

## Assoc. Prof. Tufan Kumbasar

### Personal Information

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### Biography

TUFAN KUMBASAR is an Associate Professor in the Department of Control and Automation and the Vice Dean of Faculty of Electrical and Electronics Engineering, Istanbul Technical University, Turkey. He is also the director of the Artificial Intelligence and Intelligent Systems (AI2S) Laboratory at the Istanbul Technical University. His major research interests are in computational intelligence, notably type-2 fuzzy systems, fuzzy logic, neural networks, evolutionary algorithms and control theory. Dr. Kumbasar is also interested in process control, robotics and intelligent control and their real-world applications. His major research interests are in computational intelligence, notably type-2 fuzzy systems, fuzzy control, neural networks, evolutionary algorithms and control theory. He is also interested in process control, robotics, intelligent control and their real-world applications. Dr. Kumbasar has currently authored more than 100 peer-reviewed papers in international journals, conferences and book chapters. Dr. Kumbasar received the Best Paper Award from the IEEE International Conference on Fuzzy Systems in 2015 and from the 6th International Conference on Control Engineering & Information Technology. He has participated in leading positions in many national and international projects as principal, main investigator, researcher and academic consultant. He also works as a peer reviewer for more than 40 international journals such as IEEE Transactions on Fuzzy Systems, IEEE Transaction on Industrial Electronics and Applied Soft Computing. Dr. Kumbasar has been an Associate Editor for the IEEE Transactions on Fuzzy Systems and Area Editor for the International Journal of Approximate Reasoning. He has also served as a Publication Co-Chair, Panel Session Co-Chair, Special Session Co-Chair, PC, IPC and TPC in various international and national conferences.

### Education Information

Doctorate, İstanbul Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Kontrol Ve Otomasyon Mühendisliği (Dr), Turkey 2008 - 2012

Post Graduate, İstanbul Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Kontrol Ve Otomasyon Mühendisliği (YI) (Tezli), Turkey 2006 - 2008

Under Graduate, İstanbul Teknik Üniversitesi, Elektrik-Elektronik Fakültesi, Kontrol Ve Otomasyon Mühendisliği Bölümü, Turkey 2002 - 2006

### Foreign Languages

English

### Dissertations

Doctorate, Type-2 fuzzy model inversion methods and fuzzy model based controller design, İstanbul Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Kontrol Ve Otomasyon Mühendisliği (Dr), 2012

Post Graduate, Ters bulanık model alma yöntemleri, İstanbul Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Kontrol Ve Otomasyon Mühendisliği (YI) (Tezli), 2008

## Research Areas

Information Systems, Communication and Control Engineering, Control and System Engineering, Controllers, Optimal Control, Robotics and Mechatronics Systems, Smart Factors, Engineering and Technology

## Academic Titles / Tasks

Associate Professor, Istanbul Technical University, Kontrol Ve Otomasyon Mühendisliği Bölümü, 2018 - Continues  
Assistant Professor, İstanbul Teknik Üniversitesi, Elektrik-Elektronik Fakültesi, Kontrol Ve Otomasyon Mühendisliği Bölümü, 2014 - 2018

Research Assistant, İstanbul Teknik Üniversitesi, Elektrik-Elektronik Fakültesi, Kontrol Ve Otomasyon Mühendisliği Bölümü, 2007 - 2014

## Professional Experience

Vice Dean, İstanbul Teknik Üniversitesi, 2017 - Continues

Erasmus Coordinator, İstanbul Teknik Üniversitesi, Elektrik-Elektronik Fakültesi, Kontrol Ve Otomasyon Mühendisliği Bölümü, 2016 - Continues

## Courses

OTOMATİK KONTROL SİSTEMLERİ, Under Graduate, 2016 - 2017

PROCESS CONTROL, Under Graduate, 2014 - 2015, 2015 - 2016, 2016 - 2017

## Articles Published in Journals That Entered SCI, SSCI and AHCI Indexes

- I. **Interval Type-2 Fuzzy Cognitive Map-Based Flight Control System for Quadcopters**  
Amirkhani A., Shirzadeh M., Kumbasar T.  
INTERNATIONAL JOURNAL OF FUZZY SYSTEMS, vol.22, pp.2504-2520, 2020 (Journal Indexed in SCI)
- II. **A new fractional-order general type-2 fuzzy predictive control system and its application for glucose level regulation**  
Mohammadzadeh A., Kumbasar T.  
APPLIED SOFT COMPUTING, vol.91, 2020 (Journal Indexed in SCI)
- III. **Optimal PID control of spatial inverted pendulum with big bang-big crunch optimization**  
Wang J., Kumbasar T.  
IEEE-CAA JOURNAL OF AUTOMATICA SINICA, vol.7, pp.822-832, 2020 (Journal Indexed in SCI)
- IV. **Design and development of FOLLY: A self-foldable and self-deployable quadcopter**  
Tuna T., Ovrur S. E. , Gokbel E., Kumbasar T.  
AEROSPACE SCIENCE AND TECHNOLOGY, vol.100, 2020 (Journal Indexed in SCI)
- V. **Adaptive backstepping controller design for MIMO cancer immunotherapy using Laguerre polynomials**  
Zirkohi M. M. , Kumbasar T.  
JOURNAL OF THE FRANKLIN INSTITUTE-ENGINEERING AND APPLIED MATHEMATICS, vol.357, pp.4664-4679, 2020 (Journal Indexed in SCI)
- VI. **Type-2 Fuzzy Logic-Based Linguistic Pursuing Strategy Design and Its Deployment to a Real-World Pursuit Evasion Game**  
Beke A., Kumbasar T.  
IEEE TRANSACTIONS ON CYBERNETICS, vol.50, pp.211-221, 2020 (Journal Indexed in SCI)

- VII. **A Deep Learning-Based Pipeline for Teaching Control Theory: Transforming Feedback Control Systems on Whiteboard Into MATLAB**  
Erdem D., Beke A., Kumbasar T.  
IEEE ACCESS, vol.8, pp.84631-84641, 2020 (Journal Indexed in SCI)
- VIII. **A fuzzy logic-based autonomous car control system for the JavaScript Racer game**  
Etlik U. B. , Korkmaz B., Beke A., Kumbasar T.  
TRANSACTIONS OF THE INSTITUTE OF MEASUREMENT AND CONTROL, 2019 (Journal Indexed in SCI)
- IX. **Learning with Type-2 Fuzzy activation functions to improve the performance of Deep Neural Networks**  
Beke A., Kumbasar T.  
ENGINEERING APPLICATIONS OF ARTIFICIAL INTELLIGENCE, vol.85, pp.372-384, 2019 (Journal Indexed in SCI)
- X. **Current development on using Rotary Inverted Pendulum as a benchmark for testing linear and nonlinear control algorithms**  
Hamza M. F. , Yap H. J. , Choudhury I. A. , Isa A. I. , Zimit A. Y. , Kumbasar T.  
MECHANICAL SYSTEMS AND SIGNAL PROCESSING, vol.116, pp.347-369, 2019 (Journal Indexed in SCI)
- XI. **Big Bang-Big Crunch optimized hierarchical sliding-mode control of X-Z inverted pendulum**  
Wang J., Kumbasar T.  
SIMULATION MODELLING PRACTICE AND THEORY, vol.86, pp.25-35, 2018 (Journal Indexed in SCI)
- XII. **A survey on advancement of hybrid type 2 fuzzy sliding mode control**  
HAMZA M. F. , YAP H. J. , CHOUDHURY I. A. , CHÍROMA H., Kumbasar T.  
NEURAL COMPUTING & APPLICATIONS, vol.30, pp.331-353, 2018 (Journal Indexed in SCI)
- XIII. **Type-2 Fuzzy Logic Controllers Made Even Simpler: From Design to Deployment for UAVs**  
SARABAKHA A., FU C., Kayacan E., Kumbasar T.  
IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, vol.65, pp.5069-5077, 2018 (Journal Indexed in SCI)
- XIV. **An inverse controller design method for interval type-2 fuzzy models**  
Kumbasar T., EKSİN İ., GÜZELKAYA M., Yesil E.  
SOFT COMPUTING, vol.21, pp.2665-2686, 2017 (Journal Indexed in SCI)
- XV. **HYBRID ADAPTIVE TYPE-2 FUZZY TRACKING CONTROL OF CHAOTIC OSCILLATION DAMPING OF POWER SYSTEMS**  
Zirkohi M. M. , Kumbasar T., Lin T.  
ASIAN JOURNAL OF CONTROL, vol.19, pp.1114-1125, 2017 (Journal Indexed in SCI)
- XVI. **Revisiting Karnik-Mendel Algorithms in the framework of Linear Fractional Programming**  
Kumbasar T.  
INTERNATIONAL JOURNAL OF APPROXIMATE REASONING, vol.82, pp.1-21, 2017 (Journal Indexed in SCI)
- XVII. **Book review**  
KUMBASAR T.  
FUZZY SETS AND SYSTEMS, vol.306, pp.169-170, 2017 (Journal Indexed in SCI Expanded)
- XVIII. **Robust Stability Analysis and Systematic Design of Single-Input Interval Type-2 Fuzzy Logic Controllers**  
Kumbasar T.  
IEEE TRANSACTIONS ON FUZZY SYSTEMS, vol.24, pp.675-694, 2016 (Journal Indexed in SCI)
- XIX. **A Self-Tuning zSlices-Based General Type-2 Fuzzy PI Controller**  
Kumbasar T., Hagraş H.  
IEEE TRANSACTIONS ON FUZZY SYSTEMS, vol.23, pp.991-1013, 2015 (Journal Indexed in SCI)
- XX. **General derivation and analysis for input-output relations in interval type-2 fuzzy logic systems**  
Aliasghary M., EKSİN İ., Güzelkaya M., KUMBASAR T.  
SOFT COMPUTING, vol.19, pp.1283-1293, 2015 (Journal Indexed in SCI)
- XXI. **Big Bang-Big Crunch optimization based interval type-2 fuzzy PID cascade controller design strategy**  
Kumbasar T., Hagraş H.  
INFORMATION SCIENCES, vol.282, pp.277-295, 2014 (Journal Indexed in SCI)
- XXII. **A simple design method for interval type-2 fuzzy pid controllers**

- Kumbasar T.  
SOFT COMPUTING, vol.18, pp.1293-1304, 2014 (Journal Indexed in SCI)
- XXIII. **Exact inversion of decomposable interval type-2 fuzzy logic systems**  
Kumbasar T., EKSİN İ., Güzelkaya M., YESİL E.  
INTERNATIONAL JOURNAL OF APPROXIMATE REASONING, vol.54, pp.253-272, 2013 (Journal Indexed in SCI)
- XXIV. **Online tuning of fuzzy PID controllers via rule weighing based on normalized acceleration**  
Karasakal O., Güzelkaya M., EKSİN İ., YESİL E., KUMBASAR T.  
ENGINEERING APPLICATIONS OF ARTIFICIAL INTELLIGENCE, vol.26, pp.184-197, 2013 (Journal Indexed in SCI)
- XXV. **Type-2 fuzzy model based controller design for neutralization processes**  
Kumbasar T., EKSİN İ., Güzelkaya M., YESİL E.  
ISA TRANSACTIONS, vol.51, pp.277-287, 2012 (Journal Indexed in SCI)
- XXVI. **Adaptive fuzzy model based inverse controller design using BB-BC optimization algorithm**  
Kumbasar T., EKSİN İ., Güzelkaya M., YESİL E.  
EXPERT SYSTEMS WITH APPLICATIONS, vol.38, pp.12356-12364, 2011 (Journal Indexed in SCI)
- XXVII. **Interval type-2 fuzzy inverse controller design in nonlinear IMC structure**  
Kumbasar T., EKSİN İ., Güzelkaya M., YESİL E.  
ENGINEERING APPLICATIONS OF ARTIFICIAL INTELLIGENCE, vol.24, pp.996-1005, 2011 (Journal Indexed in SCI)
- XXVIII. **Big Bang Big Crunch Optimization Method Based Fuzzy Model Inversion**  
KUMBASAR T., GÜZELKAYA M.  
Lecture Notes in Computer Science, pp.732-740, 2008 (Journal Indexed in SCI)

## Articles Published in Other Journals

- I. **Parameter Optimization of Interval Type-2 Fuzzy Neural Networks Based on PSO and BBBC Methods**  
Wang J., Kumbasar T.  
IEEE-CAA JOURNAL OF AUTOMATICA SINICA, vol.6, pp.247-257, 2019 (Journal Indexed in ESCI)
- II. **A fuzzy logic based intelligent autonomous vehicle control system design in the TORCS game environment**  
Armagan E., KUMBASAR T.  
PAMUKKALE UNIVERSITY JOURNAL OF ENGINEERING SCIENCES-PAMUKKALE UNIVERSITESI MUHENDISLIK BILIMLERI DERGISI, vol.24, pp.1435-1442, 2018 (Other Refereed National Journals)
- III. **Type-2 Fuzzy Logic Control in Computer Games**  
Sahin A., Kumbasar T.  
TYPE-2 FUZZY LOGIC AND SYSTEMS: DEDICATED TO PROFESSOR JERRY MENDEL FOR HIS PIONEERING CONTRIBUTION, vol.362, pp.105-127, 2018 (Refereed Journals of Other Institutions)
- IV. **Interval type-2 fuzzy PID controllers and an online self-tuning mechanism**  
KUMBASAR T.  
PAMUKKALE UNIVERSITY JOURNAL OF ENGINEERING SCIENCES-PAMUKKALE UNIVERSITESI MUHENDISLIK BILIMLERI DERGISI, vol.22, pp.643-649, 2016 (Refereed Journals of Other Institutions)
- V. **Interval Type-2 Fuzzy PID Controllers**  
Kumbasar T., HAGRAS H.  
SPRINGER HANDBOOK OF COMPUTATIONAL INTELLIGENCE, pp.285-294, 2015 (Refereed Journals of Other Institutions)
- VI. **A Design Methodology and Analysis for Interval Type 2 Fuzzy PI PD Controllers**  
MORTAZA A., EKSİN İ., GÜZELKAYA M., KUMBASAR T.  
International Journal Of Innovative Computing Information And Control, vol.10, pp.4215-4230, 2013 (Refereed Journals of Other Institutions)
- VII. **Type-2 fuzzy model inverse controller design based on BB-BC optimization method**  
Kumbasar T., Eksin İ., Güzelkaya M., Yesil E.  
IFAC Proceedings Volumes (IFAC-PapersOnline), vol.44, pp.5308-5313, 2011 (Refereed Journals of Other

Institutions)

## Supported Projects

Sezer V., Demir A., Kumbasar T., Zengin R. S. , Project Supported by Higher Education Institutions, Servis Robotları İçin Otonom Sürüş Çözümlerinin Geliştirilmesi ve Uygulanması, 2018 - 2019

Kumbasar T., Candan F., Project Supported by Higher Education Institutions, Intelligent Systems in Embedded Systems, 2018 - 2019

Kumbasar T., Türkeli S., Beke A., Project Supported by Higher Education Institutions, Kaçma Kovalama Oyunları için Akıllı Kontrol Sistemlerinin Geliştirilmesi, 2017 - 2018

Kumbasar T., Project Supported by Higher Education Institutions, ARALIK DEĞERLİ TİP-2 BULANIK SİSTEMLER İÇİN AÇIK KAYNAK BİR MATLAB/SİMULİNK ARAYÜZÜ, 2015 - 2018

Kumbasar T., Project Supported by Higher Education Institutions, Aralık Değerli tip-2 ve Çevrim İçi Kural Ağırlıklı Tip-1 Bulanık PID Kontrolörlerin Ph Süreci Üzerinde Performans Analizi, 2014 - 2018

Kumbasar T., Project Supported by Higher Education Institutions, Büyük Çöküş Büyük Patlama Tabanlı Aralık Değerli Tip -2 Bulanık Kontrolörler için bir tasarım yöntemi, 2013 - 2018

Kumbasar T., Project Supported by Higher Education Institutions, Zaman serisi tahminlemede bulanık mantık tabanlı yeni bir yaklaşım, 2015 - 2016

## Activities in Scientific Journals

IEEE Transactions on Fuzzy Systems, Assistant Editor, 2018 - Continues

## Citations

Total Citations (WOS):567

h-index (WOS):13