Joe Dinius, PhD

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Summary Statement

I am an experienced robotics engineer seeking professional growth opportunities. I am a fast learner, a motivating force, and have led technical efforts in sensing and estimation, path planning, localization, and computer vision. On the technical side, I enjoy solving novel problems creatively and, most importantly, timely. On the leadership side, I focus on regular interpersonal communication, making expectations plainly known, and on identifying and providing any support necessary for optimizing team output. In everything I do, I strive to communicate clearly, candidly, and respectfully.

Professional Experience

UBTECH Robotics North American R&D Center Los Angeles, CA
Senior Research Engineer – Perception & Computer Vision April 2019 – Present

- Responsible for software team hiring
- Developing cutting-edge visual SLAM algorithm for application in dynamic environments
- Support product prototype development through software
- Other responsibilities including: team-building and new business development

inVia Robotics Westlake Village, CA
Staff Research Scientist – Perception & Controls December 2017 – April 2019

- Responsible for development of control, navigation, and localization algorithms for wheeled mobile robots deployed in a warehouse automation application
- Increased coarse navigation speed 2.5x in 2 months with a novel method
- Increased navigation accuracy on precision maneuvers by over 2x while simultaneously increasing speed by 2x
- Organized ongoing efforts for personal and professional growth of team members
- Other responsibilities included: cycle-time reduction, build management (CI and configuration control), 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

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 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 (DARPA/MDA/etc)
- Developed guidance, navigation, and control (GNC) algorithms in simulation, Computer-in-the-Loop (CiL) and Hardware-in-the-Loop (HiL) environments

Sample Projects

Pose Error Compensation Using Imprecise Visual Landmarks March 2019

- Created and integrated a simple SLAM-inspired algorithm to increase precision navigation terminal accuracy 5x. The net effect was a 3-4x decrease in inventory drops.
- Visual landmarks imprecisely placed on stationary warehouse objects were used to create stable, robot-centric map markers for estimating accumulated robot localization error.
- Technologies Used: Python, OpenCV / AprilTags, Redis

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-threaded infrastructure layer for testing the algorithm in a representative environment
- Github. Technologies Used: C++, JUCE

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 using OpenCV to increase classifier accuracy
- Developed a blob detector to find minimal bounding boxes around detected objects
- Implemented a Kalman filter to smoothly track bounding boxes
- Project Writeup. Technologies Used: Python, OpenCV, Scikit-learn

Skills

OS : Windows, OS X, Ubuntu
Languages: C++ (post 11), Python (2 & 3), Fortran (77 & 90/95)
Software : Eigen, Scikit-image, Scikit-learn, Tensorflow, Keras, OpenCV, Matlab/Simulink, git, gdb(pdb), cmake, valgrind, numpy, scipy, pandas, LaTeX, Boost, IPOPT, ROS, fastai, PyTorch, docker
Other : Kalman filtering, particle filtering, localization / SLAM, computer vision, machine learning (including deep learning), state-space control design, optimal control, design-of-experiments (DoE), data exploration & visualization

Selected 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.