Chris D. Breaux

US Citizen

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Education

Robotics and Autonomous Systems (Mechanical Engineering) M.S. | Arizona State University — Graduation: May 2021
GPA: 4.00/4.00

Mechanical Engineering B.S.E. | Arizona State University, Barrett the Honors College — Graduation: May 2020
GPA: 3.74/4.00

Skills

Programming
- MATLAB
- Linux
- Git
- Python
- ROS
- VRML
- Arduino
- LabVIEW
- Java

CAD & FEA
- SolidWorks
- Solid Edge
- ANSYS
- Fusion 360
- Tinkercad

Simulation
- Simulink
- Webots
- Gazebo

Optimization
- YALMIP

Motion Capture
- Motive

Drone Control
- QGroundControl

Laser Cutting
- UCP

3D Printing
- Ultimaker Cura
- LulzBot Cura
- Ideamaker
- Zortrax Z-Suite
- MakerBot Print
- Formlabs Preform

Basic Computing
- Microsoft Office
- Google Drive
- Adobe CC

Experience

Graduate Researcher | Optimal Control for Lunar Tumbling Robot
Arizona State University | Intelligent Control and Estimation of Things (ICE-T) Lab | NASA — Aug 2020 – April 2021

As a sole graduate researcher, designed a hybrid control framework to handle multiple control modes and instantaneous jumps. Dynamics for three maneuvers were modelled and discretized for usage within the framework and the optimizer. Performance metrics were defined as cost functions and constraints. Code was accelerated to reduce process time. Optimized models were validated with a high-resolution simulation. The optimizations improved performance and revealed distinct behavior for different cost functions.

Optimal Control | Hybrid Control | Modeling | Code Acceleration | Simulation

Summer Intern | Numerical Simulator for Lunar Tumbling Robot
NASA | Goddard Space Flight Center — Jun 2020 – Aug 2020

Hired as a sole Summer intern to create a 3D simulation test bed as a platform to develop estimation and control algorithms for NASA's lunar tumbling robot. Created physically accurate robot assets and lunar environment with interchangeable components. Implemented python-based mode logic and motion control algorithms for manual and autonomous control. Optimized workflow with automated processes to rapidly adjust simulations and process data. Created a user manual and tutorials for others to reuse and reproduce all work from scratch. Maintained distributed version control of source code with git.

Simulation | Mode Logic | PID | Automation | Documentation | Version Control

Makerspace Student Worker
Arizona State University | Hayden Library Makerspace — Sep 2019 – April 2021

3D Printing | 3D Printer Repair | Laser Cutting | Media Production | Consulting | Trainings / Workshops

Capstone | Satellite Solution for Harmful Orbital Targets (Sat-SHOT)
Arizona State University | Howe Industries — Aug 2019 – May 2020

As the CAD engineer on a capstone team of six, designed custom parts and selected electronic components for a mechanical system to freeze an ice projectile, reject heat to space, and load the projectiles into a gas gun. This satellite will fire at and deorbit existing space debris with no secondary debris.

CAD Design | Thermodynamics | Orbital Mechanics | Manufacturing | Process Control

Independent Researcher | Two-Wheel Self-Balancing Robot
Arizona State University | Independent Research Continued as Team Project — Jan 2019 – Dec 2019

For fun, designed an Arduino-based two-wheel self-balancing robot on a custom chassis. Later, as a team of four, developed PID, full state feedback, and LQR controllers for self-balancing that worked in simulations but did not work on the hardware due to software threading constraints.

CAD Design | Controller Design | PID | FSF | LQR

Undergraduate Researcher | Autonomous Coupling of a UAV and UGV
Arizona State University | Human Oriented Robotics and Control (HORC) Lab — Nov 2018 – Nov 2019

As a sole undergraduate researcher, developed a heterogeneous team of robots that navigate a space in coupled and decoupled configurations to overcome obstacles and increase range. Designed an electromagnetic coupling mechanism that allows a UAV to lift a UGV over an obstacle and allows the UGV to carry the UAV greater distances. Implemented python-based mode logic and motion control algorithms for autonomous control. This team of simple robots can achieve more together than they could on their own but cost less than a single robot with the same capabilities. [Video]

Multi-Robot System | Autonomous Control | Motion Capture | Rapid Prototyping

Click here or scan the QR code to see more of my projects: