Last Updated on 21st December 2021

Rajiv Govindjee

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EDUCATION

UC BERKELEY

B.S. Electrical Engineering & Computer Science
Minor: Mechanical Engineering
May 2022 | Berkeley, CA
Overall GPA: 3.7 / 4.0
EECS GPA: 3.9 / 4.0

LINKS

Github:// **rgovindjee**
LinkedIn:// **rgovindjee**

COURSEWORK

- Model Predictive Control (grad)
- Control for Legged Robots
- Embedded Systems, Robotics
- Machine Learning
- Artificial Intelligence
- Convex Optimization
- Advanced Algorithms
- Formal Methods (grad)
- Computer Architecture
- Mechanics, Thermodynamics
- Digital Design (FPGAs)

SKILLS

PROGRAMMING

Proficient:
Python • MATLAB / Simulink • Java • C • RISC-V • Go • ROS • CARLA • Scheme • Pyomo • Git • Mercurial • vim • LaTeX • pandas • NumPy • SciPy

Familiar:
C++ • Verilog • OpenMP • Intel AVX • ARM mbed • SQL • R • Fortran • Rust • MuJoCo • CVX • PyTorch

SOFTWARE TOOLS

Proficient:
Cadence Allegro • Eagle • KiCad • Vivado • SolidWorks • Inventor • AutoCAD • Fusion360 • Adobe Creative Cloud • Microsoft Office

Familiar:
CATIA • Altium • SPICE

LANGUAGE

Proficient:
Spanish • German

EXPERIENCE

WING | Guidance, Navigation, and Controls Intern

2021 | Palo Alto, CA (remote)

- Designed control mixer for concept fixed-wing eVTOL aircraft in MATLAB / Simulink and integrated embedded C++ autocode with on-vehicle code
- Evaluated mixer performance with Python nonlinear optimization tools

APPLE | iPhone Hardware Year-Long Co-Op

2020 – 2021 | Cupertino, CA

- Developed Python tests and API for new silicon bringup, enabling validation of voltage regulators, crystal oscillators, and serial communication
- Carried out root cause analysis and hardware debug for interaction issues including ground bounce, EMI, capacitive and inductive coupling, etc.
- Developed end-to-end automated signal integrity validation flow for SPI, I2C, and SPMI traffic and implemented with contract manufacturers in China
- Debugged and reduced sources of error with Kelvin sensing and ADC sampling

THE BOEING COMPANY | Flight Controls Intern

2019 | Everett, WA

- Developed a first-principles dynamic model and ran Monte Carlo simulations in MATLAB to assess potential safety issue for the 787 high lift system
- Created a Simulink / Simscape model to determine viability of a proposed design change to an electric motor under dynamic loading conditions
- Audited connectors and wire bundles for appropriate design with respect to harsh environmental conditions including vibration, moisture, and temperature

FLETCHER LAB | Research Assistant

2018 – 2019 | UC Berkeley

- Designed PCBs to power and control LED arrays for mobile phone microscopy illumination; wrote and tested firmware for boards in Arduino / C++

EXTRACURRICULARS

SPACE TECHNOLOGIES & ROCKETRY CLUB (STAR)

Systems Engineering Lead, Operations and Safety Officer
2018 – 2021 | UC Berkeley

- Led team of nine members to develop and manage CONOPS, requirements, FMEAs, BOMs, verification & validation plans, and checklists
- Coordinated vehicle final integration and launch operations for four launches

Payload, Avionics, and Propulsion Team Member
2017 – Present | UC Berkeley

- Performed electrical and mechanical design and fabrication for scientific payloads, liquid bi-propellant engine controller, and recovery electronics
- Performed additive and subtractive manufacturing (CNC and manual milling, laser and waterjet cutting, SLA and FDM 3D printing, milling, etc.)

TEACHING

EE 198 (HANDS-ON PCB ENGINEERING) | Lead Instructor

Spring 2021 – Spring 2022 | UC Berkeley
Created and delivered weekly lectures to class of 25+ students. Ran remote PCB design labs in KiCad + 3 hands-on assembly and bringup labs with 4-person staff.

CS 61A (INTRO PROGRAMMING AND ALGORITHMS) | Lab TA

Spring 2018 | UC Berkeley

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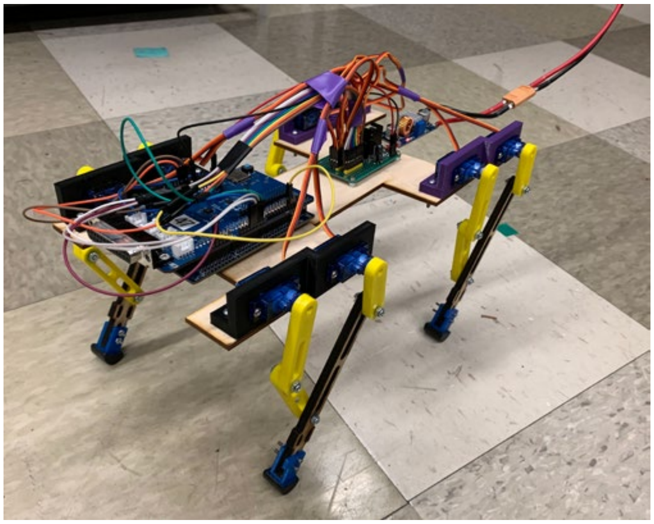


TART: TART Autonomously Roams Terrain

Embedded Systems (EECS 149) and
Feedback Control for Legged Robots (ME 193B)

TART is a low-cost quadrupedal robot intended to move with both dynamically and statically stable gaits. Designed for potential applications in disaster relief, TART can report environmental sensor data via Bluetooth Low Energy (BLE); sensors record air pressure, humidity, light intensity, temperature, and potentially volatile organic compounds. I designed, tested, and implemented the control system. I also designed the 5-bar leg linkages using nonlinear optimization to maximize the reachable space for each foot.

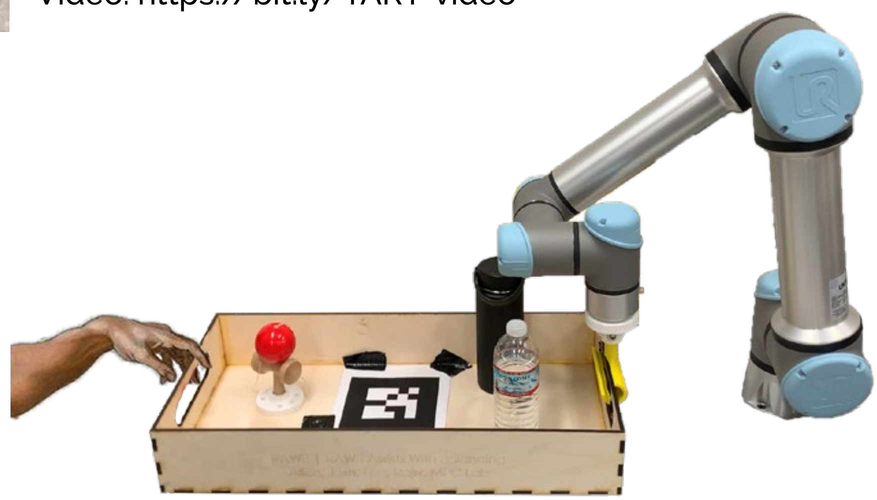
Video: https://bit.ly/TART-video

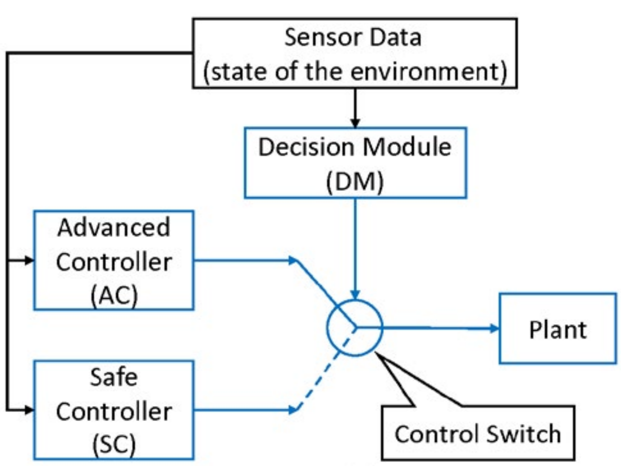
RAWB: RAWB Assists With Balancing

Robotics (EECS 106A)

RAWB uses a UR5e robotic arm to comfortably balance and move a tray with objects on it in collaboration with a human. Interaction with the robot is natural and predictable, and occurs in 4 degrees of freedom (three translational and one rotational). I worked on control system design, mechanical design, and construction of hardware.

Video: https://bit.ly/RAWB-video





Learning Runtime Monitors from Simulation

Formal Methods (EECS 219C)

This project employs a runtime-assurance (RTA) module to ensure the satisfaction of a safety property at runtime while maximizing performance. Control policy is learned from experience with previous simulations. We demonstrate the architecture using the CARLA autonomous driving simulator; in this case, the RTA module ensures the ego car does not crash into other cars or experience lane departures. I designed the adaptive cruise and lane-keeping controller, and wrote code to efficiently label simulation data.

Video: https://bit.ly/RTA-video

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AirBears and Bear Force One

Space Technologies and Rocketry (2019-2021)

AirBears (left) and Bear Force One (right) are solid-fuel sounding rockets. AirBears is a test vehicle and has been flown twice (apogee ~7,700 ft); Bear Force One placed first in the collegiate FAR 1030 competition by carrying over 8.8 lbm of scientific payloads to over 10,000 ft. I was the team's Operations and Safety Lead for AirBears, directing vehicle final integration and coordinating launch-day procedures. I was the Systems Engineering Lead for Bear Force One and ultimately responsible for cross-functional engineering issues through design, production, and launch.

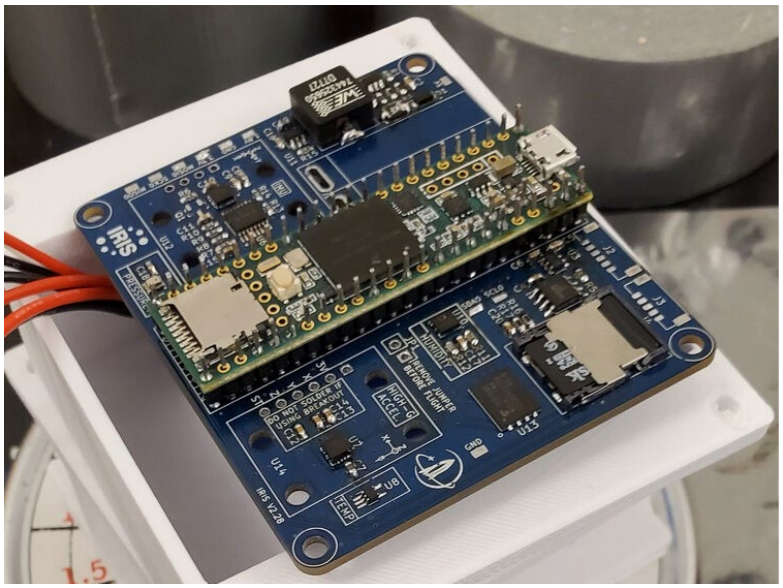
Video: https://bit.ly/BFO-video

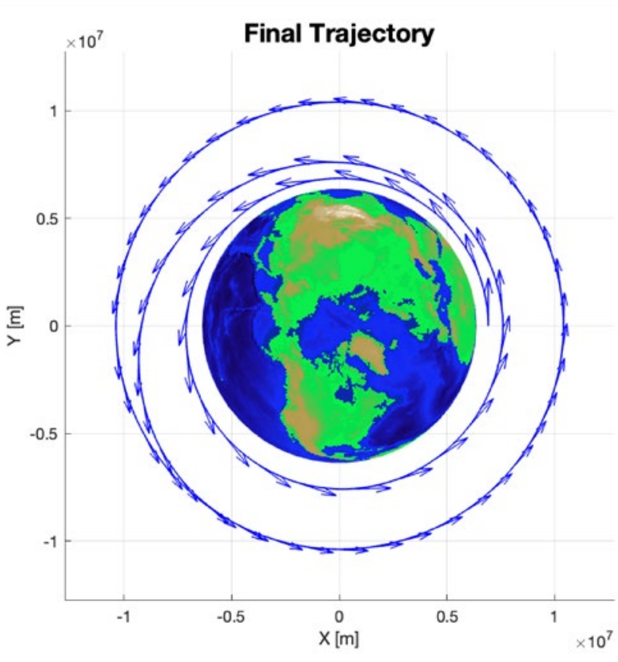
IRIS: IRIS Records Information via Sensors

Space Technologies and Rocketry (2018-2021)

IRIS is a self-contained payload designed to measure barometric pressure, acceleration, orientation, temperature, and humidity throughout a rocket's flight. Data can be logged to both a soldered flash memory chip or removable SD card. Versions of IRIS have flown on club sounding rockets (see above), and been recovered successfully. I worked on component selection, schematic and layout design for early versions of IRIS; I provided design review, assembled boards, debugged electrical issues, and wrote C/C++ software throughout.

ECAD (sensing board): https://bit.ly/IRIS-core
ECAD (power board): https://bit.ly/IRIS-power





MPC for Satellite Orbit Raising and Circularization

Model Predictive Control (ME C231A)

This project uses model predictive control techniques to plan trajectories for satellite orbital maneuvers. The highly nonlinear orbital dynamics are first linearized and discretized about a reference trajectory, and constraints are convexified. Control inputs are then generated using Pyomo, an open-source optimization modeling language, and an interior point solver (ipopt). I designed the overall software architecture and developed the closed-loop controller architecture, including the use of nonlinear sequential convex programming (SCPn) to increase the accuracy of generated trajectories. I also developed an extensive test suite with both unit tests and integration tests. Future work includes extending the code to work for reconfiguring constellations of small satellites.

Code: https://bit.ly/mpconstellation-code