William Chapin

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Summary

Accomplished software engineer and robotics researcher with seven years of subject matter expertise. Extremely flexible in capabilities according to project needs, with a willingness to learn new tools, languages and processes on the fly. Expert in mixed kinematic systems and has written a fully featured open source robotics toolkit which has been in use to answer novel theory questions. Proven ability to lead low TRL R&D efforts and deliver successful novel demonstrations on-time. Capable of coordinating and managing large scale software architectures with a release schedule, including delegation and assignment of tasks to team members. Proficient in the implementation of automated solutions and processes, decreasing man-hour overhead. Skilled in the qualification process of flight hardware, having developed ground support software and supervised environmental testing. Comfortable in hardware prototyping, including electronics design/integration and mechanical fabrication, presenting a synthesis of skill-sets useful for robotics research and cross-disciplinary communication.

Skills

Programming: Python (NumPy, SciPy, ROS, etc.), MATLAB/Simulink/Speedgoat, ASIST/STOL, C, C++, Java, Arduino, Julia
Electronics: Soldering, Circuit Design, Circuit Debugging, Vintage Electronics
Robotics Theory: Kinematics, Dynamics, Metrology, Controls, Path Planning
Fabrication: 3D Printing, Laser Cutting, Water Jet Operation, CAD (Inventor)
Systems Administration: Linux, Intranet/Networking, Server Systems Architecture

Experience

Senior Robotics Software Engineer
NASA Goddard Space Flight Center (KBR Contractor)
07/24 – 01/25
Greenbelt, MD
- Served on integrated Robot System 1 TVAC Campaign as ASIST SME/PoC and ESTOP
- Devised EMI Test software for Robot System 1 and served as a test director during the EMI campaign.
- Translated software from REU level for use in Robot System 1 and 2 environments.
- Performed qualification of flight hardware for integration with flight systems 1 and 2 to replace damaged components.

Software Lead for OSAM1 Robotics Electronics Unit (REU)
NASA Goddard Space Flight Center (Blackwatch Contractor)
04/23 - 07-24
Greenbelt, MD
- Served as test director through the REU FLT #1 and #2 TVAC campaigns, playing a major role in delivery of both systems.
- Led development of Comprehensive Performance Testing (CPT) software for REU, with a focus on automation, eliminating need for lengthy manual test plan execution.
- Constructed flexible telemetry parsing system and SQL database in support of CPT and post test analysis.
- Created automated test report generation system capable of analyzing system failures, classifying results, and outputting to the desired acceptance format.
- Became proficient in the use of NASA Goddard ground support tools such as ASIST/STOL.
- Supervised and organized REU git repositories, maintained software group resources.
- Lead weekly Software Status meetings and coordinated with project management.
- Participated in REU FLT #1 failure review boards in capacity as software lead.

Robotics Researcher and Lab Manager
FASERLab at Virginia Tech
08/18 - 12/22
Blacksburg, VA
- Designed general purpose robotics python library for serial and parallel mechanisms (Basic-Robotics).
- Designed kinematic and optimization software for highly parallel and mixed kinematic autonomous robotic systems.
- Led design of electronics and control systems for FASERLab's FORCE 4m Large Scale Manipulator.
- Researched collaborative autonomous assembly, including conducting assembly trials in simulation.
- Utilized low-cost hardware to provide a high-fidelity metrology system for robotic tracking.
- Led laboratory fabrication, mentored senior design, and handled visitor presentations.
- Handled acquisition, inventory, IT resources, and access control for the laboratory space.
- Published multiple technical papers and journal articles.

Robotics Software Contractor
MAXAR
05/21 – 08/22
Westminster, CO
- Designed workspace and manipulability analysis tools for generalized robotic manipulators.
- Worked on hardware-level control software for novel robots.

- Designed gravity offloading algorithm for support of OSAM-1 Robotic arm testing.
- Designed automatic fail-safe systems and limiters for robotic arm testing.

PPE Design and Manufacturing Lead
TRECLab at Virginia Tech

05/20 – 08/20
Blacksburg, VA

- Rapidly designed, prototyped, and deployed 3D printed PPE systems (face shields, aerosol shields, and other PPE) for use in response to the COVID-19 pandemic.
- Coordinated mass community manufacturing of infection control approved PPE designs.
- Additionally constructed and managed TREC Lab server/network infrastructure.

Robotic Software Systems Intern
NASA Langley Research Center

06/19 – 08/19
Hampton, VA

- Created prototype electronics and software for a small scale lunar manipulator system.
- Linked legacy robotic systems with overarching NASA Langley ROS pipeline.
- Designed software to perform a demonstration of lunar payload deployment using a pair of robots.
- Mentored a Summer Residential Governor's School student in robotics, and taught Python and Electronics.

Robotic Controls and Assembly Intern
NASA Langley Research Center

08/17 – 08/18
Hampton, VA

- Lead software development on the CIRAS autonomous robotic truss assembly project, culminating in a successful demo.
- Created a central robotic command and control program, coordinating the actions of a team of autonomous robots.
- Utilized real-time Speedgoat systems and Simulink to implement specialized hexapod kinematics and control hardware.
- Designed and built hardware concepts for modular genderless robotic connection.
- Created forward and inverse kinematic software for serialized parallel manipulators.

Education

Master of Science   Computer Science
Virginia Polytechnic Institute and State University   GPA 3.77

Aug 2020 – Dec 2022
Blacksburg, VA

Bachelor of Science   Major: Computer Science, Minor: Mathematics
Virginia Polytechnic Institute and State University   GPA 3.64

Aug 2018 – May 2021
Blacksburg, VA

Associate of Sciences   Electrical Engineering
Germanna Community College   GPA 3.286

May 2015 – Dec 2017
Spotsylvania, VA

Publications and Patents
- Submitted: Chapin, S., Chapin, W., and Komendera, E., "Semantic and Fiducial Aided Graph Simultaneous Localization and Mapping (SF-GraphSLAM) for Robotic In-Space Assembly and Servicing of Large Truss Structures, Frontiers in Robotics and AI Field Robotics, 2024
- Chapin, S.; Everson, H.; Chapin, W.; Komendera, E. Built On-Orbit Robotically Assembled Gigatruss (BORG): Ground Robotic Demonstration. Aerospace 2024, 11, 447. https://doi.org/10.3390/aerospace11060447
- Beach, B., Chapin, W., Chapin, S., Hildebrand, R., and Komendera, E., "Force-Controlled Pose Optimization andTrajectory Planning for Chained Stewart Platforms," Frontiers in Mechanical Engineering, 2023
- Chapin, S., Everson, H., Chapin, W., Quartaro, A., and Komendera, E.,"Built On-orbit Robotically-assembled Gigatruss (BORG): Mixed Assembly Architecture Trade Study," Frontiers in Robotics and AI, 2023
- Neilan et al. "Modular and Reconfigurable Assembler System for Autonomous In-Space Assembly." Patent Pub. No: US20220091593A1, 2022
- Martin J., Bisio, D., Chapin, W., and Komendera, E., "Development of a Commercialized Lightweight Surface Manipulation System for Autonomous Operations," ASCEND In-Space Autonomy and Reliability Workshop, 2022
- Moser, J., Anderson, W., Everson, H., Quartaro, A., Chapin, W., Beach, B., Hoffman, J., Hildebrand, R., and Komendera, E., "Recent Developments in Robust, Accurate Autonomous Assembly Methods for Surface and Orbital Structures", ASCEND 2020. AIAA 2020-4270. 2020.
- Chapin, W., and Komendera, E., "Habitat Scale Polar Coordinate 3D Printing System,"IROS Robotic In-Situ Servicing, Assembly and Manufacturing Workshop, 2020
- Moser, J., Cooper, J., Neilan, J., Chapin, W., Glassner, S., and Komendera, E., "A Reinforcement Learning Approach for the Autonomous Assembly of In-Space Habitats and Infrastructures in Uncertain Environments," 70th International Astronautical Congress, 2019
- Wong, I., Chapin, W., and Komendera, E., "A Collaborative Manipulation Strategy for the Assembly of Space Trusses," RSS Space Robotics Workshop, 2018
- Wong, I., Chapin, W., and Komendera, E., "Validation of Operations for the In-Space Assembly of a Backbone Truss for a Solar-Electric Propulsion Tug," AIAA Space and Astronautics Forum, 2018.