BENJAMIN REINHARDT

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SUMMARY

Innovation, Intensity and Tenacity aimed at robotics, augmented reality, reprogrammable hardware, bit-atom interfaces, and spaceships.

EDUCATION

Cornell University
PhD Mechanical Engineering and Computer Science 2015
Control Theory and Design for Orbital Robotics

California Institute of Technology
Bachelor of Science (BS) Mechanical Engineering and History 2010

EMPLOYMENT

NASA
Ames Research Center

Visiting Graduate Fellow

I was the controls engineer on a project to build a zero-gravity simulator for the SPHERES project. Specifics:
- Designing a controller to hack decades-old hardware and software to do tasks their manufacturers never intended.
- Building a system to automatically test and refine my system model and adjust gains.
- Synthesizing code from the rest of the team to access motor controllers and sensors.

Ames Research Center

Guest Scientist - SPHERES project

I worked with the ISS robotics team to verify my research using a zero-g testbed. Specifics:
- Designing and building the control software, mechanical systems, and embedded electronics for a prototype orbital robot.
- Modifying the open-source ALVAR computer vision library for rapid, real-time closed loop control.
- Designing compelling experiments to verify that my technology would work in space, ex: locomoting around the curvature of the ISS.

JPL

Visiting Graduate Fellow

I explored the potential of eddy currents for orbital actuation as an adjunct to the JPL Robotics Group. Specifics:
-Simulating closed loop control strategies for eddy-current actuators.
-Proving the interchangeability of translating permanent magnets and stationary electromagnets for specific applications.
-Instrumenting, building, and analyzing an experiment to characterize eddy-current forces.

Cornell University
Graduate Fellow
2010 to Current

My research revolves around creating an entirely new electromagnetic actuator for space robotics - both the theory framework and implementation. This project has involved:
- Developing code from scratch to model and control the 6-DoF underactuated dynamics of a robotic spacecraft
- Programming embedded hardware to wirelessly control a simulated satellite and using computer vision libraries to track it
- Implementing fast algorithms to model eddy-current forces
- Leading a team of masters students and undergraduates to test the actuator

AeroVironment
Research Initiative Intern

My group was responsible for proof-of-concept experiments for crazy ways to harness energy from the environment. Specifics:
- Designed, built, and tested an ocean-deployed solar power system.
-Prototyped cord management system for electric vehicle charging station.

Caltech and Cornell
Teaching Assistant

At Caltech, I taught undergrads how to design and synthesize mechanical systems.
At Cornell, I taught undergrads how to use differential equations to show how cold things become hot (and vice-versa.)

PROJECTS

Amphibious Robotics Competition

The competition required a pair of amphibious robots to collect debris from a pond. Solution: entirely aquatic robot starts mounted on top of wheeled robot that can control its own buoyancy.

Caltech Ditch Day

I planned and built an all-day puzzle-adventure hunt. This required planning look/feel, specific technology, and coordinating the efforts of a large group under pressure. Some highlights:
- A 12 foot wall of ice (in LA in May.)
- A reverse geocache box.
- A series of rings that triggered clues in an electronic Palantir
- A concrete wall that autonomously collapsed to music once the participants had assembled all the rings

SKILLS

LANGUAGES: Python, MATLAB/Simulink, C, ROS, English, LaTeX, Bash Scripting, Java, HTML/CSS