Joey Carpinelli

Technical Résumé
Available at ***resume.loopy.codes***

Professional Experience

NASA Johnson Space Center (JSC)

August 2017 — Present

GN&C Engineer, Pathways Intern, USRA Intern

- Full time as of July 2021; Orion's Launch Abort System GN&C development, analysis, verification
- Reduced, analyzed, and implemented flexible body (structure) model (MATLAB, C++)
- Used monte-carlo simulations for parameter tuning; improved vehicle performance noticeably
- Used linear analysis to analyze vehicle performance, verify stability margins; validates linear models
- Served as backup regression data approver for simulated Orion Launch Abort System performance
- Led development for polarity tests; created novel 6DOF kinematics simulation (Julia, Python); represented Orion GN&C at multiple lab tests in three states: Texas, Colorado, Florida

Space Systems Laboratory (SSL)

August 2016 — May 2021

Graduate Assistant

- Led core robot software development (C++, ROS) as Graduate Assistant under Dr. Dave Akin
- Developed novel Julia package to generate symbolic manipulator kinematics models; implemented and merged required changes to `ModelingToolkit.jl`; intermediate Jacobian performance substantially improved over **Orocos** iterative solvers; implemented fast inverse-kinematics algorithm
- Created C++ interfaces (templates) and implementations for control, including force/torque control
- Maintained operator GUI (Python); diver for Neutral Buoyancy Research Facility Maintenance

Harris Corporation

May 2016 — August 2016

Electrical Engineering Intern

- Automated Excel task with VBA; 20 worker hours → 2 minute runtime
- Worked with one other intern to implement rain attenuation ITU Propagation Model; MATLAB functions written to implement model calculations, C# used to gather terrain data

SRI International

May 2015 — December 2015

Data Annotation Intern

- Collected and annotated data to train deep-learning algorithms; improved process with scripting
- Designed LED Array and circuit layouts for gaze tracking project using Eagle CAD

Education

M.S. Aerospace Engineering

May 2021

University of Maryland, College Park

- Research assistant under Dr. Akin; space robotics (manipulator) software lead, primary operator
- Halo orbit & invariant-manifold research project with Instructor Barbee; released as open source
- Emphasis in space systems, prioritized dynamics & controls in coursework

B.S. Electrical Engineering

May 2019

University of Maryland, College Park

- Four control theory courses, four computer science courses; major emphasis in control theory
- Undergraduate Research Assistant under Dr. Akin at SSL; ROS/Orocos software lead in third year
- Implemented inertial and viscous friction compensation for SSL's MGA Exoskeleton (Galil, UART)

Technical Skills

Computer Programming

- Experienced Julia & Python developer; aerospace dynamics, simulation, and analysis applications
- Experienced C/C++ developer; robot core software, kinematics, & control applications
- Currently tutoring student seeking C/C++ certification

Modeling & Simulation

- Utilized linear model reduction, linear analysis, and nonlinear analysis techniques
- Frequent 6DOF monte-carlo simulations (NASA, Trick), stiff differential equation solves (Julia)
- Near-daily HPC use through `slurm` for general compute resources, and massively parallel simulations

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Personal Projects

`GeneralAstrodynamics.jl`

General calculations, visualizations, and halo & manifold solvers. Presented at ***JuliaCon****!*

`AstrodynamicalModels.jl`

Model generation, with optional state transition matrix dynamics. See also: ***`AstrodynamicalCalculations.jl`****.*

`SPICEKernels.jl`

All generic kernels provided by NASA, exposed and cached through Julia functions. See also: ***`SPICEApplications.jl`****,* ***`SPICEBodies.jl`****.*

`HorizonsEphemeris.jl`

Request JPL Horizons ephemeris data from within Julia, with a simplified interface! For a verbatim wrapper, see ***`HorizonsAPI.jl`****.*

`PolynomialGTM.jl`

Implements publicly available polynomial models for NASA's Generic Transport Model using `ModelingToolkit.jl`.

`CommonLicenses.jl`

Inline any ***standard license*** *into your executable document! For example: `CommonLicenses.MIT()`.*

`dimples`

An ongoing experiment in improved Python packaging and environment replication, with inspiration from Julia's `Pkg.jl`.

`module-hygiene`

Provides an `__export__` key for namespace hygiene. See also: ***`block-scopes`****.*

`rich-admonitions`

Extends the excellent terminal formatting package `rich` with Julia-style Markdown admonition blocks!

Personal Media

@cadojo

in/joeycarp

https://loopy.codes