
- Identified and cataloged issues to formulate the most optimal solutions

Undergraduate Researcher; Smartbases May 2020 – Present

- Headed team on RADAR sensor modality for use in autonomous cars and buses
- Utilized properties specific to RADAR for the purposes of identifying, tracking, and predicting movement of objects
- Developing online sensor alignment tools in software to assist sensor fusion
- Learned, in depth, signal processing, system architecture, CAN bus networking, data visualization, object tracking, classification

Software development intern; ObjectRocket May 2019 – August 2019

- Built faster next generation database control platform
- Automated deployment and maintenance of databases
- Reduced database build time by 75%
- Doubled the number of available database kinds (cockroach db, mongo, postgres, etc)
- Built modules, upgraded existing modules, and expanded modules as prescribed by jira cards on a weekly basis in SCRUM architecture

Software development intern; IQVIA May 2018 – August 2018

- Built tool to automatically deploy hundreds of sql scripts to a desired database
- Reduced execution time from 2 hours to 20 seconds
- Automatic error catching, rollbacks, and notifications for developers to see what needs to be fixed

Applicable classes: algorithms, software development tools and methods, advanced robotics & special topics in computer science (robotics), computer systems, data structures, linear dynamics, numerical computation, fundamentals of quantum computing

Deep learning: Pytorch, open cv, AWS, Google Compute Platform

Software development: Python, C, C++, JavaScript, HTML, C#

Robotics: Python, ROS, C++, JavaScript, Pytorch, arduino

Capable Octopus | Autonomous robot

- Used clearpath jackal as robotics platform for its high availability and relatively high top speed of 4.5mph
- Use of Intel Realsense cameras for mapping and perception with gps and imu for loop closure
- Leveraged Deeplab v3+ semantic segmentation neural network trained on cityscapes dataset for gradient descent controller to keep vehicle on sidewalks

- Lessons learned
 - deployment of neural networks on edge hardware
 - system integration
 - Code management in rapid development environment
 - efficient centroid calculation

Comma AI coding challenge | Deep learning for estimating velocity based on dashcam footage

- Expanded given dataset through OpenCV to meet the need for more training data
- Constructed a saimese convolutional neural network for processing images then combining feature vectors for processing by single set of linear layers ultimately predicting velocity
- Experimented with different convolutional network architectures including xception, alexnet, 6d input, and single resnet before settling on saimese resnet152 networks for feature vector generation then further experimentation and analysis for linear layers to make prediction eventually settling on 5 linear layers for velocity inference
- Leveraged CUDA libraries in Pytorch for accelerated gpu training