Nathaniel Guy

nathaniel.guy@gmail.com

Experience

Astroscale **Tokyo, Japan**
Software Research and Development Lead September 2018–Present

- Developed a 3D, cloud-based simulator to generate multi-sensor synthetic data for mission development and testing, including API for third-party users and automated workflows. Used an early version of this software to test mission scenarios for ELSA-d, our mission which launched in March 2021.

- Developed a web-based simulation showing satellite position and path over time. Earth rotation, sunlight angles, and orbital dynamics are simulated to present accurate visualization to user. Currently live on Astroscale website.

- Designed, wrote software to track, and tested the tracking fiducial for the DogTag docking plate, a state-of-the-art docking plate used for in-orbit rendezvous. My design has launched on several dozen OneWeb communications satellites, and can be used to rendezvous and dock with them for end-of-life servicing.

- Developed several new methods for pose estimation for orbital rendezvous, using novel computer vision and sensor fusion techniques, all the way from "drawing board" phase to actual launch of our ELSA-d spacecraft in March 2021. This code will be used for in-orbit rendezvous and docking during the mission.

- Developed multi-user HoloLens AR visualization tools for hardware discussions and public outreach. Performed multiple live demos for government and industry partners.

- Developed telemetry and telecommand parsing and visualization tools. Used these tools to test star sensors, gyroscopes, sun sensors, geomagnetic sensors, accelerometers, radar and LiDAR units, etc.

NASA Jet Propulsion Laboratory, User Interface Development Group **Pasadena, CA**
Lead User Interface Developer May 2016–July 2018

- Led development of "Caspian," the primary 3D tool used for analyzing the Perseverance rover's autonomous drives on the Martian surface. Currently in use for the ongoing Mars mission.

- Led development of "SlingShot" augmented reality tool for visualizing Europa Clipper flybys of Jupiter in 3D. Managed a team of three engineers to use hardware/software system to review planned trajectories during the Europa Clipper Mission Systems Preliminary Design Review.

- Developed many features, including navigation, terrain shadows, and web integration, for "OnSight" augmented reality tool for the MSL (Curiosity) and M2020 (Perseverance) missions. This project won the NASA Software of the Year award in 2018, and has been used on Mars for several years to plan activities and analyze science data.

Hakuto Google Lunar XPRIZE Team **Sendai, Japan**
Masters Intern, UI/Ground Station Software Engineer July 2015–December 2015

- Principal architect, developer, and operator for ground station software to support teleoperation for lunar rover mission. In about one month, took product from the concept phase to a fully operational product capable of carrying out a week of field tests without major issues.

- Designed new PID controller for rover motor control. Implemented controller in C++ on a microcontroller running RTOS, and tuned gains empirically to maximize traction on regolith-like surfaces.

SpaceX, Flight Software **Hawthorne, CA**
Flight Software Intern September 2014–December 2014

- Wrote, maintained, and executed software tests for the Dragon spacecraft in the lead-up to the CRS-4 mission to the ISS, including tests for FDIR (fault detection, isolation, and recovery) systems.

- Automated NASA verification tests for launch. Turned a 20+ hour manual process into a fully-automated one, increasing comprehensiveness and reducing execution time to around 3 hours.

NASA Jet Propulsion Laboratory, Human Interfaces Group **Pasadena, CA**
Software Engineering Intern June 2014–September 2014

- Developed an interactive 3D interface for calibration and remote manipulation of the Robonaut 2 robot on the ISS.

Nintendo of America, Software Development Support Group **Redmond, WA**
Senior Bilingual Software Engineer June 2005–January 2007; November 2009–August 2013

- Assisted other developers through all stages of the game development process, including extensive debugging and troubleshooting, development of whitepapers, creation of tools, and assistance publishing games and DLC.

Freelance Japanese Translator 2005–2009

- Translated several high-profile video game titles, as well as assorted technical and business-related documents.

EDUCATION

University of Washington
Master of Science in Aeronautics & Astronautics
Master of Science in Computer Science
  (Graduate Teaching Assistant: Software Engineering, Networks, and Graphics.)

Seattle, WA
Received June 2016
Received June 2015

Georgetown University
Bachelor of Science in Computer Science; Bachelor of Arts in Japanese

Washington, DC
Received May 2005

TECHNICAL SKILLS

- Programming Languages: C#, C++, C, Python, Javascript/HTML5, HLSL (pixel and vertex shaders), MATLAB.
- Platforms: PC, Mac OS X, Linux/UNIX, Arduino.
- Tools: Unity, Microsoft Visual Studio, Git, Subversion, Vim, LaTeX, etc. Some familiarity with Unreal Engine, ROS, and Simulink.
- Frameworks/Libraries: SciPy, OpenCV, OpenGL, Eigen, three.js, D3.js, etc.

LANGUAGES

- Fluent in Japanese, including software and aerospace technical vocabulary. Proficient in Spanish and French.

PUBLICATIONS AND POSTERS

- L. Burtz, F. Dubois, and N. Guy, **"Human-Robot Teaming Strategy for Fast Teleoperation of a Lunar Resource Exploration Rover."** In *International Symposium on Artificial Intelligence, Robotics and Automation in Space* (online), October 2020.
- N. Guy and J. Forshaw, **"Astroscale's Vision for Holo-virtualized Augmented Reality for Spacecraft Development and Public Outreach."** In *International Astronautical Congress 2019* (Washington, DC, USA), October 2019.
- N. Guy, **"Techniques for Fault Detection and Visualization of Telemetry Dependence Relationships for Root Cause Fault Analysis in Complex Systems,"** M.S. Thesis, Dept. of Aeronautics and Astronautics, University of Washington, Seattle, WA, 2016.
- N. Guy, **"Better Tools for Fault Diagnosis in Complex Systems."** At Data Visualization Research Night, Seattle, WA, USA, May 2015.

INVITED TALKS

- **"Building a Satellite to Clean Up Space Debris."** Le Wagon, Tokyo, Japan, May 2020.
- **"NEXT SPACE Vol. 3: Invited Lecture."** X-Nihonbashi, Tokyo, Japan, August 2019.
- **"Interactive Visualization Techniques for Space Exploration."** Tokyo Univ., Tokyo, Japan, April 2018.
- **"3D Graphics Basics."** JPL, Pasadena, CA, August 2017.
- **"Using AR/VR to Augment Space Exploration."** Augmented World Expo, Santa Clara, CA, June 2017.
- **"Augmented Reality for Space Exploration."** University of Washington, Seattle, WA, October 2016.
- **"3D Telepresence Interface for Robotic Manipulation."** Tohoku University, Space Robotics Lab, Sendai, Japan, August 2015.

PATENTS

- U.S. Patent No. 8,516,467: "Method and Apparatus for Enhancing Comprehension of Code Time Complexity and Flow." Issued August 20, 2013.
- U.S. Patent No. 8,147,333: "Handheld control device for a processor-controlled system." Issued April 3, 2012. (See corrections sheet for patent for full details.)

AWARDS AND CERTIFICATIONS

- NASA Software of the Year award for work on OnSight mixed-reality software (2018)
- Professional Scrum Master Level 1 certification (2017)
- Passed Japanese Language Proficiency Test (JLPT) Level 1 (2005)

INTERESTS

- Cycling and bouldering.
- Mushrooms and mycology. Officer in the Tokyo Mushroom Society.

PROJECT LINKS

- Personal website (with lots of project details): http://www.natguy.net
- GitHub page: https://github.com/NattyBumppo/