

# DAVID VAN WIJK

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## EDUCATION

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### Texas A&M University

(2021 - Expected August 2025)

*Ph.D., Aerospace Engineering*, Advisor: Prof. [Manoranjan Majji](#)

Thesis (Tentative): "Safety-Critical Control of Input-Constrained Autonomous Systems with Spacecraft Applications"

### Cornell University

(2017 - 2021)

*B.S., Mechanical and Aerospace Engineering*

GPA: 3.83, *Magna Cum Laude*

## RESEARCH FOCUS AND SKILLS

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I am a Ph.D. candidate passionate about developing **provably safe control algorithms for autonomous systems**. My research focuses on robotic and spacecraft applications, where I leverage insights from control theory, optimization, and estimation to enhance the reliability of autonomous operations in complex environments.

**Research Interests:** Safe Autonomy, Control Theory, Autonomous Vehicles, Nonlinear Systems

**Programming Languages:** Python, MATLAB, C++, Git, Java, LaTeX

**Tools:** Simscape Multibody, ANSYS, SolidWorks

## PUBLICATIONS

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### UNDER REVIEW

- R1. J. McElreath, **D. van Wijk**, M. Majji, "Controlling the Kalman Update - A Covariance Constrained Approach," *Submitted to IEEE Transactions on Aerospace and Electronic Systems (TAES)*, 2024.

### JOURNAL PUBLICATIONS

- J4. **D. van Wijk**, S. Coogan, T. G. Molnar, M. Majji, and K. L. Hobbs, "Disturbance-Robust Backup Control Barrier Functions: Safety Under Uncertain Dynamics," *IEEE Control Systems Letters (L-CSS) with ACC option*, 2024. ([link](#)) ([preprint link](#))
- J3. I. Down, **D. van Wijk**, D. Parikh, M. Majji, "Autonomous Satellite Servicing Infrastructure for In-Space Assembly and Manufacturing," *ASME Journal of Manufacturing Science and Engineering, Special Issue on In-Space Manufacturing*, 2024. (to appear)
- J2. **D. van Wijk**, K. Dunlap, M. Majji, and K. L. Hobbs, "Safe Spacecraft Inspection via Deep Reinforcement Learning and Discrete Control Barrier Functions," *AIAA Journal of Aerospace Information Systems (JAIS)*, 2024. ([link](#))
- J1. J. Gemerek, B. Fu, Y. Chen, Z. Liu, M. Zheng, **D. van Wijk**, S. Ferrari, "Directional Sensor Planning for Occlusion Avoidance," *IEEE Transactions on Robotics (T-RO)*, 2022. ([link](#))

### CONFERENCE PUBLICATIONS

- C6. K. Dunlap, K. Bennett, **D. van Wijk**, N. Hamilton, K. L. Hobbs, "Run Time Assured Reinforcement Learning for Six Degree-of-Freedom Spacecraft Inspection," *AIAA ASCEND 2024*, July 2024. ([link](#))
- C5. **D. van Wijk**, I. Down, and M. Majji, "On-Manifold Collision Avoidance using Tori Parametrization and Control Barrier Functions," *Rocky Mountain AAS GN&C Conference*, Breckenridge, Colorado, USA, 1-7 February 2024.
- C4. **D. van Wijk**, M. Majji, and K. L. Hobbs, "Fault Tolerant Run Time Assurance with Control Barrier Functions for Rigid Body Spacecraft Rotation," *AIAA SciTech 2024 Forum*, Orlando, Florida, USA, 7-12 January 2024. ([link](#))
- C3. **D. van Wijk**, K. Dunlap, M. Majji, and K. L. Hobbs, "Deep Reinforcement Learning for Autonomous Spacecraft Inspection using Illumination," *2023 AAS/AIAA Astrodynamics Specialist Conference*, Big Sky, Montana, USA, 13-17 August 2023. ([link](#))
- C2. K. Dunlap, **D. van Wijk**, and K. L. Hobbs, "Run Time Assurance for Autonomous Spacecraft Inspection," *AAS/AIAA Astrodynamics Specialist Conference*, Big Sky, Montana, USA, 13-17 August 2023. ([link](#))
- C1. **D. van Wijk**, K. Eves, and J. Valasek, "Deep Reinforcement Learning Controller for Autonomous Tracking of Evasive Ground Target," *AIAA SciTech 2023 Forum*, National Harbor, Maryland, USA, 23-27 January 2023. ([link](#))

### OTHER PUBLICATIONS

- O1. **D. van Wijk**, "Stochastic Control Barrier Functions for Economics," *arXiv*, 2023. ([link](#))

## AWARDS AND HONORS

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- **Texas A&M Graduate Excellence Fellowship Award:** Fall 2022, Fall 2023
- **Texas A&M Graduate Merit Fellowship:** 2021 – 2025
- **Cornell University Dean’s List:** Spring 2018; Fall 2018; Spring 2019; Fall 2019; Fall 2020; Spring 2021

## OUTREACH AND MENTORSHIP

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- **Camp SOAR Outreach** (2022, 2023): Led laboratory tours and demonstrations for high school students interested in STEM.
- **Texas A&M Physics Festival** (2022, 2023): Led demonstrations for students K-12 to inspire the next generation of STEM students.
- **Mentored Haru Tidmore (M.S. Student):** Provided technical support and guidance to master’s student on topic of multi-body dynamics modeling and control of 7-DOF manipulator mounted to free-flying spacecraft.

## PROFESSIONAL SERVICE

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- **Session Chair:** *AAS/AIAA Astrodynamics Specialist Conference 2023*, led and organized four technical sessions.
- **Reviewer:** *IEEE Control Systems Letters* (2), *IEEE American Control Conference 2025* (2), *AIAA Journal of Guidance, Control, and Dynamics* (1), *AIAA Journal of Aerospace Information Systems* (3), *Journal of the Astronautical Sciences* (1), *AIAA SciTech Conference 2024* (5), *AIAA Ascend 2024* (3)

## INVITED TALKS

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11. “Fault Tolerant Run Time Assurance with Control Barrier Functions for Rigid Body Spacecraft Rotation.” *Air Force Research Laboratory, Safe Trusted Autonomy for Responsible Spacecraft Annual Review*. October 2023.

## SELECT RESEARCH EXPERIENCE

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### **Safe Autonomy for Spacecraft Control** (Aug ‘22 - Current)

*Research Internship with Dr. Kerianne Hobbs, Air Force Research Laboratory (AFRL), Safe Autonomy Team*

Trained reinforcement learning agents for autonomous rendezvous, proximity operations, and docking (ARPOD) scenarios, and developed control barrier function based run-time assurance algorithms to guarantee safety of those agents. (J2, C6, C4, C3, C2)

### **Simulation and Control of 7-DOF Spacecraft Manipulator** (Aug ‘23 - Jan ‘24)

*Graduate Research with Arkisys and Prof. Manoranjan Majji, Texas A&M University*

Developed and validated a control system and manipulator planning system for 7-DOF robotic arm mounted on free-flying spacecraft using MATLAB Simulink and Simscape Multibody.

### **Spacecraft Manuever Classification using ML** (Jan ‘23 - May ‘23)

*Graduate Research with Ten One Aerospace, LLC and Prof. Manoranjan Majji, Texas A&M University*

Built simulation of ground sensor and spacecraft dynamics to perform machine learning (ML) analysis for learning maneuver intent from ground sensor image traces.

### **Path Planning for Autonomous Drone** (Jun ‘19 - May ‘21)

*Undergraduate Research with Prof. Silvia Ferrari, Cornell University*

Implemented and flight-tested custom algorithms for path planning in the presence of obstacles for an autonomous drone in occluded environments. (J1)

## REFERENCES

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**Dr. Manoranjan Majji**, Professor of Aerospace Engineering, Texas A&M University — contact: [mmajji@tamu.edu](mailto:mmajji@tamu.edu)

**Dr. Kerianne Hobbs**, Safe Autonomy Lead, Air Force Research Laboratory — contact: [kerianne.hobbs@afrl.af.mil](mailto:kerianne.hobbs@afrl.af.mil)