Chris D. Breaux

US Citizen

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Education

Robotics and Autonomous Systems (Mechanical Engineering) M.S. | Arizona State University — Projected 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 – Current

Investigating optimal control techniques for hybrid systems using the YALMIP MATLAB toolbox. Findings will be applied to NASA's lunar tumbling robot in the Webots robotic simulator.

Optimal Control | Hybrid Systems | Model Predictive Control | Simulation

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

Created a 3D simulation test bed in Webots as a platform to develop estimation and control algorithms for NASA's lunar tumbling robot. Converted Solid Edge assemblies to VRML-based robot models. Implemented python-based mode logic and motion control algorithms for manual and autonomous control. Optimized workflow with automated processes to rapidly adjust and iterate simulations. Created a wiki page with a user manual and tutorials for others to reuse and reproduce all work from scratch. Generated video demonstrations for project fundraising. 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 – Current

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

Designed a thermodynamic system to freeze an ice projectile and reject heat to space. Designed an electronically controlled mechanical system to load ice projectiles into a gas gun that will fire at and deorbit existing space debris. All system components were designed in SolidWorks to be produced by a combination of metal fabrication and 3D printing. Prototype manufacturing was halted due to Covid-19 shutdowns.

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

Designed Arduino-based robot on a custom 3D-printed chassis. Team developed PID, full state feedback, and linear quadratic regulator controllers for self-balancing. [See GrabCAD for more information]

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

The UAV can follow the UGV through a space, couple with the UGV, and lift the UGV over an obstacle. The UGV can navigate the space while carrying the UAV. This heterogeneous 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.

Designed electromagnetic coupling mechanism in SolidWorks. Designed Python/ROS based autonomous controls. Used OptiTrack motion capture system for localization and tracking. Processed position tracking data using MATLAB. Presented research to a panel of professors. Thesis was accepted and approved. [See Video, Paper, or GrabCAD for more information]

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

See more of my personal projects on GrabCAD

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