David Kooi

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Education

Masters of Science Computer Engineering
University of California Santa Cruz — Fall 2018 – 2020

Research Interests: Hybrid Model Predictive Control and Hybrid Controller Synthesis from Formal Specifications
Organizations: Hybrid Systems Lab

Bachelors of Science Computer Engineering 2018
University of California Santa Cruz GPA 3.81 — Fall 2016 – 2018

Extracurricular Involvement
UCSC Tau Beta Pi Member, UCSC IEEE Member, UCSC Rocket Club Member,

Experience

Jet Propulsion Laboratory, Pasadena CA — June - September 2018

Worked within the Autonomous Systems Division for the Mars 2020(M2020) Vision Compute Element(VCE). The VCE will perform terrain relative navigation during M2020's entry, descent and landing. During this summer I worked on flight software running on the VCE computer. My tasks involved:

- Creating a static source code analyzer to auto-code a binary image representing the on-board parameter structure.
- Creating an auto-coder taking as input memory segment specifications and outputting flight verified C code.
- Extending the memory mapping auto-coder to support bad-page remapping.

UC Santa Cruz Senior Design Project: — Fall 2017 - Spring 2018

Title: Automated Stockpile Moving: Experimental Validation of a Vision-Based Front Loader (Sponsored by Topcon Corporation)
Objective: Use a computer vision to locate and traverse to a stockpile; use stereo cameras to calculate an optimal approach vector; fill bucket and verify fil; maneuver to dump site; return and repeat.

UC Santa Cruz Mechatronics — September - December 2017

We developed the mechanical and electronic hardware; and event driven software, necessary to complete a series of tasks within a variable environment. Highlights include:

- Using motion profiling for complex maneuvering
- Identifying signal peaks using a real-time derivative
- Feedback control for line following
- Developing signal conditioning and power distribution circuits.

Jet Propulsion Laboratory, Pasadena CA — June - September 2015-2017

For three summers worked in the Autonomous Systems Division under the Small Scale Flight Software group. Work was performed within the open source, model based NASA JPL FPrime flight software framework. Worked involved:

2017: FPrime Ground Server System redesign using ZeroMQ middleware to support a dynamic, many-many, publish-subscribe system. Developed C++ "ZmqRadio" to support robust communication between embedded systems and the new server. Server supports 'pluggable' packet protocol translation
2016: FPrime Ground System UI and API development and maintenance. Created real-time telemetry visualization with multiple channels. Created a C++ signal generator for telemetry visualization testing.
2015: FPrime autocoder maintenance and development.

Skills

Autonomous Systems: Hybrid System methodology; path planning techniques like RRT* and D*; MPC based planning
Programming Languages: Python, C, C++, Java, Matlab, Unix Shell Scripting, Verilog, PLC Ladder Logic
Software Frameworks: ZeroMQ, PointCloudLibrary, ROS, Numpy, Matplotlib, Tkinter, Git, Nose, Android SDK,
Software Methodologies: Functional Programming, AST Traversal, OOP Design Patterns, Model Based Design, UML modeling
Electrical: Basic circuit design, analysis, fabrication. Troubleshooting with multimeters, oscilloscopes,and logic analyzers

References available upon request.