# 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.

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## 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

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## 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

**Traffic Sign Classification Using Convolutional Neural Networks** March 2017

– 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/C++, Python
Software  : Eigen, Scikit-image, Scikit-learn, Tensorflow, Keras, OpenCV, Matlab/Simulink, git, gdb(pdb), valgrind, LaTeX
Other      : Kalman filtering, particle filtering, localization, computer vision, machine learning, optimal control, design-of-experiments (DoE), data exploration & visualization

## Publications / Patents

- **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

– **C**ommunity **H**elpers in **M**athematics, **E**ngineering, and **S**ciences
– Advised high school students as part of a university-led effort to engage them in developing engineering projects to impact their community.