

# VENKATA RAMANA MAKKAPATI

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## RESEARCH INTERESTS

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Decision and control under uncertainties, Optimization, Multi-agent systems, and Machine learning with applications in *Aerospace systems & Robotics*

## EXPERIENCE

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- **Engineer, Advanced Research** *Jul 2021 – present*  
*Honda Aircraft Company, Greensboro, USA*  
Automatic Flight Control Systems (AFCS) / Advanced Research  
Responsibilities:
  - Support research, design, development, integration, and certification of AFCS and advanced systems, such as Augmented Steering Assistance System, Autothrottle, Emergency Autoland
  - Development, modification, and validation of aircraft simulation models in support of advanced R&D
  - Support verification and validation testing, including laboratory (hardware-in-the-loop) and flight tests
  - Prepare system development and certification documents (requirements, interface documents, test plans and reports)
- **Graduate Research Assistant** *Aug 2016 – May 2021*  
*Georgia Institute of Technology, Atlanta, USA*  
Projects:
  - Sensitivity-based analysis to mitigate for control design of hypersonic vehicles
  - Safe, resilient and efficient operation of autonomous aerial and ground vehicles
  - Optimal strategies for uncertain differential games with applications
- **Research Intern** *May 2019 – Aug 2019*  
*Foresight AI Inc, San Jose, USA*  
Project: POMDPs and RL based motion planning and driving decisions algorithms & software
- **Summer Intern** *May 2013 – Jul 2013*  
*Mahindra & Mahindra, Chennai, India*  
Project: Approximation methods for the modal analysis of an exhaust system
- **Summer Intern** *May 2012 – Jul 2012*  
*CSIR - National Aerospace Laboratories, Bangalore, India*  
Project: Evaluation of free-to-roll test technique to study unsteady motions of an aircraft

## EDUCATION

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- **Ph.D., Aerospace Engineering** 2021  
**Georgia Institute of Technology**  
Advisor: Prof. Panagiotis Tsiotras  
Thesis: *Games of pursuit-evasion with multiple agents and subject to uncertainties*
- **M.S., Computational Science and Engineering** 2021  
**Georgia Institute of Technology**  
Focus: *Machine Learning*
- **M.Tech., Aerospace Engineering** 2016  
**Indian Institute of Technology Kanpur**  
Advisor: Prof. Mangal Kothari  
Thesis: *Pursuit-evasion games of high speed evaders*
- **B.Tech., Aerospace Engineering** 2014  
**Indian Institute of Technology Madras**  
Minor: *Industrial Engineering*

## CERTIFICATIONS

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- **Private Pilot (Airplane Single Engine Land)**  
*Federal Aviation Administration (FAA)*
- **Open Water Diver**  
*Professional Association of Diving Instructors (PADI)*
- **Leading Flight Cadet**  
*4-TN Air Squadron, National Cadet Corps (NCC)*
  - B Certificate in the NCC examination

## PUBLICATIONS

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*Peer-reviewed*

### JOURNAL ARTICLES

- J1. Safe optimal control under uncertainties  
**V. R. Makkapati**, H. Sarabu, V. Comandur, P. Tsiotras, and S. Hutchinson  
*IEEE Robotics and Automation Letters (RA-L)*, 2020
- J2. Optimal evading strategies and task allocation in multi-player pursuit-evasion problems  
**V. R. Makkapati** and P. Tsiotras  
*Dynamic Games and Applications (DGAA)*, 2019

- J3. Nested saturation based guidance law for unmanned aerial vehicles  
J. Patrikar, **V. R. Makkapati**, A. Pattanaik, H. Parwana, and M. Kothari  
*ASME Journal of Dynamic Systems, Measurement, and Control*, 2019
- J4. Optimal evading strategies for two-pursuer/one-evader problems  
**V. R. Makkapati**, W. Sun, and P. Tsiotras  
*Journal of Guidance, Control, and Dynamics (JGCD)*, 2018
- J5. A comprehensive differential game theoretic solution to a game of two cars  
R. Bera, **V. R. Makkapati**, and M. Kothari  
*Journal of Optimization Theory and Applications (JOTA)*, 2017
- J6. Pursuit-evasion games of high speed evader  
**M. V. Ramana** and M. Kothari  
*Journal of Intelligent & Robotics Systems (JINT)*, 2017
- J7. Pursuit strategy to capture high-speed evaders using multiple pursuers  
**M. V. Ramana** and M. Kothari  
*Journal of Guidance, Control, and Dynamics (JGCD)*, 2016

#### CONFERENCE PROCEEDINGS

- C1. A game-theoretic model for one-on-on air combat  
V. Ramteke, V. Comandur, **V. R. Makkapati**, and M. Kothari  
*IFAC International Symposium on Automatic Control in Aerospace (ACA)*, 2022
- C2. Desensitized strategies for pursuit-evasion games with asymmetric information  
**V. R. Makkapati**, V. Comandur, H. Sarabu, P. Tsiotras, and Seth Hutchinson  
*IEEE Conference on Control Technology and Applications (CCTA)*, 2022
- C3. Reachability-based covariance control for pursuit-evasion in stochastic flow fields  
**V. R. Makkapati**, J. Ridderhof, and P. Tsiotras  
*AIAA Scitech Forum*, 2022
- C4. Desensitized trajectory optimization for hypersonic vehicles  
**V. R. Makkapati**, J. Ridderhof, P. Tsiotras, J. Hart, and B. van Bloemen Waanders  
*IEEE Aerospace Conference*, 2021
- C5. Covariance steering for discrete-time linear-quadratic stochastic dynamic games  
**V. R. Makkapati**, T. Rajpurohit, K. Okamoto, and P. Tsiotras  
*IEEE Conference on Decision and Control (CDC)*, 2020
- C6. C-DOC: Co-state desensitized optimal control  
**V. R. Makkapati**, D. Maity, M. Dor, and P. Tsiotras  
*American Control Conference (ACC)*, 2020
- C7. Sequential auto-landing of multiple UAVs using control constrained path following  
J. Patrikar, **V. R. Makkapati**, and M. Kothari

*AIAA Guidance Navigation and Control Conference (GNC), SciTech, 2019*

- C8. Trajectory desensitization in optimal control problems  
**V. R. Makkapati**, M. Dor, and P. Tsiotras  
*IEEE Conference on Decision and Control (CDC)*, 2018
- C9. Pursuit-evasion problem involving two pursuers and one evader  
**V. R. Makkapati**, W. Sun, and P. Tsiotras  
*AIAA Guidance, Navigation, and Control Conference (GNC), SciTech*, 2018
- C10. Motion planning for a fixed-wing UAV in urban environments  
**M. V. Ramana**, S. A. Varma, and M. Kothari  
*Advances in Control and Optimization of Dynamical Systems (ACODS)*, 2016
- C11. A cooperative pursuit strategy for a high speed evader  
**M. V. Ramana** and M. Kothari  
*AIAA Guidance Navigation and Control Conference (GNC), SciTech*, 2016
- C12. A cooperative pursuit-evasion game of a high speed evader  
**M. V. Ramana** and M. Kothari  
*IEEE Conference on Decision and Control (CDC)*, 2015

#### WORKSHOP PAPERS

- W1. Apollonius allocation algorithm for heterogeneous pursuers to capture multiple evaders  
**V. R. Makkapati** and P. Tsiotras  
*Workshop on Heterogeneous Multi-Robot Task Allocation and Planning, Robotics: Science and Systems (RSS)*, 2020

#### INVITED TALKS

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- **Workshop on Decision and Control: Optimal Planning, ML & Games, IIT Kanpur** *Feb 2021*  
Introductory lectures on *optimal control, differential games, and pursuit-evasion games*
- **IRIM-Robograde Virtual Student Seminar on Robot Planning** *Oct 2020*  
*Desensitization for safe planning under parametric uncertainties*
- **International Symposium on Dynamic Games and Applications** *Jul 2018*  
*Optimal strategies and task allocation in multi-pursuer single-evader problems*

#### TEACHING

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- **Graduate Teaching Assistant, Georgia Tech**
  - AE 6511: Optimal guidance & control *Spring 2019*
  - AE 6530: Multi-variable linear systems and control *Fall 2018*
- **Teaching Assistant, IIT Kanpur**

- AE647A: Flight dynamics
- AE648A: Flight stability & control

*Fall 2015*  
*Spring 2016*

## AWARDS

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### LONG DISTANCE RUNNING

- **Bronze Medal** *Apr 2014*  
*Dean's Trophy Road Race, IIT Madras*
- **Team Record – Longest Distance (87 km) on a Treadmill** *Mar 2014*  
*Treadathon, Chennai*

## SERVICE

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### INSTITUTE SERVICE

- **Graduate Representative** *Jan 2020 - May 2021*  
*School of Aerospace Engineering Student Advisory Council (SAESAC), Georgia Tech*
- **Senator (Aerospace Engineering)** *Jan 2020 – Aug 2020*  
*Graduate Student Government Association (Grad SGA), Georgia Tech*

### EVENT ORGANIZATION

- **Lectures Series on Learning and Control** *Nov 2020 – Jan 2021*  
*IIT Kanpur (Virtual event)*

### REVIEWER

Automatica  
 IEEE Transactions on Automatic Control  
 IEEE Transactions on Robotics  
 IEEE Robotics and Automation Letters  
 Dynamic Games and Applications  
 Journal of Intelligent & Robotics Systems  
 Journal of Aerospace Information Systems  
 Journal of Air Transportation  
 Journal of the Franklin Institute  
 IEEE International Conference on Robotics and Automation  
 IEEE Conference on Decision and Control  
 American Control Conference  
 AIAA SciTech Forum  
 IFAC International Symposium on Automatic Control in Aerospace  
 Advances in Control and Optimization of Dynamical Systems