

Joe Dinius, PhD

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Summary Statement

I am an experienced systems and software engineer seeking opportunities in autonomous systems or related fields. I am a fast learner, self-starting, and have completed projects in sensing and estimation, path planning, localization, and computer vision for autonomous vehicles. I enjoy finding novel techniques to reduce complexity and improve system design. I strive to communicate clearly, candidly, and respectfully.

Professional Experience

inVia Robotics

Westlake Village, CA

Staff Research Scientist - Perception & Controls

December 2017 – Present

- Responsible for development of control and localization algorithms for wheeled mobile robots
- Developed a novel extension of a known architecture for trajectory-tracking
- Increased robot speed 2.5x in 2 months
- Other responsibilities include cycle-time reduction, build management, system test, and obstacle avoidance.

Walt Disney Imagineering R & D

Glendale, CA

Senior R & D Imagineer - Contract Position

July 2017 – October 2017

- Responsible for developing scene segmentation and state estimation algorithms for multiple object tracking using 2D laser rangefinders
- Conceptualized and developed a collision avoidance algorithm to ensure passenger safety
- Developed graphical frontend to allow automated ride operation and safety monitoring

Ford Motor Company

Dearborn, MI

Senior Research Engineer

December 2015 – June 2017

- Responsible for conceptualizing and interpreting advanced algorithms for multiple object tracking for the Next Generation Vehicle (NGV), including state estimation, data fusion, and data association

Raytheon Missile Systems

Tucson, AZ

Senior Systems Engineer II

June 2006 – December 2015

- Led small teams in simulation, control, and signal/image processing disciplines
- Directed analyses of flight test failure, operational safety, requirements development, and system performance
- Designed and developed simulation architectures for new product development efforts
- Created physics- and requirements-based models of environment and hardware to simulate missile system operation and assess performance
- Developed guidance, navigation, and control (GNC) algorithms in simulation, Computer-in-the-Loop (CiL) and Hardware-in-the-Loop (HiL) environments

Sample Projects

Extended Object Tracking

April 2018

- Developed a performant representation of a cutting-edge algorithm for extended object tracking using elliptical primitive shapes
- Built a simulation and multi-thread infrastructure layer for testing the algorithm in a representative environment
- Technologies Used: C++, JUCE

Differential Drive ROS Robot

June 2017

- Built a differential drive robot that navigated around obstacles to a desired goal using COTS parts
- April tags were used for localization (using a Raspberry Pi camera), Kalman filters using position and commanded speed were used for navigation, and ROS Catkin was used for interprocess communication and vehicle control
- Technologies Used: Raspberry Pi, ROS, Python

Single Shot Detection using Sliding Windows

April 2017

- Built a support vector machine classifier to detect cars in a monocular video stream
- Performed feature extraction to increase classifier accuracy
- Developed a blob detector to find minimal bounding boxes around detected objects
- Implemented Kalman filter to smooth bounding box transients
- Technologies Used: Python, OpenCV, Scikit-learn

- Implemented an image classifier using deep convolutional neural networks to classify signs from the German traffic sign database
- Classifier achieved an accuracy of over 93% on a dataset with over 40 different possible classifications for each feature vector
- Technologies Used: Python, Tensorflow, OpenCV

Skills

OS : Windows, OS X, Ubuntu

Languages: C++ (mostly post-11 standard), Python (2.7+), Fortran (77,90/95)

Software : Eigen, Scikit-image, Scikit-learn, Tensorflow, Keras, OpenCV, Matlab/Simulink, git, gdb(pdb), valgrind, numpy, scipy, pandas, L^AT_EX

Other : Kalman filtering, particle filtering, localization, computer vision, machine learning, optimal control, design-of-experiments (DoE), data exploration & visualization

Publications / Patents

- Sakai, A., D. Ingram, **J. Dinius**, K. Chawla, A. Raffin, A. Paques. PythonRobotics: a Python code collection of robotics algorithms. *arXiv e-print: submitted 31 Aug, 2018*. Available: <https://arxiv.org/abs/1808.10703>
- **Dinius, J.W.**, B.K. Pennington. Spatiotemporal Controller for Controlling Robot Operation. *U.S. Nonprovisional Pat. Ser. No. 16/044,344*, filed 24 July, 2018
- **Dinius, J.**, R. Furfaro, F. Topputo, and S. Selnick. Near Optimal Feedback Guidance Design and the Planar Restricted Three-Body Problem. In: *Proceedings of the AAS 24th Spaceflight Mechanics Meeting*, January 26–30, 2014.
- **Dinius, J.**, Adv. J. Lega. Dynamical Properties of a Generalized Collision Rule for Multi-Particle Systems. *Doctoral Dissertation*. Available: <http://arizona.openrepository.com/arizona/handle/10150/315858>.

Education

University of Arizona, MS/PhD Applied Mathematics

- Raytheon Advanced Scholar's Fellowship

Northern Arizona University, BS Mathematics and Physics

- University Honors Program
- Dean's List

Related Activities

Open-Source Projects

Contributor

2017 – Present

I regularly contribute to open-source projects, some of which include

- PythonRobotics
- Open Source Self Driving Car Initiative (OSSDC)

Check out my GitHub for more details.

CHIMES

Tucson, AZ

Project Advisor

2014

- Community Helpers in Mathematics, Engineering, and Sciences
- Advised high school students as part of a university-led effort to engage them in developing engineering projects to impact their community.