David Kooi

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EDUCATION

University of California, Santa Cruz   Santa Cruz, CA
— *Master of Science in Electrical and Computer Engineering (GPA 3.86)*   *Expected Graduation: June 2020*
  - **Affiliation: Hybrid Systems Lab:** Graduate Researcher
  - **Thesis: Dynamics Aware Monitoring Safety Critical Self-Triggered Control:** System dynamics are used to estimate aperiodic sampling periods that guarantee safety with respect to barrier function defined sets.

University of California, Santa Cruz   Santa Cruz, CA
— *Bachelor of Science in Computer Engineering (GPA 3.80)*   *Sept. 2016 – June. 2018*
  - **Emphasis:** Robotics and Control; **Organizations**: Tau Beta Pi, IEEE

EXPERIENCE

SGT at NASA Ames   Moffet Field, CA
— *Requirements Engineering Intern **(Formal Methods, Model Checking)***   *June 2019 - September 2019*
  - **Realizability Testing:** Developed and proved a compositional testing approach. Used model checking techniques to test, analyze, and document realizability of formal flight requirements.
  - **Development:** Extended the FRET software to support generation of realizability specifications in Lustre.

UC Santa Cruz Summer Internship Program   Santa Cruz, CA
— *Project Mentor **(Computer Vision, Reactive Motion Planning)***   *June 2019 - Sept. 2019*
  - **Autonomous Control of PacMan:** Led a team of high-schoolers to reconstruct the PacMan game-state using computer vision and demonstrated real-time control of PacMan using potential functions.
  - **Accomplishments:** Poster accepted into Sigma Xi conference.

NASA Jet Propulsion Laboratory *(Python, C++, Unix)*   Pasadena, CA
— *Flight Software/Ground System Development Intern*   *June - September of 2015 - 2018*
  - **2018:** • Used static analysis tools to extract memory allocation information from flight code. Used information to create binary images for in-flight parameter updates. • Created an auto-coder to take memory segment specifications and and output flight verified C code.
  - **2017:** • Used Python ZeroMQ to create a dynamic, many-many, publish-subscribe ground system. • Developed a C++ interface to server. • Created "pluggable" packet-protocol translation.
  - **2016:** Ground system UI and API development and maintenance.
  - **2015:** Ground system and auto-coder development and maintenance.

UC Santa Cruz Senior Design Project / Topcon Corporation   Santa Cruz, CA
— *Software Systems Lead **(C++, Python, ROS, BOOST, Perception)***   *September 2017 - June 2018*
  - **Result:** Used computer vision to demonstrate autonomous operation of full sized hydraulic front-loader.
  - **Perception:** Developed C++ functions to analyze stereo-camera data to find optimal approach towards stockpile as measured by maximizing of material ahead of front-loader.
  - **Software Systems:** Developed modular Python framework to allow independent development of scheduling, perception, and control tasks. Developed asynchronous Python module for actuation of front-loader.
  - **Testing:** Development on 1/20 scale front-loader, field testing of full-size hydraulic front-loader.

SKILLS

- **Programming Languages:** C, C++, Python, Unix shell scripting, Verilog, Java, MATLAB
- **Software Frameworks:** ROS, Boost, ZeroMQ, PointCloudLibrary, Tkinter, Git, Nose, Android SDK
- **Software Methodologies:** Automated Code Generation, AST Traversal, OOP Design Patterns, UML Modeling
- **Robotics/Control:** Hybrid System methodology; classical, state-space, optimization based control; path planning techniques like RRT, A*; MPC based planning, minimum-jerk curve fitting
- **Electrical:** Signal Conditioning; Circuit design, analysis; Troubleshooting with DMMs, O-scopes, logic analyzers

LINKS TO PROJECTS

- Construction Vehicle Automation*(C++, Python, ROS, BOOST, Perception)*
- Path Planning for Robotic Manipulator*(MATLAB, Dynamics, Computed Torque)*
- Perceptron Branch Predictor Implementation*(Micro-Architecture, C++)*