Chunshang Li

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SKILLS

Languages & Tools: C, C++, Python, MATLAB, ROS, g2o, Ceres Solver, OpenCV, PyTorch, Linux, Docker, Git
Knowledge: autonomous mobile robots; SLAM: factor graph optimization, Kalman filter, particle filter; computer vision; planning and control; deep learning; embedded systems; sensors: IMU, camera, LIDAR, GPS

EXPERIENCE

University of Waterloo WAVELab / Toronto TRAILab, ***Graduate Student*** Sept. 2017 – July 2020

- Developed a system for learning visual-inertial odometry end-to-end with a robo-centric extended Kalman filter as part of the deep network, combining data-driven learning for images with a physics-based IMU model
- Built a gimbaled visual-inertial estimator with online calibration of gimbal parameters
- Implemented an optimization-based stereo visual-inertial odometry pipeline for drone state estimation
- Designed and coded a safety-critical state machine for transitioning planners and controllers in a driverless car
- Assisted in building a parking planner and controller for a self-driving car demo at CES 2018

Avidbots, ***Infrastructure Software Developer*** May 2017 – Aug. 2017

- Architected and implemented a fast, extensible, ROS integrated, physics enabled, open-source 2D robot simulator to replace Gazebo, significantly improving the capacity for concurrent simulations
- Created simulations for 2D LiDAR sensor, contact sensor, tricycle drivetrain, and differential drivetrain
- Refactored a monolithic code base into distinct packages and wrote scripts for package management

University of Waterloo WAVELab, ***Autonomous Driving Research Assistant*** May 2016 – Aug. 2016

- Implemented an advanced lane detection algorithm from research to C++ for real-time road testing
- Designed and integrated unit tests for each stage of the algorithm ensuring correctness and efficient workflow
- Profiled code execution using Valgrind to find bottlenecks and optimized the pipeline for faster runtime

Nuvation Engineering, ***Embedded Software Engineering*** Jan. 2015 – Apr. 2015, Sept. 2015 – Dec. 2015

- Configured and troubleshot Linux drivers for the board support package of an ARM SoC Android system
- Created Android apps to test hardware functions and driver compatibility at the application layer
- Built web and mobile app support for integrating new home automation devices with existing security system

PROJECTS

University Rover Challenge, ***UW Robotics Team*****, Mechanical & Autonomy Lead** 2016 – 2017

- Co-led the team to qualify for competition in Utah for the first time in 6 years; 2nd place among Canadian teams
- Led the design and fabrication of rover's chassis, drivetrain, manipulator, soil sampler, and camera gimbal
- Led the design and implementation of rover autonomous navigation system to follow GPS waypoints

Visit chunshangli.com/works for more projects, additional details, and code repositories

EDUCATION

University of Toronto Institute for Aerospace Studies

- MASc. Aerospace Science & Engineering, transferred from University of Waterloo 2018 – 2020

University of Waterloo

- MASc. Mechanical & Mechatronics Engineering, *NSERC CGS-M Scholarship* 2017 – 2018
- BASc. Mechatronics Engineering, *Dean's Honours List, 92% cumulative average* 2012 – 2017