Dr. Elgiz Baskaya

CONTACT INFORMATION

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RESEARCH INTERESTS

Fault Detection and Diagnosis, Machine Learning, Fault Tolerant Control, Estimation and Control

EDUCATION

PhD., Ecole Doctoral Aeronautique Astronautique 2016 - 2019 February (Expected)

University of Paul Sebatier, Toulouse, France

- Dissertation Topic: "Fault Detection & Diagnosis for Drones using Machine Learning"

PhD., Interdisciplinary Aeronautical and Astronautical Sciences 2010 - 2018
Faculty of Aeronautics and Astronautics

Istanbul Technical University, Istanbul, Turkey

- Dissertation Topic: "Heat Transfer Enhancement by Using Magnetic Nanofluids"

M.Sc., Interdisciplinary Aeronautical and Astronautical Sciences 2007 - 2010
Faculty of Aeronautics and Astronautics

Istanbul Technical University, Istanbul, Turkey

- Thesis: "Sensor Fusion Based Attitude Determination for Small Satellites"

B.S., Astronautics Engineering 2002 - 2007
Faculty of Aeronautics and Astronautics

Istanbul Technical University, Istanbul, Turkey

- Graduation Project: "Transfers Between Satellites and Planets Through Trajectories on Stability Boundary"

ACADEMIC EXPERIENCE

Researcher - The ENGIE Ineo - Grope ADP - SAFRAN RPAS Chair 2015 - Present
Ecole National l'Aviation Civile (Civil Aviation Institute of France), Toulouse, France
Designing fault diagnosis algorithms using machine learning techniques to enable a safe integration of drones into airspace. Algorithms designed will be a part of Paparazzi open-source autopilot system and be tested in real flights held under lab URI-DRONES of civil aviation institute of France, ENAC.

- Encourage innovation
- Strive to improve decisiveness

Research Assistant - Faculty of Aeronautics & Astronautics 2009 - 2015
Istanbul Technical University, Istanbul, Turkey

Researcher - TUBITAK (The Scientific and Technological Research Council of Turkey) project 2014 - 2015
Development of methods and algorithms for the integrated attitude determination systems with in-flight sensor calibration, long-term planning guidance and fault-tolerant attitude control for the small information satellites,

Worked on robust attitude determination algorithms, Earth's Magnetic Field modeling, orbit propagation. This was a joint project with Samara State Technical University and was funded by TUBITAK (The Scientific and Technological Research Council of Turkey) and Russian Science Foundation.

- Improve the effectiveness of communications and interactions with others

Researcher - Control and Avionics Laboratory **2010 - 2013**

High precision ADCS and indiginous bus architecture design and development project for Nano Satellites,

Developed the onboard orbit propagator and attitude determination software in MATLAB for ITUpSAT 2, which is the 2^{nd} small satellite project of ITU funded by TUBITAK. Additionally, worked on the design and development of the software/hardware-in-the loop system utilizing MATLAB/Simulink and STKConnect Module to verify the indigenous ADCS which enjoys a redundant reaction wheel set for reliability.

- Constantly sharpen and update skills

Resillience2050, EU 7th RTD Framework Programme

Worked on Decision Support Tools for Air Traffic Management to enable designs fostering safety, agility and resillience for Air Traffic Management.

Real time ATC Operator and Pilot Automation and Decision - Support Systems Design for New ATM Concept,

Worked on Decision Support Tools for Air Traffic Management. Specialized on development of algorithms to estimate trajectory of aircraft and detect collision in the presence of uncertainties. The project is funded by TUBITAK.

Researcher - Space Systems Laboratory **2008 - 2010**

Pico Satellite Design, Development of Engineering and Flight Models,

System Engineer during the design, assembly and test phases of ITUpSAT 1, which was launched on 23 September 2009 from Satish Dhawan Space Center India. ITUpSAT 1, funded by TUBITAK, is the first orbiting student satellite designed and manufactured in Turkey.

Researcher - Vestel Defense Industry **2008**

Studied on verification of the estimated model parameters with the use of measurements via least squares method.

Researcher - Vestel Defense Industry **2007**

Developed codes on estimation of aircraft model using Extended Kalman Filter.

Teaching Experience

Teaching Assistant - Faculty of Aeronautics & Astronautics **2009 - 2015**

Istanbul Technical University, Istanbul, Turkey

Probability & Statistics	2015, 2014
Orbital Mechanics	2014
Heat Transfer	2013
Thermodynamics	2013
Attitude Determination & Control	2014, 2013, 2012, 2011
Avionics	2012, 2011
Principles of Aircraft Design	2012, 2011
Flight Stability and Control,	2011
Automatic Control	2011, 2009
Introduction to Sci&Eng. Comp. - C Programming Language	2011
Dynamics	2009
Spacecraft System Design	2009

Presented "*Developments in Satellite Technology in Turkey*" during GAP Astronomy Journey to Southeastern Anatolia to educate and inform students on recent subjects. Funded by Republic of

Turkey, Regional Development Administration,
Southeastern Anatolia 2010

Course given to Okyanus College students on "*Space, Science and Technology Demonstrations*"
Okyanus College, Istanbul 2009, 2010

INTERNSHIP

Baykar Technologies, Istanbul, Turkey
Intern **2006**
Summer Internship in one of the two unmanned air vehicle design companies in Turkey. Trained on Kalman Filtering.

TAI (Turkish Aerospace Industries, Inc.), Ankara, Turkey
Intern **2005**
Summer Internship in R&D Department. Trained on satellite thermal control system. Developed codes on thermal network method in Matlab to verify the in-house developed satellite thermal system simulator.

PUBLICATIONS

E. Baskaya, M. Bronz, D. Delahaye, "Fault diagnosis for UAVs using flight data via machine learning," (in preperation)

T. Cunis, E. Baskaya, "Controllability of Unmanned Aircrafts in the Event of Loss-of-control," 10^{th} *International Micro Air Vehicles (IMAV),* (accepted)

G. Manfredi, E. Baskaya, J. Sharpes, Y. Jestin, "Unmanned Aerial System Operations for Retail, " 14^{th} *International Conference on Autonomic and Autonomous Systems (ICAS),* May 20 - 24, 2018

E. Baskaya, M. Bronz, D. Delahaye, "Fault Detection & Diagnosis for Small UAVs via Machine Learning " 14^{th} *IEEE/AIAA Digital Avionics Systems Conference (DASC),* September 17 - 21, 2017

E. Baskaya, M. Bronz, D. Delahaye, "Flight Simulation of a MAKO UAV for Use in Data-Driven Fault Diagnosis " 9^{th} *International Micro Air Vehicles,* September 18 - 21, 2017

E. Baskaya, G. Manfredi, M. Bronz, D. Delahaye "Flexible open architecture for UASs integration into the airspace: Paparazzi autopilot system" 35^{th} *IEEE/AIAA Digital Avionics Systems Conference (DASC),* September 25 - 29, 2016

E. Baskaya, G. Komurgoz, I. Ozkol, "Investigation of Oriented Magnetic Field Effects on Entropy Generation in an Inclined Channel Filled with Ferrofluids, *Entropy,* 19(7), 377, 2017

E. Baskaya, G. Komurgoz, I. Ozkol, "Entropy Generation and Equipartition Phenomenon Investigation in a Variable Viscosity Channel Flow under Constant Magnetic Field via Generalized Differential Quadrature Method (GDQM) , " *Heat Transfer Research* (accepted)

E. Baskaya, G. Komurgoz, I. Ozkol, "Analysis of Variable Viscosity Channel Flow under Constant Magnetic Field via Generalized Differential Quadrature Method, " *Advanced Materials Research,* vol. 1016, pp.564-568, 2014

E. Baskaya, U. Daybelge, A. Sofyali, E. Topal, C. Yarim, "Developments in Astrodynamics in the Light of Chaos " *Journal of Istanbul Kultur University,* vol.4, pp.191-212, 2006

E. Baskaya, G. Komurgoz, I. Ozkol "Analysis of a Variable Viscosity Channel Flow under Constant Magnetic Field via Generalized Differential Quadrature Method" *ICMAE* 5^{th} *International Conference on Mechanical and Aerospace Engineering*, July 18 - 19, 2014

E. Baskaya, M. Fidanoglu, et at. "Investigation of MHD Natural Convection Flow Exposed to a Variable Magnetic Field via Differential Quadrature Method" *ASME* 12^{th} *Biennial Conference on Engineering Systems Design and Analysis*, June 24 - 27, 2014

M. Fidanoglu, E. Baskaya, et at. "Application of Differential Quadrature Method and Evolutionary Algorithm to MHD Fully Developed Flow of a Couple-Stress Fluid in a Vertical Channel With Viscous Dissipation and Oscillating Wall Temperature" *ASME* 12^{th} *Biennial Conference on Engineering Systems Design and Analysis*, June 24 - 27, 2014

E. Baskaya, G. Inalhan, et al. "Design and Development of a Reliable ADCS and Indigenous Bus Architecture for Nanosatellites : ITUpSAT II" 63^{rd} *International Astronautical Congress*, October 1- 5, 2012

E. Baskaya, U. Eren, G. Inalhan "Development of High - Precision Attitude Determination and Control System : ITUpSAT II project " *National Aeronautical and Astronautical Conference*, September 12 - 14, 2012

E. Baskaya, E. Koyuncu, G. Inalhan "Design of a Multi - Purpose Nanosatellite Bus : ITUpSAT II project " *National Aeronautical and Astronautical Conference*, September 12 - 14, 2012

E. Baskaya, U. Eren, et al. "A Precise ADCS Design for ITUpSAT II" *International Conference on Student Small Satellites*, April 25 - 27, 2012

U. Eren, E. Baskaya, et al. "Design of a Flexible Bus System for ITUpSAT II" *International Conference on Student Small Satellites*, April 25 - 27, 2012

E. Koyuncu, E. Baskaya, et al. "ITUpSAT II : High - Precision Nanosatellite ADCS Development Project" 5^{th} *International Conference on Recent Advances in Space Technologies*, June 9 - 11, 2011

G. Inalhan, E. Koyuncu, E. Baskaya, et al. "Design and Development of ITUpSAT II : On Orbit Demonstration of a High - Precision ADCS for Nanosatellites " 8^{th} *International ESA Conference on Guidance & Navigation Control Systems*, June 5 - 10, 2011

E. Baskaya, C. Hajiyev, G. Inalhan "Estimation of Small Satellite Attitude Dynamics via EKF using Magnetometers - ITUpSAT II Project" *National Aeronautical and Astronautical Conference*, September 16 - 18, 2010

Workshops

E. Baskaya, "ITUpSAT II ADCS : Getting Ready for Launch" 8^{th} *Annual CubeSat Developers' Workshop*, April 20 - 22, 2011

E. Baskaya, G. Inalhan "ITUpSAT II - Nanosatellite Platform for In-Space R&D" 7^{th} *Annual CubeSat Developers' Workshop*, April 21 - 23, 2010

Poster Presentations

U. Eren, Elgiz Baskaya, et al. "Design of a Flexible Nanosatellite Bus for Science Missions " *AIAA SPACE 2012 Conference & Exposition*, September 11- 13, 2012

E. Baskaya, U.Eren, et al. "ITUpSAT II - Design and Development " *Innovation Week Turkey*, December 6- 8, 2012

Workshops, Meetings & Lectures Attended

Tutorial on Approaches to Software Design Assurance for Avionics and Flight Controls: DO-178C and Beyond (Part 1 & Part 2), by Tom Ferrell, 2018

Tutorial on Reliable Navigation for Unmanned Aircraft Systems (UAS), by Maarten Uijt de Haag,

2018

Object Oriented Programming with C++, 160 hours course on Objected Oriented Programming with C++ in C System Programmers Association, 2014 - 2015

C Programming Language Training and Certificate, 160 hours course on C Programming language in C System Programmers Association, 2013 - 2014

Practical Adaptive Control, International Graduate School on Control, by Prof Anuradha Annaswamy, MIT Active Adaptive Control Laboratory, May 15 - 19, 2017

Tutorial on Multi-Sensor Navigation Focus on UAV Navigation, by Assist. Prof. Demoz Gebre-Egziabher, University of Minnesota, November 14, 2016

Resillience 2050 Progress Meeting, November 15 - 16, 2012

Research in Decision Support Tools for Future Air Traffic Management, *HALA! SEZAR Research Network Summer School*, July 9 - 12 2012

Lecture on Space System Engineering & CUBESATs by Prof. Dr. Eberhard GILL, May 24, 2012

Small Satellite Formations for Distributed Survelliance: System Design and Optimal Control Considerations, *NATO-RTO Lecture Series SCI-231*, April 14 - 15 2011

Multifunctional Structures and System Technologies for Small Spacecraft, *NATO RTO-AVT171*, April 12 - 15, 2010

Astronet Workshop, *The Astrodynamics Network*, March 30 - April 1, 2009

Skills

- Languages: Turkish (native), English (fluent)(Toefl IBT : 97), French(beginner)
- Programming Languages : MATLAB, C, C++, Fortran
- Simulation/ CAD Tools: MATLAB/Simulink, STK, STKConnect, Mathematica, R, CATIA
- OS: MacOS, Linux, Windows

Professional Activities

- President of Aerospace Engineering Research Assistants (2010 - 2011)
- Member of UUMK (Aeronautics and Astronautics Engineering Club) (2003 - 2007)
- Member of TEGV (Turkish Education Volunteers) (2002 - 2004)

Recreational / Personal Activities

- Pianist and Tango dancer in Galata Festival in 2007, still practicing both as a hobby
- Pianist in concert as PERA Fine Arts High-school students in 2000 in AKM (Ataturk Cultural Center) opera house
- Practicing Shotokai Karate once per week (orange belt) since 2016
- Dedicated Baroque music fan, especially by Bach and Glenn Gould
- Licensed volleyball player in 1999 and 2000 and won two cups as the best team in the town
- Member of the best team in group discussion challenge throughout town in 2002