

# ALEXANDER VON MOLL

## PERSONAL INFORMATION

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## GOAL

Make meaningful research contributions to the area of cooperative control

## WORK EXPERIENCE

<i>Air Force Research Laboratory</i>	<i>2017—</i> <b>Research Engineer, AFRL/RQQA</b> Perform fundamental research as a member of the UAV Cooperative Control Team under the Autonomous Controls Branch of the Power and Control Division. Describe, define, and solve problems of interest to the Air Force in the areas of pursuit-evasion differential games and algorithms for persistent intelligence, surveillance, and reconnaissance.
<i>Air Force Research Laboratory</i>	<i>2012–2017</i> <b>Research Engineer, AFRL/RQTE</b> Served as Integrated Product Team member under several turbine engine technology programs. Established plans and roadmaps for turbine engine control technologies. Supported research programs in turbine engine control software, actuators, and sensors.
<i>Boeing</i>	<i>Sum. 2011</i> <b>Software Development Intern, BOEING</b> Developed support software and tools for the F-15SA flight control software group.

## EDUCATION

<i>PhD in Electrical Engineering</i>	<i>2019–2022</i> <b>University of Cincinnati</b> GPA: 4.0 · School: Engineering Research: <i>Skirmish-Level Tactics via Game-Theoretic Analysis</i> Advisor: Prof. Zachariah FUCHS
<i>Masters in Aerospace Engineering</i>	<i>2014–2015</i> <b>Georgia Institute of Technology</b> GPA: 4.0 · School: Engineering Special Project: <i>Machine Learning Applications in Complex Control Systems</i> Description: The iterative linear quadratic Gaussian algorithm was re-derived, and the application of Gaussian Process Regression Networks to the algorithm was explored. Advisor: Assoc. Prof. Evangelos THEODOROU
<i>Bachelors in Aero/Astro Engineering</i>	<i>2008–2012</i> <b>The Ohio State University</b> GPA: 3.97 · <i>Minor: Computer Science</i> · School: Engineering

## Journal Articles

- Bajaj, Shivam, Jha Bhargav, et al. "Shortest Trajectory of a Dubins Vehicle with a Controllable Laser". In: *Transactions on Automatic Control* (June 30, 2024). Submitted for Review.
- Bajaj, Shivam, Shaunak Bopardikar, Eric Torng, et al. "Multi-vehicle Perimeter Defense in Conical Environments". In: *Transactions on Robotics and Automation* (Jan. 10, 2024). DOI: [10.1109/TRO.2024.3351556](https://doi.org/10.1109/TRO.2024.3351556).
- Jha, Bhargav et al. "Linear Quadratic Guidance Law for Joint Motion Planning of a Pursuer-Turret Assembly". In: *Journal of Guidance, Dynamics, and Control* (June 30, 2024). Submitted for Review.
- Von Moll, Alexander and Meir Pachter. "Complete Solution of the Lady in the Lake Scenario". In: *International Symposium on Dynamic Games and Applications* (July 9, 2024). URL: <https://arxiv.org/abs/2401.14994>.
- Von Moll, Alexander and Isaac Weintraub. "Basic Engagement Zones". In: *Journal of Aerospace Information Systems* (June 1, 2024). Submitted for Review. URL: <https://arxiv.org/abs/2311.06165>.
- Bajaj, Shivam, Shaunak D. Bopardikar, et al. "Competitive Perimeter Defense with a Turret and Mobile Vehicle". In: *Frontiers in Control Engineering* (Feb. 27, 2023). DOI: [10.3389/fcteg.2023.1128597](https://doi.org/10.3389/fcteg.2023.1128597).
- Dillon, Patrick M. et al. "Optimal Trajectories for Aircraft Avoidance of Multiple Weapon Engagement Zones". In: *Journal of Aerospace Information Systems* 20 (8 June 12, 2023), pp. 520–525. DOI: [10.2514/1.1011224](https://doi.org/10.2514/1.1011224).
- Von Moll, Alexander, Zachariah Fuchs, Daigo Shishika, et al. "Turret Escape Differential Game". In: *Journal of Dynamics and Games* 11 (2 Sept. 1, 2023). Presented at the 19th ISDG., pp. 100–114. DOI: [10.3934/jdg.2023012](https://doi.org/10.3934/jdg.2023012). URL: <https://avonmoll.github.io/files/turret-escape-differential-game.pdf>.
- Weintraub, Isaac, Alexander Von Moll, Eloy Garcia, et al. "Surveillance of a Faster Fixed-Course Target". In: *Transactions on Aerospace & Electronic Systems* (May 31, 2023). None. DOI: [10.1109/TAES.2023.3237129](https://doi.org/10.1109/TAES.2023.3237129). URL: <http://arxiv.org/abs/2209.11289>.
- Manyam, Satyanarayana Gupta, David W. Casbeer, et al. "Shortest Dubins Paths to Intercept a Target Moving on a Circle". In: *Journal of Guidance, Control, and Dynamics* (June 1, 2022). DOI: [10.2514/1.G005748](https://doi.org/10.2514/1.G005748).
- Von Moll, Alexander and Zachariah Fuchs. "A Lock-Evade, Engage or Retreat Game". In: *None* (Oct. 1, 2022). In preparation.
- Von Moll, Alexander, Meir Pachter, and Zachariah Fuchs. "Pure Pursuit with an Effector". In: *Dynamic Games and Applications* (Nov. 2, 2022), 961–979. DOI: [10.1007/s13235-022-00481-9](https://doi.org/10.1007/s13235-022-00481-9). URL: <https://avonmoll.github.io/files/pure-pursuit-with-an-effector.pdf>.
- Von Moll, Alexander, Meir Pachter, Daigo Shishika, et al. "Circular Target Defense Differential Games". In: *Transactions on Automatic Control* 68 (7 Oct. 5, 2022), pp. 4065–4078. DOI: [10.1109/TAC.2022.3203357](https://doi.org/10.1109/TAC.2022.3203357). URL: <https://avonmoll.github.io/files/circular-target-defense-differential-games.pdf>.
- Von Moll, Alexander, Daigo Shishika, et al. "The Turret-Runner-Penetrator Differential Game with Role Selection". In: *Transactions on Aerospace & Electronic Systems* 58 (6 May 23, 2022), pp. 5687–5702. DOI: [10.1109/TAES.2022.3176599](https://doi.org/10.1109/TAES.2022.3176599). URL: <https://avonmoll.github.io/files/trpdg-with-role-selection.pdf>.
- Dorothy, Michael et al. "One Apollonius Circle is Enough for Many Pursuit-Evasion Games". In: *Automatica* (Nov. 17, 2021). Accepted. arXiv: [2111.09205 \[math.OC\]](https://arxiv.org/abs/2111.09205). URL: <https://arxiv.org/abs/2111.09205>.
- Milutinović, Dejan, David W. Casbeer, et al. "Rate of Loss Characterization that Resolves the Dilemma of the Wall Pursuit Game Solution". In: *Transactions on Automatic Control* 68 (1 Dec. 27, 2021), pp. 242–256. DOI: [10.1109/TAC.2021.3137786](https://doi.org/10.1109/TAC.2021.3137786).
- Weintraub, Isaac E., Alexander Von Moll, Eloy Garcia, and Meir Pachter. "Maximum Observation of a Target by a Slower Observer in Three Dimensions". In: *Journal of Guidance, Control, and Navigation* 44 (3 Dec. 15, 2021). DOI: [10.2514/1.G005619](https://doi.org/10.2514/1.G005619).
- Garcia, Eloy, David W Casbeer, et al. "Multiple Pursuer Multiple Evader Differential Games". In: *Transactions on Automatic Control* (May 1, 2020). DOI: [10.1109/TAC.2020.3003840](https://doi.org/10.1109/TAC.2020.3003840).
- Manyam, Satyanarayana G., David W. Casbeer, et al. "Curvature Constrained Paths to Intercept a Target Moving on a Circle". In: *Transactions on Automation Science and Engineering* (Dec. 31, 2020). Submitted for Review.
- Pachter, Meir et al. "Cooperative Pursuit by Multiple Pursuers of a Single Evader". In: *Journal of Aerospace Information Systems* (Feb. 1, 2020). DOI: [10.2514/1.1010739](https://doi.org/10.2514/1.1010739). URL: <https://avonmoll.github.io/files/ManyPursuers.pdf>.
- Salmon, John L. et al. "Single Pursuer Multiple-Cooperative Evaders in the Border Defense Differential Game". In: *Journal of Aerospace Information Systems* (Mar. 19, 2020). DOI: [10.2514/1.1010766](https://doi.org/10.2514/1.1010766).
- Von Moll, Alexander, Eloy Garcia, et al. "Multiple Pursuer Single Evader Border Defense Differential Game". In: *Journal of Aerospace Information Systems* (Feb. 1, 2020). DOI: [10.2514/1.1010740](https://doi.org/10.2514/1.1010740). URL: <https://avonmoll.github.io/files/mp1e-border.pdf>.
- Pachter, Meir et al. "Two-on-One Pursuit". In: *Journal of Guidance, Control, and Dynamics* 42.7 (July 8, 2019). DOI: [10.2514/1.G004068](https://doi.org/10.2514/1.G004068). URL: <https://avonmoll.github.io/files/TwoCutters.pdf>.
- Von Moll, Alexander, David Casbeer, et al. "The Multi-Pursuer Single-Evader Game: A Geometric Approach". In: *Journal of Intelligent and Robotic Systems* 96 (2 Jan. 2, 2019), pp. 193–207. DOI: [10.1007/s10846-018-0963-9](https://doi.org/10.1007/s10846-018-0963-9). URL: <https://avonmoll.github.io/files/mp1e-journal.pdf>.

Von Moll, Alexander, Meir Pachter, Eloy Garcia, et al. "Robust Policies for a Multiple Pursuer Single Evader Differential Game". In: *Dynamic Games and Applications* (10 May 4, 2019), pp. 202–221. DOI: 10.1007/s13235-019-00313-3. URL: <https://avonmoll.github.io/files/mp1e-robust.pdf>.

## Conference Papers

- Maity, Dipankar et al. "Optimal Evasion From a Sensing Limited Pursuer". In: *American Control Conference*. Accepted. Toronto, Canada, July 8, 2024.
- Mora, Braulio et al. "Escape from an Orbiting Pursuer with a Nonzero Capture Radius". In: *None. None. None*, July 8, 2024.
- Von Moll, Alexander, David W. Casbeer, Isaac E. Weintraub, et al. "Pure Pursuit of a Target on a Circular Trajectory". In: *ALAA SciTech*. Accepted. Orlando, FL, Jan. 30, 2024. DOI: 10.2514/6.2024-0956. URL: [www.isaacew.com/publication/vonmoll2024pure/vonmoll2024pure.pdf](http://www.isaacew.com/publication/vonmoll2024pure/vonmoll2024pure.pdf).
- Weintraub, Isaac E., Alexander Von Moll, David W. Casbeer, et al. "Virtual Target Selection for a Multiple-Pursuer Multiple-Evader Scenario". In: Accepted. Orlando, FL, Jan. 30, 2024. DOI: 10.2514/6.2024-0123. URL: <https://arxiv.org/abs/2305.19399>.
- Bajaj, Shivam, Shaunak Bopardikar, Alexander Von Moll, et al. "Perimeter Defense using a Turret with Finite Range and Startup Times". In: *American Control Conference*. San Diego, USA: IEEE, May 31, 2023. DOI: 10.23919/ACC55779.2023.10155838.
- Weintraub, Isaac, Alexander Von Moll, and Meir Pachter. "Range-Limited Pursuit-Evasion". In: *2023 National Aerospace and Electronics Conference (NAECON)*. Dayton, OH, Aug. 28, 2023. DOI: 10.1109/NAECON58068.2023.10365808.
- Bajaj, Shivam, Eric Torng, et al. "Competitive Perimeter Defense of Conical Environments". In: *Conference on Decision and Control*. June 8, 2022. DOI: 10.1109/CDC51059.2022.9993007. URL: <https://arxiv.org/pdf/2110.04667.pdf>.
- Pourghorban, Arman et al. "Target Defense against Sequentially Arriving Attackers". In: *Conference on Decision and Control*. Cancun, MX: IEEE, Dec. 14, 2022. DOI: 10.1109/CDC51059.2022.9992425. URL: <https://arxiv.org/pdf/2212.06628.pdf>.
- Weintraub, Isaac E., Alexander Von Moll, Christian Carrizales, et al. "An Optimal Engagement Zone Avoidance Scenario in 2-D". In: *Scitech*. San Diego: AIAA, Jan. 3, 2022. DOI: 10.2514/6.2022-1587. URL: <https://arxiv.org/pdf/2111.05904.pdf>.
- Fuchs, Zachariah E., Alexander Von Moll, and David Casbeer. "Engage or Retreat Differential Game with N-Targets and Distributed Defensive Assets". In: *Conference on Controls Technology and Applications*. San Diego, CA, Aug. 31, 2021. DOI: 10.1109/CCTA48906.2021.9658922.
- Garcia, Eloy, David W. Casbeer, et al. "The Cooperative Blocking Differential Game". In: IEEE, Dec. 31, 2021. DOI: 10.1109/CCTA48906.2021.9658654.
- Von Moll, Alexander and Zachariah Fuchs. "Turret Lock-on in an Engage or Retreat Game". In: *American Control Conference*. New Orleans: IEEE, May 28, 2021, pp. 3188–3195. DOI: 10.23919/ACC50511.2021.9483106. URL: <https://avonmoll.github.io/files/turret-lockon-in-an-engage-or-retreat-game.pdf>.
- Von Moll, Alexander, Daigo Shishika, et al. "The Turret-Runner-Penetrator Differential Game". In: *American Control Conference*. New Orleans, May 26, 2021. DOI: 10.23919/ACC50511.2021.9483094. URL: <https://avonmoll.github.io/files/turret-runner-penetrator-differential-game.pdf>.
- Weintraub, Isaac, Alexander Von Moll, David Casbeer, et al. "Engagement Zone Defense of a Non-Maneuvering Evader". In: *Conference on Control Technology and Applications*. San Diego, CA, Aug. 31, 2021. DOI: 10.1109/CCTA48906.2021.9659042.
- Garcia, Eloy, David W. Casbeer, et al. "Pride of Lions and Man Differential Game". In: *Conference on Decision and Control*. Jeju Island, South Korea, Dec. 8, 2020. DOI: 10.1109/CDC42340.2020.9304060.
- Von Moll, Alexander, Pavlos Androulakis, et al. "Evolutionary Design of Cooperative Predation Strategies". In: *Conference on Games*. Osaka, Japan: IEEE, Aug. 24, 2020. DOI: 10.1109/CoG47356.2020.9231945. URL: <https://avonmoll.github.io/files/evolutionary-design.pdf>.
- Von Moll, Alexander and Zachariah Fuchs. "Attacker Dispersal Surface in the Turret Defense Differential Game". In: *IFAC World Congress on Automatic Control*. Vol. 53. Berlin, Germany, July 31, 2020, pp. 15659–15666. DOI: 10.1016/j.ifacol.2020.12.2549. URL: <https://avonmoll.github.io/files/attacker-dispersal-surface.pdf>.
- "Optimal Constrained Retreat within the Turret Defense Differential Game". In: *Conference on Control Technology and Applications*. Montreal, Canada, Aug. 24, 2020. DOI: 10.1109/CCTA41146.2020.9206388. URL: <https://avonmoll.github.io/files/turret-ocr.pdf>.
- Von Moll, Alexander, Zachariah Fuchs, and Meir Pachter. "Optimal Evasion Against Dual Pure Pursuit". In: *American Control Conference*. Denver, CO: IEEE, July 5, 2020. DOI: 10.23919/ACC45564.2020.9147776. URL: <https://avonmoll.github.io/files/optimal-evasion-against-dual-pure-pursuit.pdf>.
- Von Moll, Alexander, Meir Pachter, Daigo Shishika, et al. "Guarding a Circular Target By Patrolling its Perimeter". In: *Conference on Decision and Control*. Jeju Island, South Korea: IEEE, Dec. 11, 2020, pp. 1658–1665. DOI: 10.1109/CDC42340.2020.9304018. URL: <https://avonmoll.github.io/files/guarding-a-circular-target-by-patrolling-its-perimeter.pdf>.

- Weintraub, Isaac E., Alexander Von Moll, Eloy Garcia, David Casbeer, et al. "Maximum Observation of a Faster Non-Maneuvering Target by a Slower Observer". In: *American Control Conference*. Denver, CO, July 5, 2020. DOI: [10.23919/ACC45564.2020.9147340](https://doi.org/10.23919/ACC45564.2020.9147340).
- Garcia, Eloy, David W. Casbeer, et al. "Cooperative Two-Pursuer One-Evader Blocking Differential Game". In: July 10, 2019. DOI: [10.23919/ACC.2019.8814294](https://doi.org/10.23919/ACC.2019.8814294).
- Garcia, Eloy, Alexander Von Moll, et al. "Strategies for Defending a Coastline Against Multiple Attackers". In: *IEEE Conference on Decision and Control*. Nice, France, Dec. 31, 2019. DOI: [10.1109/CDC40024.2019.9029340](https://doi.org/10.1109/CDC40024.2019.9029340).
- Manyam, Satyanarayana G., David Casbeer, Alexander Von Moll, and Zachariah Fuchs. "Optimal Dubins Paths to Intercept a Moving Target on a Circle". In: *American Control Conference*. July 10, 2019. DOI: [10.23919/ACC.2019.8814913](https://doi.org/10.23919/ACC.2019.8814913).
- Manyam, Satyanarayana G., David Casbeer, Alexander Von Moll, and Eloy Garcia. "Coordinating Defender Path Planning for Optimal Target-Attacker-Defender Game". In: *AIAA Infotech*. San Diego, CA: AIAA, Jan. 11, 2019. DOI: [10.2514/6.2019-0388](https://doi.org/10.2514/6.2019-0388).
- Manyam, Satyanarayana Gupta, David Casbeer, et al. "Shortest Dubins Path to a Circle". In: *AIAA SciTech*. San Diego, CA: AIAA, Jan. 7, 2019. DOI: [10.2514/6.2019-0919](https://doi.org/10.2514/6.2019-0919). URL: <http://arxiv.org/abs/1804.07238>.
- Pachter, Meir et al. "Singular Trajectories in the Two Pursuer One Evader Differential Game". In: *2019 International Conference on Unmanned Aircraft Systems*. Atlanta, GA, June 15, 2019. DOI: [10.1109/ICUAS.2019.8798244](https://doi.org/10.1109/ICUAS.2019.8798244). URL: <https://avonmoll.github.io/files/2p1e-singular.pdf>.
- Von Moll, Alexander, Eloy Garcia, et al. "Multiple Pursuer Single Evader Border Defense Differential Game". In: *AIAA SciTech*. San Diego, CA: AIAA, Jan. 11, 2019. DOI: [10.2514/6.2019-1162](https://doi.org/10.2514/6.2019-1162). URL: <https://avonmoll.github.io/files/mp1e-border.pdf>.
- Black, Richard J. et al. "Integrated Fiber-Optic Sensor Network System Reliability Modeling and Analysis for Aerospace Applications". In: *2018 AIAA Information Systems-AIAA Infotech @ Aerospace*. AIAA SciTech Forum. American Institute of Aeronautics and Astronautics, Jan. 7, 2018. DOI: [10.2514/6.2018-0714](https://doi.org/10.2514/6.2018-0714). URL: <http://arc.aiaa.org/doi/10.2514/6.2018-0714>.
- Kalyanam, Krishna et al. "Scalable and Exact MILP Methods for UAV Persistent Visitation Problem". In: IEEE, Aug. 1, 2018, pp. 337–342. DOI: [10.1109/CCTA.2018.8511587](https://doi.org/10.1109/CCTA.2018.8511587). URL: <https://sites.google.com/site/krishnakalyanam/ccta2018.pdf>.
- Moslehi, Behzad et al. "High-Bandwidth Fiber-Optic Pressure Sensors for High-Temperature Aerospace Applications". In: *2018 AIAA Information Systems-AIAA Infotech @ Aerospace*. AIAA SciTech Forum. American Institute of Aeronautics and Astronautics, Jan. 7, 2018. DOI: [10.2514/6.2018-0715](https://doi.org/10.2514/6.2018-0715). URL: <http://arc.aiaa.org/doi/10.2514/6.2018-0715>.
- Von Moll, Alexander, David W. Casbeer, Eloy Garcia, et al. "Pursuit-evasion of an Evader by Multiple Pursuers". In: *2018 International Conference on Unmanned Aircraft Systems (ICUAS)*. Dallas, TX: IEEE, June 1, 2018, pp. 133–142. DOI: [10.1109/ICUAS.2018.8453470](https://doi.org/10.1109/ICUAS.2018.8453470). URL: <https://avonmoll.github.io/files/mp1e.pdf>.
- Von Moll, Alexander, Krishna Kalyanam, et al. "Genetic Algorithm Approach for UAV Persistent Visitation Problem". In: Atlanta, GA: ASME, Oct. 1, 2018. DOI: [10.1115/DSCC2018-8950](https://doi.org/10.1115/DSCC2018-8950). URL: <https://drive.google.com/file/d/0B0yHktr7udqgZERIUHRfaXNjOWQ5ZWJwNi05bDBvOVYtbDBV/view?usp=sharing>.
- Behbahani, Alireza R. et al. "Aircraft Integration Challenges and Opportunities for Distributed Intelligent Control, Power, Thermal Management, Diagnostic and Prognostic Systems". In: *2014 SAE Aerospace Systems and Technology Conference*. SAE International, Sept. 1, 2014. DOI: [10.4271/2014-01-2161](https://doi.org/10.4271/2014-01-2161).
- Von Moll, Alexander, Alireza R. Behbahani, et al. "A Review of Exhaust Gas Temperature Sensing Techniques for Modern Turbine Engine Controls". In: *50th AIAA/ASME/SAE/ASEE Joint Propulsion Conference*. AIAA Propulsion and Energy Forum. American Institute of Aeronautics and Astronautics, July 25, 2014. DOI: [10.2514/6.2014-3977](https://doi.org/10.2514/6.2014-3977). URL: <http://arc.aiaa.org/doi/10.2514/6.2014-3977>.
- Von Moll, Alexander, Ken Semega, et al. "Recent Progress, Challenges, and Future Development Needs of Thermally/Energy Efficient Fuel Actuator Pumping Systems for Military Gas Turbine Engine Applications". In: *JANNAF Interagency Propulsion Committee 34th Airbreathing Propulsion*. JANNAF Interagency Propulsion Committee, Jan. 1, 2014.
- Von Moll, Alexander and Alireza R. Behbahani. "Comparison of Communication Architectures and Network Topologies for Distributed Propulsion Controls". In: *59th IIS*. ISA, Feb. 1, 2013. URL: <http://www.dtic.mil/dtic/tr/fulltext/u2/a586909.pdf>.

#### OTHER INFORMATION

##### Awards & Recognition

2022 · Excellent Reviewer – AIAA Journal of Guidance, Control, and Dynamics

2022 · University of Cincinnati Department of Electrical Engineering & Computer Science Outstanding Doctoral Dissertation Award

2019 · Aerospace Control & Guidance Systems Committee Dave Ward Memorial Lecture Award

2014 · AFRL Turbine Engine Division Civilian of the Year (for Excellence in Primary Job Duty)

2014 · DoD SMART Scholarship

2011 · DoD SMART Scholarship

February 20, 2024