# Thomas Antony

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## EDUCATION

### PURDUE UNIVERSITY
**Ph.D. Aeronautics & Astronautics**
May 2018 | West Lafayette, IN
Advisor: Prof. Michael J. Grant
*Dissertation: Large Scale Constrained Trajectory Optimization using Indirect Methods*

### PURDUE UNIVERSITY
**MS Aeronautics & Astronautics**
December 2014 | West Lafayette, IN
Major: Aerospace Systems, Minor: Astrodynamics
Advisor: Prof. Michael J. Grant
*Thesis: Rapid Indirect Trajectory Optimization on Highly Parallel Computing Architectures*

### COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY
**B.Tech Mechanical Engineering**
June 2011 | Kochi, India

## COURSEWORK

### GRADUATE
Hypersonic Performance and Design
Astronautical Navigation and Guidance
Guidance and Control of Aerospace Vehicles
Optimization in Aerospace Engineering
Multidisciplinary Design Optimization
Principles of Dynamics
Orbital Mechanics
Spacecraft Attitude Dynamics

## SKILLS

### SOFTWARE
Proficient
Rust • C++ • Python • Matlab • LaTeX
Intermediate
Unix shell • C • Javascript • Assembler
Familiar
Clojure • Simulink

### OTHER
Git • Docker

## MISCELLANEOUS
Private Pilot w/ Instrument Rating

## INDUSTRY

### RAVEN INDUSTRIES | Research Engineer
via acquisition of Smart Ag
Nov 2019 - Present | Ames, IA
- Helped bring to production the first driverless grain cart on the market
- Architecting/developing a general high-level, executive control framework for multiple agricultural vehicles and operations
- Wrote low-level device drivers for a QNX RTOS embedded system

### SMART AG | Intern → Autonomous Vehicle Engineer
Jan 2017 – Aug 2017, Feb 2018 – Nov 2019 | Ames, IA
- Developed high-level executive control software for autonomous tractor
- Multi-channel redundant communication system using MQTT
- Guidance algorithm for "sync" operation between a combine harvester and autonomous tractor
- Designed basic perception system that utilizes radar and cameras to detect obstacles
- Simulator for automated testing of vehicle control software

## RESEARCH

### RAPID DESIGN OF SYSTEMS LABORATORY | Graduate Research Assistant
Aug 2013 – Feb 2018 | West Lafayette, IN
- Open source mission design framework (**beluga**) that uses indirect methods
- GPU-accelerated indirect trajectory solver for Matlab

### AFRL MATHEMATICAL MODELING AND OPTIMIZATION INSTITUTE | Visiting Researcher
May 2015 – Aug 2015 | Shalimar, FL
Developed an adaptive numerical method for solving two-point boundary value problems

## PROJECTS

**APOLLO ENTRY GUIDANCE IMPLEMENTATION IN PYTHON** • 3Blue1Brown Summer of Math Exposition 2021
**MONTE CARLO SIMULATION OF A HIAD MARS LANDER** • NASA Big Idea Challenge 2016, Finalist
**AEROCAPTURE TRAJECTORY DESIGN** • Inspiration Mars Student Design Competition, 2014

## SELECTED PUBLICATIONS

[1] T. Antony and M. J. Grant. Rapid Indirect Trajectory Optimization on Highly Parallel Computing Architectures. *Journal of Spacecraft and Rockets*, 54(5):1081–1091, 2017.

[2] T. Antony and M. J. Grant. Quasilinear Chebyshev-Picard Iteration Method for Indirect Trajectory Optimization. In *AIAA Atmospheric Flight Mechanics Conference*, 2019.

[3] M. J. Grant and T. Antony. Rapid Indirect Trajectory Optimization of a Hypothetical Long Range Weapon System. In *AIAA Atmospheric Flight Mechanics Conference*, 2016.