

## Curriculum Vitae

**Name:** Ahmet Onat

**Birth date:** 24 September 1969

**Academic Title:** Associate Professor, Mechatronics

### Education

- Undergraduate: Electronics and communication Eng., Istanbul Technical University, 1991
- Ms: Electrical and Electronic Eng., Kyoto University (Japan), 1995
- PhD: Kyoto University (Japan), 1999

### Work Experience:

- Istanbul Technical University, Faculty of Electrical and Electronic Engineering; research assistant, 1991-1992,
- Kyoto University (Japan), Faculty of Aeronautics and Astronautics, postdoctoral researcher, 1999-2000.
- Sabanci University, Faculty of Engineering and Natural Sciences, Mechatronics Program, associate professor, 2000-.

### Research Interests

Real-time and embedded systems, linear synchronous motor design modeling and control, realtime communication, distributed systems, control, machine learning, and artificial neural networks.

### Web page

<http://people.sabanciuniv.edu/onat>

### Projects

1. Smart and Networking UnderWATER Robots in Cooperation Meshes, "SWARMS", H2020 supported ECSEL project. 2015-2018. Duration 30 month, budget 250,000EUR. Deliverables: Networked control of autonomous underwater vehicles (robotic submarine) under poor communication and visibility conditions. Member of consortium of 32 partners.
2. Drive and Safety Methods for New Generation Elevator Systems, Phase 2, with Japanese elevator company, 2010-2012. Duration 30 months. Budget: 450,000USD. Deliverable: Design and development of other novel ideas in linear motor design and implementation, publications, patents, linear motor prototype and design know-how. Primary investigator. 2010 Nov-.
3. Data Acquisition and Remote Diagnostics for Commercial Vehicles. Turkish bus and truck manufacturing company, 2008-2010. Duration 24 months, budget:145,000USD, Deliverable:

- Fault diagnostics system based on vehicle LAN, fault reporting over cellular network, fault analysis and reporting database system, papers. Primary investigator.
4. Drive and Safety Methods for New Generation Elevator Systems, funded by a Japanese Company, 2007-2009. Duration 24 months, budget:150,000USD, deliverable: Design and construction of large payload linear motor and electromechanical brake system design method, prototype, patent application, papers. Primary investigator.
  5. Control over Lossy Communication Networks(TBITAK 1001), Sabanci University, 2007–2009. Duration 24 months, budget: 110,000USD. Deliverable: Networked control computer design method, papers. Primary investigator.
  6. Nano-fiber Woven Wing Application for Micro Aerial Vehicle, Sabanci University, 2005–2007. Duration: 24 months, budget: 150,000USD. Deliverable: Prototype.
  7. "Sabanci University Robotics Research Laboratory Platform(TBITAK 1001), Sabanci University, 2006-2009. Duration: 36 months, budget: 300,000USD. Deliverable: Humanoid walking robot prototype with 29 degrees of freedom.
  8. Design and prototyping of a general purpose, open architecture computing, communication and electronics system for a micro system assembly and manipulation workstation (for Government), 2005-2007. Duration 2 years, budget 700,000USD, outcome prototype. Internal project code: EACF 05-00268
  9. Solar car prototype. Design, material selection and prototyping of electronic subsystem, consultation for mechanical design, Sabanci University, 2005. Budget 15,000USD, deliverable prototype.
  10. Automatic Fabric Labeling System, Control System Design Consultant, 2004–2005; duration1year, budget 40,000 USD, outcome prototype. Internal project code: EACF 05-00260
  11. Design of a very small footprint, expandable real-time Linux operating system, 2003-2005. Duration 2 years, budget 5,000USD, deliverable prototype, conference paper.
  12. Design and implementation of Multi-Legged Walking Robot for the Study of Emergent Gait Patterns, Kyoto University, Japan, 1999. Duration 1 year, budget 40,000 USD, deliverables prototype, journal papers conference papers.

## **Memberships**

1. IEEE 2004-
2. Steinbeis GMBH, Steinbeis Turkey, Steinbeis Sabanci University Mechatronics 2004-
3. ABIGEM; European Union Business Development Center, Development Consultant. 2005-

## **Awards**

1. Kyoto Shimbun Company (Kyoto Newspaper), financial support towards the doctoral degree award, 1998.
2. Highest level certificate in the Japanese language level proficiency test 1999
3. Japanese government scholarship (Monbusho) for full support during MS and Ph.D. studies, 1993-1999.
4. FP6 project proposal support grant, TUBITAK. Subject: "Design and prototyping of sensor

networks to be used in disaster rescue. 2004.

a

### **International Research Visits**

1. 2012 June, Malardalen University, Sweden, Erasmus teaching staff mobility program.
2. 2010 August-September, National Institute of Information and Communications Technology (NICT), Japan. Design of robotic user interface for 3D display device.
3. 2007, 2010 numerous short visits, Japan, Fujitec Co. Ltd., Linear motor design and control methods.
4. 2006 August-September, Kyoto University, Japan. Networked Control Systems.
5. 2004 August, Maribor University Slovenia. Fast prototyping in embedded systems.
6. 2001 August. Kyoto University, Japan. Data acquisition in the walking experiments of Myriapod walking robot, design and implementation of non-holonomic robot with vision system.

### **Publications**

#### **Books**

1. Alphan Ulusoy, Ozgur Gurbuz, Ahmet Onat, "Cooperative Wireless Model Based Predictive Networked Control Systems: Design, Implementation and Analysis", Lambert Academic Publishing, ISBN: 978-3843373999, 2010.
2. Mehmet Emrah Parlakay, Ahmet Onat, "Model Based Predictive Networked Control Systems: Methods, Design and Implementation", Lambert Academic Publishing, ISBN: 978-3838353746, 2010.

#### **Book Chapters**

1. Alphan Ulusoy, Ozgur Gurbuz, Ahmet Onat, "Wireless Control Networks with Real-Time Constraints", in: "Industrial Wireless Sensor Networks: Applications, Protocols, Standards, and Products", CRC press, accepted for publication, 2012.

#### **Journal Papers**

1. Ahmet Onat, Cagri Gurbuz, Sandor Markon, "A New Active Position Sensing Method for Ropeless Elevator", Elsevier Mechatronics (SCI), Vol. 23, pp 182-189, 2013.
2. Kazan E., Onat A., "Modeling of Air Core Permanent-Magnet Linear Motors with a Simplified Nonlinear Magnetic Analysis", IEEE Transactions on Magnetics (SCI), Vol.47, No.6, pp 1753–1762, 2011.
3. Onat A., Naskali T, Parlakay E, Mutluer O, "Control over Imperfect Networks: Model Based Predictive Networked Control Systems", IEEE Transactions on Industrial Electronics (SCI), Vol.58, No.3, pp. 905-913, 2011.

4. Alphan Ulusoy, Ozgur Gurbuz, Ahmet Onat, "Wireless Model Based Predictive Networked Control System Over Cooperative Wireless Network", IEEE Transactions on Industrial Informatics (SCI-E), Vol.7, No.1, pp.41–51, 2011
5. Gurbuz C., Kazan E., Onat A., Markon S., "Linear Motor for Multi-Car Elevators, Design and Position Measurement" (invited paper), Turkish Journal on Electrical Engineering and Computer Sciences (SCI-E), accepted for publication, 2010.
6. Kemalettin Erbatur, Utku Seven, Evrim Taskiran, Ozer Koca, Metin Yilmaz, Mustafa Unel, Gullu Kiziltas, Asif Sabanovic, Ahmet Onat, "Design and control of the humanoid robot SURALP" (invited paper), Turkish Journal of Electrical Engineering and Computer Sciences, (SCI-E), accepted for publication, 2010.
7. Onat A., Kazan E., Norio T., Daisuke M., Komatsu Y., Markon S., "Design and Implementation of a Linear Motor for Multi-Car Elevators", IEEE Transactions on Mechatronics (SCI), Vol.15, No.5, pp.685-693, 2010.
8. S. Yannier, A. Sabanovic, A. Onat, M. Bastan "Sliding Mode Based Behavior Control", International Journal of Information Technology, ISSN 1305-2403, Vol1, Issue 1, pp 1-12, 2005.
9. S. Yannier, A. Sabanovic, A. Onat, "Realization of Reactive Control for Multi Purpose Mobile Agents", Journal of Electronics Engineering, IU, JEEE, ISSN 1303-0914, Vol. 4, No. 2, pp. 1161-1170, 2004.
10. Tsujita, K.Tsuchiya, A. Onat, "Decentralized Autonomous Control of a Quadruped Locomotion Robot using Oscillators", Artificial Life and Robotics 4, 158-162, 2002.
11. A. Onat, H. Kita and Y. Nishikawa, "A Study on Architecture, Algorithms and Internal Representation for Reinforcement Learning with Recurrent Neural Networks", Transactions of the Society of Instrument and Control Engineers (Japan), Vol. 35, No. 12, pp. 1599-1608, 1999.
12. A. Onat, H. Kita, and Y. Nishikawa, "Reinforcement Learning of Dynamic Behavior by using Recurrent Neural Networks", Journal of Artificial Life and Robotics, Vol. 1, No. 3, pp. 117-121, 1997.

### Patents

1. "Moving magnet type linear motor", inventors: Sandor Markon, Ender Kazan, Ahmet Onat, granted Aug 6, 2013, CN102171915A, EP2333942A1, EP2333942A4, US8502421, US20110221282, WO2010038325A1...
2. "Position detection device for movable magnet type linear motor", inventors: Sandor Markon, Ahmet Onat, granted 26 June 2014, CN102804566A, US20120091928, WO2011001555A1...

### Conference Papers (International)

1. S. Markon, S. Maekawa, and A. Onat. Multi-Modal Interaction for Medical Visualization with Floating Images, 2014 ICME International Conference on Complex Medical Engineering (CME), pp. 462466, IEEE 2014
2. S. Markon, H. Miyake, S. Maekawa, A. Onat, and Z. Zhao. Improved interaction methods for medical visualization with floating images, 2013 ICME International Conference on Complex Medical Engineering (CME), pp. 462466, IEEE 2013

3. Alphan Ulusoy, Ahmet Onat, Ozgur Gurbuz, "Wireless Model Based Predictive Networked Control System Over IEEE 802.15.4", 5th International Workshop on Performance Control in Wireless Sensor Networks, PWSN 2013.
4. Markon S., Maekawa S., Onat A., "Robot-Assisted Medical Visualization with Floating Images", International Symposium on Network Enabled Health Informatics, Biomedicine and Bioinformatics, Istanbul, 2012
5. Markon S., Maekawa S., Onat A., Furukawa H., "Interactive Medical Visualization with Floating Images", International Conference on Complex Medical Engineering, ICME 2012, pp.20-23, Japan, 2012.
6. C. Gurbuz, A. Onat, "A New Active Position Sensing Method for Ropeless Elevator", LDIA11, Linear Drives in Industry Applications, pp. MLT-II.3, 2011
7. Markon S., Onat A., Kazan E., Gurbuz C., "Linear Motor Coils as Position Sensors", LDIA09, Linear Drives and Industrial Applications Conference, accepted, 2009.
8. Ulusoy A., Onat A., Gurbuz O., "Wireless Model Based Predictive Networked Control System", submitted to FeT09, 8th IFAC Conference on Fieldbuses and Networks in Industrial and Embedded Systems, 2009.
9. Onat A., Naskali T., Parlakay A. "Model Based Predictive Networked Control Systems", IFAC08 World Congress, pp 13000-13005, 2008.
10. Erbatur K, Seven U., Taskiran E, Koca O., Kiziltas G., Unel M., Sabanovic A., Onat A., "SURALP-L The Leg Module of a New Humanoid Robot Platform", IEEE Intl Conf on Humanoid Robots, 2008.
11. Onat A., Parlakay M.E., "Implementation of Model Based Networked Predictive Control System", RTLWS09, pp 85-93, 2007.
12. S. Markon Y. Komatsu, A. Yamanaka, A. Onat, E. Kazan, "Linear Motor Coils as Brake Actuators for Multi-Car Elevators", ICEMS07, CDROM proceedings, 2007.
13. S. Markon, Y Komatsu, A Onat, A. Yamanaka, E. Kazan, "Linear Motor Coils as Brake Actuators for Multi-Car Elevators, LDIA07, CDROM proceedings, 2007.
14. A.T. Naskali, A. Onat, "Random Network Delay in Model Based Predictive Networked Control Systems", WSEAS Intl. Conf. on Applied Computer Science, pp 199-206, 2006.
15. A. Sabanovic, A. Onat, "Generalized Motion Control; A SMC Perspective", IEEE Conference on Electric Drives and Power Electronics EDPE'05, Croatia, Vol1, pp 178-183, 2005.
16. Yannier S., Sabanovic A., Onat A., Bastan M., "Sliding Mode Based Obstacle Avoidance and Target Tracking for Mobile Robots", ISIE'05, Vol 2, pp 1489-1494, 2005.
17. Yannier S., Sabanovic A., Onat A. and Bastan M., "Sliding Mode Based Behavior Control for Mobile Robots", REM workshop, France, accepted, 2005.
18. Yannier, S., Sabanovic, A. and Onat, A., "Basic Configuration for Mobile Robots", IEEE International Conference on Industrial Technology ICIT2003, pp.256-261, 2003.
19. Sozibilir, O., Sabanovic, A., Goktug, G., and Onat, A., "A proposed Architecture for Remote Mechatronics Laboratory", Proc. Advanced Motion Control Conference, July 07-09, pp.561-566, 2002.
20. A. Onat, K. Tsuchiya, K. Tsujita, "Decentralized Autonomous Control of a Myriapod Locomotion Robot", Proc. 1st International Conference on Information Technology in Mechatronics,

- pp. 191-196, 2001.
21. K.Tsujita, K.Tsuchiya, A.Onat, S.Aoi, M.Kawakami, "Locomotion Control of a Multipod Locomotion Robot with CPG Principles", Proc. Sixth International Symposium on Artificial Life and Robotics, Vol.2, pp. 421-426, 2001.
  22. K.Tsujita, K.Tsuchiya and A. Onat, "Decentralized Autonomous Control of a Quadruped Locomotion Robot", Proc. International Symposium on Adaptive Motion of Animals and Machines, E-18, 2000.
  23. K. Tsujita, A. Onat, K. Tsuchiya and Y. Kawano, "Autonomous Decentralized Control of a Quadruped Locomotion Robot using Oscillators", Proc. Fifth International Symposium on Artificial Life and Robotics(AROB), Vol. 2, pp. 703-710, 2000.
  24. A. Onat, N. Kosino, M. Kuramitsu and H. Kita, "Reinforcement Learning under Incomplete Perception using Stochastic Gradient Ascent and Recurrent Neural Networks", Proc. IEEE International Conference on Systems, Man, and Cybernetics(IEEE SMC), Vol. 5, pp. 481-486, 1999.
  25. A. Onat, H. Kita and Y. Nishikawa, "Q-learning with Recurrent Neural Networks as a Controller for the Inverted Pendulum Problem", Proc. The Fifth International Conference on Neural Information Processing (ICONIP), pp. 837-840, 1998.
  26. A. Onat, H. Kita, and Y. Nishikawa, "Recurrent Neural Networks for Reinforcement Learning: Architecture, Learning Algorithms, and Internal Representation", Proc. World Congress on Computational Intelligence, pp. 2010-2015, 1998.
  27. A. Onat, H. Kita, and Y. Nishikawa, "Reinforcement Learning of Dynamic Behavior by Using Recurrent Neural Networks", Proc. 1st International Symposium on Artificial Life and Robotics, pp. 98-101, 1996.
  28. A. Onat, H. Kita, and Y. Nishikawa, "Reinforcement Learning of Dynamic Behavior by Using Recurrent Neural Networks", Proc. World Congress on Neural Networks, Vol. 2, pp. 342-345, 1995.

### **Conference Papers (Turkey)**

1. Mercedes Terrones , Ahmet Onat, "Olaya Dayal Model Ongorulu Kontrol", Proc. TOK, pp. 206-210, Turkey 2012.
2. Gurbuz C., Onat A. , Markon S., "Lineer Motorlar Icin Aktif Pozisyon Olcum Yontemi", Proc. TOK, pp. 530-535, Turkey 2011.
3. Sipahi Y., Onat A., "Gelistirilmis Genisletilmis Yapay Sinir Aglari", Proc. TOK, pp., Turkey, 2011, accepted for publication
4. Gurbuz C., Kazan E., Onat A., Markon S.,"Lineer Motorlu Asansorler icin Guvenilir Surus Yontemleri", TOK09, best student paper award, 2009
5. Erbatur K, Seven U., Taskiran E, Koca O., Kiziltas G., Unel M., Sabanovic A., Onat A., "SURALP-L Insansi Robot Platformu Bacak Modl", Proc. TOK 2007.
6. A. Teoman Naskali, Ahmet Onat, Ozan Mutluer, "Modele Dayali Ongorulu Ag Baglantili Kontrol Sistemi", Proc. TOK 2007, Vol.1, pp , 2007
7. M. Bastan, A. Onat, S. Yannier, A. Sabanovic, "Gezgin Robotlarin Potansiyel Alan Metoduyla Goruntu isleme Kullanilarak Kontrol Edilmesi", in the Proceedings of TOK'05, Vol 1, pp 319-

323, 2005

8. Murat Gunay, Asif Sabanovic, Nadira Sabanovic, Ahmet Onat, Anahtarlamali Guç Ceviricilerinin Akimlarinda Toplam Harmonik Distorsiyonun Azaltılması, Proc. TOK'02, Ankara, 2002, Turkey, pp.
9. Gurbuz, A., Sozbilir, O., Sabanovic, A., Onat, A., Goktug, G., Piezo robot MICMOR, Proc. TOK'02, Ankara, 2002, Turkey, pp.
10. Yannier, S., Sabanovic, A. and Onat, A., "Mobil Robotlar iin Engelden Sakindiran ve Hedefe Yonlendiren Katmanli Denetim Yontemi", in the Proceedings of ELECO'02, 18-22 December, Bursa, 2002, Turkey, pp. 168-172.

### **Conference Papers (Japan)**

1. N. Koshino, A. Onat, M. Kuramitsu, H. Kita, "Reinforcement Learning of Recurrent Neural Networks by Means of the Stochastic Gradient Algorithm", Proc. 42nd Annual Conference of the Institute of Systems, Control and Information Engineers(Japan), pp. 337-338, 1998 (in Japanese).
2. A. Onat, H. Kita and Y. Nishikawa, "Controlling an Inverted Pendulum by Reinforcement Learning with Recurrent Neural Networks", 25th SICE Symposium on Intelligent Systems (Japan), pp. 149-154, 1998.
3. T. Takenouchi, A. Onat, H. Kita and Y. Nishikawa, "Comparison of Algorithms for Reinforcement Learning with Recurrent Neural Networks", Proc. 41th Annual Conference of the Institute of Systems, Control and Information Engineers (Japan), pp. 43-44, 1997 (in Japanese).
4. A. Onat, H. Kita, and Y. Nishikawa, "A Study on Learning Algorithms and Architecture of Recurrent Neural Networks for Reinforcement Learning", Proc. 9th SICE Symposium on Decentralized Autonomous Systems (Japan), pp. 67-72, 1997.
5. A. Onat, H. Kita, and Y. Nishikawa, "A Study on Learning Algorithms and Architecture of Recurrent Neural Networks for Reinforcement Learning", Proc. 9th SICE Symposium on Decentralized Autonomous Systems (Japan), pp. 67-72, 1997.
6. A. Onat, H. Kita, and Y. Nishikawa, "Reinforcement Learning with Recurrent Neural Networks", Proc. 39th Annual Conference of the Institute of Systems, Control and Information Engineers (Japan), pp. 65-66, 1995.

### **Turkish Non-Academic Journal Publications**

1. Onat A., Kazan E., Gurbuz C., Markon S., "Lineer Senkron Motorlari Tasarimi, Imalati ve Kullanım Alanlari", Otomasyon, 2009.
2. A. Onat, G. Goktug, S. Yesilyurt, K. Tsuchiya, K. Tsujita, "Cok Bacakli Robotun Merkezlessiz Otonom Kontrolu", Otomasyon, pp. 100-105, 2003.
3. S. Izmit, E. Parlakay, A. Onat, "Linux'la Gerçek Zamanli Motor Kontrolu ve Goruntu isleme", Otomasyon, pp.50-52, 2003.

## Thesis Supervision

### Ms Theses:

1. "Residual Generation and Fault Diagnosis of Rechargeable Lead-Acid Batteries", Sena Ergullu, MS, Mechatronics, Mar. 2009, Jan 2011.
2. "Wide area network for vehicle diagnostics", Yusuf Sipahi, MS, Mechatronics, Mar 2009, Feb 2011.
3. "Active position measurement method for linear motor elevators", Cagri Gurbuz, MS, Mechatronics, Sept. 2008, Dec.2010.
4. "Dynamic balancing of underactuated robots", Ayse Nese Tufekciler, MS, Mechatronics, 1 Oct. 2007 - 21 Jan. 2010.
5. "Energy and power management in series hybrid vehicles", Yigit Resit Okan, MS, Mechatronics, 1 Feb. 2007 - 5 Feb. 2009.
6. "Design implementation and analysis of wireless model based predictive networked control system over cooperative wireless network", Alphan Ulusoy, MS, Electronics, 1 Oct. 2007 - 15 Aug. 2009.
7. "Design and implementation of a linear motor for multi-car elevators", Ender Kazan, MS, Mechatronics, 1 Sept. 2007 - 2 Jul. 2009.
8. "Stability and implementation of model based predictive networked control system", Ozan Mutluer, MS, Mechatronics, 1 Mar. 2007 - 28 Jul. 2009.
9. "Implementation of a distributed control system using real-time operating system", Mehmet Emrah Parlakay, Ms, Mechatronics, 01 Sept. 2004 - 14 Aug 2007.
10. "Model Based Predictive Networked Control systems", Ahmet Teoman Naskali, 1 Oct 2004 - 1 Jul 2006
11. Bastan M., "Visual Servoing of Mobile Robots using Potential Fields", Sabanci Univ, 2004
12. Bahadir K. "Sensorless Control of Induction Machine", Sabanci Univ,(co-advisor) 2004
13. Yannier S., "Realization of Reactive Control for Multi Purpose Mobile Agents", Sabanci Univ, 2002.
14. Gnay M., "Minimisation of Instantaneous Total Harmonic Distortion of Currents for Three-Phase Switching Power Converters", Sabanci University, 2002 (co-advisor).

### Bs Theses:

1. N. Koshino "Reinforcement Learning of Recurrent Neural Networks by Means of the Stochastic Gradient Algorithm", Kyoto University, (Japan), 1999
2. T. Takenouchi Recurrent Neural Networks in Reinforcement Learning, Kyoto University, (Japan), 1998.
3. In Sabanci University, graduation theses are given as a separate course. About three groups of three students each year have been advised between 2001- to date.



## **Courses Taught**

### **ME407 Embedded systems 2002-**

Fundamentals of design methods and technology of embedded systems. Integration of the measurement and actuators with embedded controller. Implementation of control algorithms. Interfacing the embedded controllers to network. Labs cover introduction to real-time Linux on an industrial computer, periodic task generation, data acquisition device drivers etc. A semester long project supports the course.

### **EE525 Real-Time Systems Design 2002-**

Introduction to real-time systems, real-time software design , concurrent programming and process interactions, real-time operating system, processing scheduling Case study: high performance real-time application, process communication, deadlock management distributed real-time systems, fault tolerance. Lab work.

### **TE409 Signal Processing Design and Implementation 2002-**

Development of real-time digital signal processing (DSP) systems using a DSP microprocessor; several structured laboratory exercises, such as sampling and real-time time discrete-time filtering, median filtering, FFT implementation. Lab work implementing Sampling, FIR, IIR, FFT on 2 DSP platforms, one with assembly, the other with 'C' language. A semester long project supports the course.

### **EE561 DSP systems Design and Implementation 2004-**

A study of theory and practice in the design and implementation of DSP algorithms on programmable processors, multiprocessors, and ASICs. Specification, evaluation, and implementation of real-time DSP software applications on embedded DSP-based environments Lab and project work.

### **ME308 Industrial Control 2002,2003**

This course covers industrial control systems. The specific topics include: control system architectures; transducers and actuators; secondary transducers; measurement; amplification; errors; communication in industrial control systems industrial LANs; sequential logic control; programmable logic controllers; direct digital control and supervisory control; structures of SCADA systems; case studies.

### **EE524 Industrial Automation 2002, 2003**

Code sharing with Industrial Control.

### **ENS206 System Modeling and Control 2001, 2013-**

Examples of physical and abstract systems and their mathematical models. Classification of dynamic system models linearity and time invariance; finite state discrete event systems. Tools of analysis

for linear systems: transform techniques, input-output analysis, block diagrams, frequency response representation. Introduction to stability and closed loop system design. Introduction to supervisory control for discrete event systems.