

# Bariş Başıpınar

Assistant Professor

Istanbul Technical University  
Faculty of Aeronautics and Astronautics  
Aeronautical Engineering  
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## Professional Interests

Data-driven modeling for cyber-physical systems; high-level autonomy in air traffic control systems; machine autonomy in air-to-air/air-to-ground combat systems; coordination and control of multi-UAV systems; guidance, navigation, and control of aerial vehicles; air traffic complexity; climate-optimized applications in aviation; optimization-based control and reinforcement learning; modelling, analysis, and control of complex network systems; AI/ML-based applications in aviation.

## Education

- 2015-2020 **Ph.D. at Istanbul Technical University**, Aerospace Engineering.  
Thesis: Optimization-Based Control of Cooperative and Noncooperative Multi-Aircraft Systems, under advising; Asst. Prof. Emre Koyuncu at Controls and Avionics Lab.
- 2013-2015 **M.Sc. at Istanbul Technical University**, Aerospace Engineering.  
Thesis; Design of Real-Time Decision Support and Automation Systems for Air Traffic Control and Air Traffic Flow Management, under advising; Prof. Gokhan Inalhan at Controls and Avionics Lab.
- 2010-2013 **B.Sc. at Istanbul Technical University**, Control and Automation Engineering.  
Thesis; Navigation with INS/GPS Integration, under advising; Prof. Hakan Temeltas at Robotics Lab.
- 2008-2013 **B.Sc. at Istanbul Technical University**, Aeronautical Engineering.  
Thesis; Development of New Generation Pilot Decision Support Tools, under advising; Prof. Gokhan Inalhan at Controls and Avionics Lab.

## Academic Honours and Awards

- University Award **The Best Ph.D. Thesis Award of 2020.**  
The Ph.D. thesis is considered worthy for the Most Successful Thesis Awards, 2021
- Ph.D. Fellow **The Scientific and Technological Research Council of Turkey (TUBITAK).**  
4 years research fellowship for the Ph.D. at Aerospace Engineering, 2015-2019
- M.Sc. Fellow **The Scientific and Technological Research Council of Turkey (TUBITAK).**  
2 years research fellowship for the M.Sc. at Aerospace Engineering, 2014-2015
- University Award **Honored by ITU for completing Double Major in 4 years.**  
The prize for the student who completed double major in 4 years, June 2013
- University Award **Aeronautical Engineering Department Magna Cum Laude.**  
Completed the B.Sc. at Aeronautical Engineering with second-highest GPA, June 2013
- University Award **Control and Automation Engineering Department Summa Cum Laude.**  
Completed the B.Sc. at Control and Automation Engineering with highest GPA, June 2013

## Professional Experiences

- Assistant Professor **Istanbul Technical University**, Faculty of Aeronautics and Astronautics.  
Aeronautical Engineering, 2021-present
- Researcher **Aerospace Research Center (ITU ARC)**, Controls and Avionics Research Group.  
Istanbul Technical University, 2012-present
- Visiting Researcher **Massachusetts Institute of Technology.**  
Department of Aeronautics and Astronautics, 2018-2019
- Teaching Assistant **Istanbul Technical University**, Faculty of Aeronautics and Astronautics.  
Aeronautical Engineering, 2017-2020

## Selected Projects

- \* **H2020 EU Project – ClimOP: Climate Assessment of Innovative Mitigation Strategies Towards Operational Improvements in Aviation**, *recommendations to mitigate impact of aviation on climate, in ITU with the project partners DLR, NLR, TU-Delft, Deep Blue, IATA Espane SL, SEA, and Amigo SRL, 2020-2023.*
- \* **AI-RADAR: ML-based Airspace Threat Detection**, *AI-based real-time airspace monitoring and anomaly/threat detection models in order to provide safe air flight traffic, in ITU Aerospace Research Center, funded by ASELSAN, 2019-2020.*
- \* **Real-Time Terrain Avoidance Support for Helicopters**, *developing a safe flight navigation algorithm for helicopter TAWS avionics, in ITU Aerospace Research Center, funded by STM Co., 2018-2019.*
- \* **Trajectory Prediction System for Air Traffic Controller Working Position**, *developing flight navigation functions for air traffic controller working position, in ITU Aerospace Research Center, funded by TUBITAK BILGEM, 2016-2017.*
- \* **SESAR H2020 EU Project – COPTRA: COmbining Probable TRAjectories**, *analysing trajectory uncertainty and its impact on air traffic flow network, in ITU with the project partners Boeing RTE, CRIDA, EUROCONTROL and UCL, 2016-2018.*
- \* **Design of Real-Time Automation and Decision-Support Systems for ATC Operators and Pilots Within The New Air Traffic Management Paradigm**, *Flight Deck and Automated Air Traffic Controller Working Position Testbed development, in ITU Aerospace Research Center, supported in part by TUBITAK (N.111M167) and ITU BAP, 2012-2015.*
- \* **SESAR JU WP-E Project – SecureDataCloud: Secure computation techniques for data exchange in ATM**, *secure data sharing mechanism and test cases for new air transportation infrastructure, in ITU with the project partners Innaxis, and Team&Cloud, 2012-2015.*
- \* **FP7 EU Project – Resilience2050: New design principles fostering safety, agility and resilience for ATM**, *Resilience and Delay Propagation Analysis across European Flow Network, in ITU with the project partners Innaxis, DLR, NLR, UPM, Kings College and DHMI, 2012-2015.*

## Selected Publications

### Journal Papers

- [J9] Baspinar B., Altun A., and Koyuncu E., **Event-Based Air Transport Network Resiliency Management with Meta-Population Epidemic Model**, *Journal of Aerospace Information Systems (AIAA)*, 2021, DOI: 10.2514/1.I010935
- [J8] Baspinar B., Balakrishnan H, and Koyuncu E., **Optimization-based Autonomous Air Traffic Control for Airspace Capacity Improvement**, *IEEE Transactions on Aerospace and Electronic Systems*, 2020, DOI: 10.1109/TAES.2020.3003106
- [J7] Baspinar B., Koyuncu E., **Assessment of Aerial Combat Game via Optimization-Based Receding Horizon Control**, *IEEE Access* 8 (2020): 35853-35863
- [J6] Baspinar B., Balakrishnan H, and Koyuncu E., **Mission Planning and Control of Multi-Aircraft Systems with Signal Temporal Logic Specifications**, *IEEE Access* 7 (2019): 155941-155950
- [J5] Baspinar B., Koyuncu E., **Evaluation of Two-vs-One Air Combats Using Hybrid Maneuver-Based Framework and Security Strategy Approach**, *Journal of Aeronautics and Space Technologies*, 2019
- [J4] Baspinar B., Koyuncu E., **Demand and Capacity Balancing Through Probabilistic Queuing Theory and Ground Holding Program for European Air Transportation Network**, *Anadolu University of Sciences and Technology - A: Applied Sciences and Engineering (AUJST-A)*, 2017
- [J3] Baspinar B., Koyuncu E., Inalhan, G., **Large Scale Data-Driven Delay Distribution Models of European Air Traffic Flow Network**, *Transportation Research Procedia*, 2017

- [J2] Baspinar B., Koyuncu E., **A Data-Driven Air Transportation Delay Propagation Model Using Epidemic Process Models**, International Journal of Aerospace Engineering 2016:1-11, DOI: 10.1155/2016/4836260
- [J1] Pasaoglu C., Baspinar B., Ure N.K., Inalhan, G., **Hybrid Systems Modelling and Automated Air Traffic Control for Three Dimensional Separation Assurance**, The Inst. of Mechanical Eng., Part G, Jour. of Aerospace Engineering, SAGE, 2015

#### Peer Reviewed Conference Papers

- [C15] Aksoy, M., Ozdemir, O., Guner, G., Baspinar, B., and Koyuncu, E., **Flight Trajectory Pattern Generalization and Abnormal Flight Detection with Generative Adversarial Network**, AIAA SciTech Forum and Exposition: Learning, Reasoning, and Data-Driven Systems V, January 19-21, 2021
- [C14] Baspinar B., Koyuncu E., **Differential Flatness-based Optimal Air Combat Maneuver Strategy Generation**, AIAA SciTech Forum and Exposition: Modelling and Simulation Technologies, January 07-11, 2019
- [C13] Baspinar B., Koyuncu E., **Survivability based Optimal Air Combat Mission Planning with Reinforcement Learning**, 2nd IEEE Conference on Control Technologies and Applications (IEEE CCTA 2018), August 21-24, 2018
- [C12] Baspinar B., Koyuncu E., **Aerial Combat Simulation Environment for One-on-One Engagement**, AIAA SciTech Forum and Exposition: Modelling and Simulation Technologies, January 08-12, 2018
- [C11] Baspinar B., Uzun M. et al, **A 4D Trajectory Generation Infrastructure Tool for Controller Working Position**, 36th IEEE/AIAA Digital Avionics Systems Conference, September 17-21, 2017
- [C10] Uzun M., Baspinar B., Koyuncu E. and Inalhan G., **Take-off Weight Error Recovery Tool for Tactical Trajectory Prediction Automaton of Air Traffic Control Operator**, 36th IEEE/AIAA Digital Avionics Systems Conference, September 17-21, 2017
- [C9] Baspinar B., Koyuncu E., **Managing Air Transportation Demand and Capacity via Stochastic Modelling Approach**, 9th Ankara International Aerospace Conference, September 20-22, 2017
- [C8] Koyuncu E, Baspinar B., Guney G. et al, **Implementing Dynamic Air Transport Slot Trading Through Secure Auction Mechanism**, 7th International Conference on Research in Air Transportation, June 20-24, 2016
- [C7] Baspinar B., Ure N.K., Koyuncu E. and Inalhan G., **Analysis of Delay Characteristics of European Air Traffic through a Data-Driven Airport-Centric Queuing Network Model**, 14th IFAC Symposium on Control in Transportation Systems, May 18-20, 2016
- [C6] Guner G., Baspinar B., Koyuncu E., et. al., **A Flight Delay Reporting and Analysis Platform Through Secure Information Sharing**, Fifth SESAR Innovation Days, Bologna, Italy, 1 – 3 December 2015
- [C5] Baspinar B., Pasaoglu C., Ure N.K., Inalhan, G., **Infrastructure Development for Ground-Based Separation Assurance with Optional Automation**, International Conference on Application and Theory of Automation in Command and Control Systems, Toulouse, France, September 30-October 2, 2015
- [C4] Baspinar B., Pasaoglu C., Inalhan, G., **Hybrid Modelling and Automation of Air Traffic Controller Decision Process: Separation Assurance**, International Conference on Research in Air Transportation (ICRAT'14), May 26-30, Istanbul, 2014
- [C3] Baspinar B., Koyuncu E., Inalhan G., **Modelling of Air Traffic Flow Network and Analysis of Delay Characteristics because of Capacity Reductions in Airports**, VI. National Conference on Aeronautics and Astronautics(UHUK'16), Kocaeli, Turkey, September 2016 (in Turkish)

- [C2] Baspinar B., Pasaoglu C. et al., **Hybrid Automata Models for Separation Assurance in Air Traffic Control**, V. National Conference on Aeronautics and Astronautics(UHUK'14), Kayseri, Turkey, September 2014 (in Turkish)
- [C1] Baspinar B., Temeltas H., **Navigation with EKF based INS/GPS Integration**, Turkish National Automatic Control Committee (TOK'13), Malatya, Turkey, September 2013 (in Turkish)