Phelps Williams

Email: pww36@cornell.edu Web: williamslabs.com

I aim to use my results-focused approach, teamwork ability, and creativity to gain experience in commercial applications of high performance, high reliability, and mission critical software engineering.

Education

Master of Engineering 8/2007 – (5/2008)
Cornell Computational Synthesis Lab, Cornell University, Ithaca, NY
Major Field: Computer Science
Thesis: Molecubes modular robotics research platform. Advisor: Prof. Dr. Hod Lipson

Bachelor of Science 9/2003 – 6/2007
Robotic Systems Lab, Santa Clara University, Santa Clara, CA
Major Field: Computer Engineering
Thesis: ONYX Nanosatellite Command and Data Handling Systems. Advisor: Prof. Dr. Christopher Kitts

Internship Experience

Jet Propulsion Laboratory 6/2007 – 8/2007
Pasadena, CA
Responsibilities included the design and implementation of a web based tool for editing of large command dictionaries, part of the next generation spacecraft bus being internally developed at JPL. From conceptual objectives of the customer, translating these into requirements, developing a schedule for my colleague and myself, developing a system architecture agreed upon by the customer, and finally the implementation of the system. The project was documented and handed off to the customer. Reference: Nagin Cox.

Santa Clara University ONYX Nanosatellite Program 9/2005 – 6/2007
Santa Clara, CA
Responsibilities included program management of a small (30 person) satellite development team as part of the Air Force Research Lab's University Nanosat-4 Program. Significant embedded flight hardware and software design and implementation. Power system design, harness design, and most electronics hardware assembly. Managed Integration & Test process and final flight hardware presentation to Air Force Research Laboratory. Presented segments of program in 3 reviews to Air Force Research Lab and aerospace industry members. Reference: Dr. Christopher Kitts.

Jet Propulsion Laboratory 6/2005 – 9/2005
Pasadena, CA 12/2005 – 1/2006
Responsibilities included the implementation of a web based tool for pre-Phase A spacecraft development program cost estimation. Entering the project about a month after its initiation, the project entailed working with a senior developer implementing a tool defined by the customer to automate several tasks performed during cost engineering process particularly for use in Team X. Reference: Chris Swan.

Conference Publications

1. Rogers-Marcovitz, F., Williams, P., "Dallas EEProm Equipment Profile for Rapid Integration and System Modeling"; Proceedings of the 21st AIAA/USU Conference on Small Satellites, Logan Utah, August 13-16 2007.
2. Kitts, C. et al., "Flight Results from the GeneSat-1 Biological Microsatellite Mission"; Proceedings of the 21st AIAA/USU Conference on Small Satellites, Logan Utah, August 13-16 2007.
3. Rogers-Marcovitz, F., Williams, P., "Dallas EEProm Equipment Profile for Rapid Integration and System Modeling"; Proceedings of the 5th Responsive Space Conference, Los Angeles California, April 23-26, 2007. Sponsored by the AIAA LA and Orange County Sections, and the Space Systems and Space Transportation Technical Committees

Theses

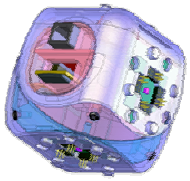
4. Williams, P. (2007) Molecubes Controller Semester Report. Project report presented to Dr. Hod Lipson of the Computer Science Department of Cornell University in partial fulfillment for completion of a Master of Engineering degree.
5. Angeles, R., Williams, P., Zabinski, Z. (2007) ONYX Nanosatellite Command and Data Handling Systems. Bachelors Thesis presented to the faculty of the Santa Clara University School of Engineering in partial fulfillment for completion of a Bachelor of Science degree in Computer Engineering.

Honors

- Frank J. Reed Student Scholarship, 21st Annual Conference on Small Satellites Student Paper Competition, August 2007
- Sigma Xi Research Honor Society, June 2007
- Santa Clara University School of Engineering Undergraduate Award for Research Excellence, June 2007
- Santa Clara University School of Engineering, Department of Computer Engineering, Technical Excellence Award, May 2007
- Santa Clara University School of Engineering Dean's List, June 2007
- Santa Clara University IEEE Electrical Engineering Award of Service, June 2006
- Santa Clara University IEEE Award of Excellence, June 2006

Research Projects

2007 - Present **Molecubes** **CCSL, Cornell**



This project aims to develop open modular robotic framework envisioned as a universal, robust, and low cost alternative to a variety of specialized robots with fixed body structure and functions. Personal work has focused upon protocol design, ARM processor based controller hardware and software design and the integration and test of system level project components. (with Victor Zykov and Hod Lipson)

2007 - Present

KepCalc – Orbital Propagation Library

KepCalc implements the SGP orbital propagation algorithm first published in 1980 by the DoD in SpaceTrack Report #3. The software library provides catalog importers to import satellites from a variety of sources including Space-Track, the NORAD operated distribution site. Utilizing this library of space objects, the current position of the object can be propagated forward followed by transformations enabling the calculation of current geodetic coordinates, elevation, azimuth, and range information among many others. This project is open source and available on SourceForge. It is implemented in both Java and Python. Project pursued for recreational purposes.

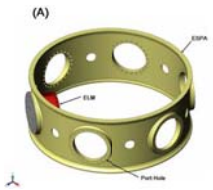
2006 - 2007

NASA Ames Genesat-1 Mission **RSL, SCU**

Genesat-1 served as a technology demonstration mission exploring the capabilities of the cubesat platform for space based biological research. Genesat-1 launched as a secondary payload with the AFRL's Tacsat-2 on December 16th 2006. By January 17th all primary mission criteria had been successfully completed. The spacecraft was operated by Santa Clara University. Personal responsibilities included all beacon reception and data handling. Modifying a substantial existing codebase implemented in Java, this software provides an internet based ground operations system enabling remote control of ground stations. An additional responsibility included serving as the primary contact with the amateur radio community in an effort which resulted in over 60,000 beacon packets submitted from 44 individuals in 11 countries. (with Chris Kitts)

2007

ESPA Launch Load Module **RSL, SCU**



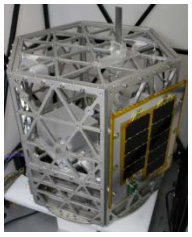
Flight software design of ESPA Launch Load Module (ELM) data logging software. The ELM structure was built and designed by the Mechanical Engineering Department at Northeastern University to fit in the secondary payload area on a CSA Engineering ESPA ring secondary payload adapter for Atlas V and Delta IV launch vehicles. A custom 10 channel data logger capable of a 10 bit sampling at 1kHz for 30 minutes was designed and built at Santa Clara University. Working with an electrical engineer responsible for the hardware design, personal responsibilities included all onboard software and simple tools for transfer and reconstruction of data after transfer. (with Chris Kitts)

2005-2007

Plug n' Play Satellites **RSL, SCU**

Personal research involved developing abstract system profiles for spacecraft elements. Assembling these elements enables a model to be built in real time of the capabilities of the space system. Research was targeted at facilitating the integration and test process, typically a very expensive and time consuming effort. Research was performed on university class small satellite programs at Santa Clara University and Washington University in St. Louis. Research culminated in private sessions at the 2006 AIAA Conference on Small Satellites successfully demonstrating ability to interchange subsystems between two spacecraft with a seamless and rapid integration and test process. Followed up by conference papers on the topic a year later. (with Chris Kitts)

2006 - 2007 **Spacecraft Software & Electronic Systems Assembly Lead** **RSL, SCU**



Responsibilities included leading a small team (10 people) including a NASA certified assembly technician in the flight assembly of the ONYX Nanosatellite. Tasks ranged from managing component inventories to tracking of subsystem assemblies and test results. Additionally, managing work assigned to team members and making sure tasks were accomplished properly in a timely manner. Assisted in establishing clean room facilities for these activities at CREST in the NASA Ames Research Park. (with Chris Kitts)

2005 - 2007 **Spacecraft Software & Electronic Systems Developer** **RSL, SCU**

Developed software and hardware for ONYX Nanosatellite subsystems. Worked extensively in C on systems supporting the Emerald Protocol Suite (EPS). Activities also included extension of EPS and an extensive redesign of the AVRSAT, a modular hardware platform for spacecraft subsystem development. Use of several EDA applications for circuit design, analysis and fabrication. Consulting work with the Washington University in St. Louis Akoya program and the Texas A&M FASTRAC program was also part of this work. (with Chris Kitts)

2004 - 2007 **IEEE Region 6 Micromouse Competition** **IEEE, SCU**

First year served as primary software developer for SCU team. Involved implementing modified A* algorithm for exploring and discovering optimal route in a 16x16 grid maze with walls arranged in any manner. Interfacing with sensors for wall detection and stepper motor control all on an 8 bit AVR microprocessor. Following year served as team lead, work involved design of dc motor control board with PID position control and trapezoidal velocity profiling. (with Shoba Krishnan)

Fall 2006 **Sounding Rocket Data Logger**

Design from scratch of an acceleration and pressure logging device for use on amateur rockets and sounding rockets capable of reaching the uppermost regions of the atmosphere. Device capable of logging 1 channel of acceleration and 1 channel of atmospheric pressure for approximately 8 minutes at 500Hz. Work entailed requirements definition, hardware, software design, build and test. Project pursued for recreational purposes.

2001 - Present **General Hardware / Software Library Development**

Catch all category for smaller personal projects typically exploring interesting technologies. This includes software libraries supporting the iRobot SCI protocol, SICK PLS series LIDAR, and ICOM PCR series amateur radio scanners among others. Hardware design ranging from Digi Xbee ZigBee wireless modules to Phillips I^2C based LED drivers for graphic displays. Ranging from large object oriented software systems in Java to light weight embedded applications on 8 bit AVR microprocessors.

Professional References

1. Dr. Christopher Kitts
Assistant Professor, Mechanical Engineering
Director, Robotic Systems Laboratory
###-###-####*
Dept. of Mechanical Engineering
Santa Clara University
500 El Camino Real
Santa Clara, CA 95053

2. Dr. Victor Zykov
Postdoctoral Associate
###-###-####*
239 Upson Hall, Cornell University,
Computational Synthesis Laboratory
Sibley School of Mechanical and Aerospace Engineering
Ithaca, NY 14853

3. Z. Nagin Cox
MSL Flight System Systems Engineering Team &
313 Surface Systems SE Group Supervisor
###-###-####*
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91109

4. Dr. Hod Lipson
Assistant Professor,
Joint Mechanical & Aerospace Engineering
and Computing & Information Science
###-###-####*
Sibley School of Mech. & Aerospace Engineering,
216 Upson Hall, Cornell University
Ithaca, NY 14853-7501

5. Christopher Swan
Phoenix Payload Systems Engineer
###-###-####*
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91109

6. Dr. Shoba Krishnan
Associate Professor
###-###-####*
Department of Electrical Engineering
Santa Clara University
500 El Camino Real, Santa Clara 95053

*Information removed for privacy reasons, please contact for full reference info.