Capt Shankar Kulumani

CONTACT INFORMATION

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RESEARCH INTERESTS

Astronautical Engineering with applications in control systems theory: Focus on spacecraft attitude dynamics and control, estimation and orbit determination

EDUCATION

Purdue University, West Lafayette, IN **January 2011 to December 2013**

M.S., Aeronautics and Astronautics Engineering

- Overall GPA: 3.66/4.00
- Area of Study: Spacecraft Dynamics and Control

United States Air Force Academy, Colorado Springs, CO **June 2005 to May 2009**

B.S., Astronautical Engineering

- Overall GPA: 3.35/4.00

PROFESSIONAL EXPERIENCE

United States Air Force, Kirtland AFB, NM
Lead Test Engineer, Guidance, Navigation, & Control Group
Air Force Research Laboratory **August 2011 to July 2014**

- Created orbit determination software for geo-stationary GPS receiver validation
- Designed astrodynamics force model for AFRL satellite science experiment
- Developed attitude control simulations for CMG test-bed known as Attitude Control System Proving Ground (ACSPG) which is the largest spherical air-bearing testbed in the world used for attitude control and determination research
- Developed ground transmitter geolocation via satellite time difference of arrival algorithm
- Led incorporation of satellite relative motion dynamics, guidance and control for simulation on embedded ground based robotic system
- Implemented miniature inertial measurement (IMU) sensors for attitude control experiments
- Managed space situational awareness software development by leading diverse team of academia, industry, and government in an effort to develop integrated orbit determination software

Deputy Space Vehicles Lead, Responsive Space Squadron
Space Development and Test Directorate **May 2009 to August 2011**

- Responsible for development, integration, test, & launch of ORS-1 (Operationally Responsive Space) satellite which was the first operational satellite developed under the ORS office and supports US Central Command Battlespace Awareness
- Extensive experience with technical management of diverse contractor/government teams leading to successful ORS-1 launch and operations
- Resolved $600K satellite flight sensor issues and prevented ORS-1 launch delays by ensuring vital hardware repairs were completed correctly.
- First hand experience monitoring 100+ days of integration and testing of ORS-1 satellite leading to on-time launch from Wallops Island, VA on 29 June 2011
- Assessed and served as on-site government inspector of 200+ satellite test plans dealing with crucial flight hardware leading to successful test campaign and mitigated possible launch delays

PROFESSIONAL MEMBERSHIPS

American Institute of Aeronautics and Astronautics (AIAA), Member, 2012–present

Sigma Gamma Tau, Member, 2008–present

Qualifications and Skills

MATLAB/Simulink skill set:

- Dynamical system simulation, astrodynamics applications, Linear algebra, Monte Carlo analysis, Optimization, GUI development, statistics, estimation, data processing, visualization

Design Software:

- Solidworks, AutoCAD

Computer Programming:

- Experience with C, C++, UNIX shell scripting, DVCS (Git)

Desktop Editing and Productivity Software:

- TEX (LATEX, BIBTEX, PSTricks),
- Microsoft Office, OpenOffice.org, LibreOffice, Google Docs
- GIMP, InkScape

Operating Systems:

- Microsoft Windows family, Apple OS X, Linux/UNIX

Hardware Systems:

- PhaseSpace motion capture system
- VectoNav Inertial Measurement Unit
- Embedded robotic systems

Expertise

Control Theory and Engineering:

- Linear and Nonlinear Systems Theory, Feedback, Optimization, Digital Control

Communications and Signal Processing:

- Probability, Random Variables, Stochastic Processes, Estimation, Statistical Inference

Astronautical Engineering:

- Astrodynamics, Orbit Determination, Attitude Dynamics, Analytical dynamics, Rocket Propulsion

Awards

Responsive Space Squadron

- Rotary National Award for Space Achievement Foundation Stellar Award nomination for successful ORS-1 mission accomplishments (2011)
- ORS-1 named by C4ISR Journal as one of the top 25 most important intelligence, surveillance and reconnaissance concepts of the year (2011)

United States Air Force Academy

- Awarded Commandant/Dean pin 8 consecutive semesters for high military/academic performance (2005-2009)
- Top Academic Performer - Astrodynamics 321 (2007)

Security Clearance

Department of Defense Top Secret SCI (awarded: 2010)