Joseph Dinius, PhD

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Summary Statement

I am an experienced systems and software engineer looking for new opportunities in the field of autonomous systems. I am a fast learner, self-starting, and I have completed projects in sensing and estimation, path planning, localization, and computer vision in autonomous vehicles. I enjoy finding novel techniques to reduce complexity and improve system design. I focus on clear documentation and clean user interfaces.

Professional Experience

Game7 Staffing/ Walt Disney Imagineering R & D Glendale, CA
Senior R & D Imagineer July 2017 – Present

- 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

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 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

Guidance Integrated Fuzing Improvement with Regression   October 2015

- Identified principal components most responsible for guidance integrated fuzing algorithm effectiveness
- Regression analysis resulted in performance improvement of guidance fuzing algorithm
- Technologies Used: C++, Matlab, Python

Simulation Runtime Improvement Using Neural Networks   March 2014

- Conceptualized a simple neural network to reduce computation time of simulation of optical flux due to irradiating stars and planets
- Solution allowed faster prototyping of guidance and control algorithms
- Technologies Used: C, Matlab

Skills

OS	: Windows, OS X, Ubuntu
Languages	: C/C++, Python
Software	: Eigen, Scikit-image, Scikit-learn, Tensorflow, Keras, OpenCV, Matlab/Simulink, git, gdb, valgrind, LaTeX
Other	: Kalman filtering, particle filtering, localization, computer vision, machine learning, data exploration & visualization

Publications

- **Dinius, J.**. Designing GPU-Accelerated Algorithms for High-Dimensional Dynamical Systems. *In preparation.*

- **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

Outreach

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 that will impact their community.

Sunnyside High School   Tucson, AZ
Tutor   2013

- Tutored remedial high school math as part of Sunnyside Math Nights