ÜMIT ÖZGÜNER

Professor of Electrical & Computer Engineering
TRC Inc. Chair on ITS
The Ohio State University

Education:

Ph. D. in Electrical Engineering, University of Illinois, 1975.
M. S. in Electrical Engineering, Istanbul Technical University, 1971.

Employment:

Present (at The Ohio State University)

- Professor of Electrical and Computer Engineering, 1988- present.
- TRC Inc. Chair on ITS (Intelligent Transportation Systems), July 1999 to present.
- Director, Crash Imminent Safety University Transportation Center, 2013-present.
- Director, Center for Intelligent Transportation Research, 1994-99.
- Assistant Professor, Jan. 1981-Sept. 1983.
- Associate Professor, Oct. 1983-Sept. 1988.
- Professional Leave of Absence:
  Sept. 1991–Jan. 1992 Ford Motor Company.
  Jan. 1992 –June 1992 Ohio Aerospace Ins. and NASA Lewis Rsrch. Cntr.
  March. 2006 Univ. of Karlsruhe.
  April 2006—June 2006 Istanbul Technical University, Turkey.
  Sept. 2013—Dec. 2013 Okan University, Turkey.

Past

- Visiting Assistant Professor, University of Toronto, Dept. of Electrical Engineering. On leave from Istanbul Technical University. Sept. 1979 – Aug. 1980.
- Assistant Professor of Electrical Engineering, Istanbul Technical University, 1976-1980. The title of Dozent was conferred in 1980.
- Lecturer at Bogazici University, Dept. of Mathematics, 1978-1979.
- Post-doctoral Research Appointment at I.B.M. T.J. Watson Research Center, Yorktown Heights, N.Y., 1975-1976.

Areas of Interest:

- Design of large scale systems and intelligent control
- Automotive control and Intelligent Transportation Systems (ITS)

Awards and Honors:

- IEEE Fellow, Jan. 1, 2010.
- OSU College of Engineering, Lumley Research Award, 1991.
- OSU College of Engineering, Lumley Research Award, 1996.
- OSU College of Engineering, Lumley Research Award, 2000.
- OSU College of Engineering, Lumley Research Award, 2005.
- OSU College of Engineering, Lumley Interdisciplinary Research Award, 2007.
- OSU College of Engineering Lumley Research Award 2010.
- OSU College of Engineering, Annual Research Accomplishment Award, 1998.
- Ford Motor Company, Faculty Research Award. ($150,000 for 1992-94)
- National Instruments Foundation Award. ($50,000, 2007, $50,000 2009)

Plenary Speaker at:

- IEEE Robotics Symposium, 1998, Toronto;
- IFAC Symposium on Control in Transportation Systems, 2003, Tokyo;
- MED'04 at Kusadasi, Turkey, 2004;
- IEEE Intelligent Vehicles Conference, Parma, 2004;
- IEEE Intelligent Vehicles Conference, Tokyo, 2006;
- ICIST-KAIST Conference. July 2006. Daejon, Korea.
- IEEE International Conference on Vehicle Electronics and Safety, June 2012, Istanbul.

Professional Activity:

- IEEE Control Systems Society, Columbus Chapter President, 1983-1985.
- National Research Council, Transportation Research Board, Member, Committee on Communications. 1984-1990.
- Chair of IEEE Control Systems Society *Working Group on Decentralized Control*, 1985-1992.
- Consultant to Ford Motor Company, 1988-95.
- Member of the *Board of Governors* of the IEEE Control Systems Society, 1990, (appointed).
- Ohio Aerospace Institute, Chair of Focus Area on Dynamic Systems and Control, 1990-1993. Chairman of Control Systems Technet 1993-96.
- IVHS-Ohio (now ITS-Midwest), Member of Executive Com.. 1993-2000.
- Chair, IEEE Control Systems Society, Technical Committee on Intelligent Control. 1994-96.
- IEEE Control Society, Conference Technical Review Committee. 1993-96.
- IEEE Control Society, Rep. on IEEE TAB, ITS Committee, 1995-1997.

- IEEE TAB, ITS Committee Chair, 1998
- IEEE ITS Council, President 1999, 2000 (elected)
- IEEE Control Society, Member of Board of Governors 1999-2001 (elected)
- IEEE TAB Committee on Nominations and Appointments 2001-2002 (elected)
- IEEE ITS Society, Member, Board of Governors, 2005-2007 (elected).
- IEEE ITS Society, VP Conferences, 2006-2007 (elected), 2008-2009 (re-elected).

Conference Organization

- Vice Chair, 1990 IEEE International Conference on Systems Engineering.
- Chair and Organizer of *O.S.U. Control Workshop*; 1983, 1984, 1985, 1990, 1994.
- Chair and Organizer of IEEE Control Systems Society *Workshop on Decentralized and Distributed Control.* September 1987.
- International Technical Program Committee member for the Conferences:
    - IEEE Conf. On Decision and Control 1990, 1991, 1993, 1996
    - 1991 IFAC Symposium on Distributed Intelligence Systems
    - 7th IEEE Symposium on Intelligent Control 1992
    - Conference on Active Materials and Adaptive Structures 1991, 1993
    - IFAC Workshop on Control Education 1991, 1994, 1997
    - IFAC Workshop on Variable Structure and Lyapunov Control, 1994, 1996, 2006,2008.
    - IFAC Mechatronics Conference, 1997
    - IFAC Symposium on Large Scale Systems 1998
    - IFAC Symposium on Vehicle Electronics, 1999
    - 1996 IFAC World Congress
    - 1999 IFAC World Congress.
- Registration Chair for the joint 1991 IFAC Symposium on Distributed Intelligence Systems and the 6th IEEE Symposium on Intelligent Control.
- Workshops Organizer and member of Executive Committee for the 1992 IEEE CDC.
- Program Co-Chair for 1993, 8th IEEE Symposium for Intelligent Control.
- General Chair of NSF/OAI Workshop on *Variable Structure Systems*, October 1992, Cleveland.
- General Chair for 1994, 9th IEEE Symposium on Intelligent Control.
- Member of International Advisory Committee of ITST, 2001- 2006.
- General Co-Chair, 1997 12th IEEE Symposium on Intelligent Control, Istanbul.
- Program Chair, 1997 IEEE ITS Conference, Boston.
- General Chair, 2002 Conf. On Decision and Control, Las Vegas.
- General Chair, IEEE Intelligent Vehicles Conference, June 2003, Columbus.
- General Chair, IEEE International Conference on Vehicle Electronics and Safety, September 2009, Columbus.

Associate Editorship

- Associate Editor in charge of Book Reviews of *IEEE Control Systems Society Transactions* 1984-1991.
- Technical Associate Editor, *IEEE Control System*, 1984-1986.
- Mini Special Issue Editor for *IEEE Automatic Control Transactions*, Mini Special Issue on Decentralized Control, June 1990.
- International Journal of Intelligent Mechatronic Design and Production
- International Journal of Intelligent Control and Systems
- IEEE ITS Transactions, 2000--present.
- IEEE ITS Transactions, Special Issue on the DARPA Urban Challenge, 2008.
- Transportation Science—C, Special Issue on Vehicle to Vehicle Communication, 2008/9.

College and University Activities

- College of Engineering, Transportation Committee 2012.
- Director of Center for Intelligent Transportation Research., 1993-1999
- Member of University Senate. 1993-96. (Elected to represent the College of Engineering)
- Member of University Committee on Academic Misconduct, 1993-96.
- College of Engineering, Promotion and Tenure Committee, 1992-95.
- College of Engineering, Research Committee, 1992-95.
- University Key Technologies Committee, 1993-95.
- Chair, Electrical Engineering Chair Search Committee, 1993-94.

Administrative Activities:

- *Director of Center for Intelligent Transportation Research, 1993-1999*

  As Director, Professor Ozguner coordinated the ITS related activities of faculty, research staff and students in seven Departments within and outside the College of Engineering (EE, ME, CIS, CE and ISE in Engineering, Geography and City Planning outside). He established a Graduate Student Fellowship Program on ITS, initiated a number of laboratories in different Departments, published a National Newsletter and supported annual Seed Grants for OSU faculty and research staff. The Center was a founding member of the State organization ITS-Ohio (now ITS-Midwest). The Center had an operating budget funded from the OSU Transportation Research Endowment Program (TREP), which annually provided from $250,000 to $500,000 for its budget. External research funding ranged from $1M to $2M.

In 2000, the College of Engineering decided to merge all TREP supported activities in automotive, ITS and manufacturing into the Center for Automotive Research (CAR) within which Prof. Ozguner still leads the ITS effort and the CAR Industrial Consortium's ITS Thrust.

- *Founding President of IEEE ITS Council/Society, 1998-2000*

  IEEE is the world's largest engineering organization. In 1998, as he was Chair of the IEEE Technical Activities Board, ITS Committee, Prof. Ozguner was asked to initiate an ITS Council/Society to join the other 32 IEEE Society/Councils. He led a team supported by 18 Societies; establishing the Rules and Bylaws, the administrative structure, the committees, the budget and the operational process of the Council that soon became the Society. A set of annual Conferences were initiated. The first IEEE ITS Conference was chaired by Prof. Ozguner. A new ITS Transactions and a newsletter were also initiated.

  Today the IEEE ITS Society, with Prof. Ozguner still on the Executive Committee, has a worldwide dues paying membership of about 1200, a highly successful Transactions, a Newsletter with a distribution of over ten thousand and six established international annual conferences.

Selected Projects:

Prof. Ozguner has participated in and led a number of high visibility programs. Notable are:

- Leading the OSU group which participated in the National Automated Highway System's demonstration on I-15 in San Diego in 1997. In this advanced research and technology demonstration, OSU developed and demonstrated 3 autonomous cars, and a radar reflective road based stripe technology. Using radar and vision, the cars autonomously achieved convoying, lane change, passing and coordinated activity. The cars were built for Prof. Ozguner's team by Honda which also supplied funding. The OSU team utilized a new radar-reflective tape technology. That portion of the effort was funded by the Department of Transportation, leading to a budget of over $2M. The OSU team included about 20 faculty, staff and students.

- Leading the OSU team as it participated in the 2 DARPA Grand Challenge races across the desert for autonomous vehicles. OSU developed the sensing and intelligence for TerraMax, an army truck from Oshkosh, in 2004. In 2005 OSU developed ION a smaller off-road vehicle. ION came in 10th among more than one hundred participants. Subsequently Prof. Ozguner led the OSU team in the DARPA Urban Challenge in 2007 through the Semifinals and into the top 20. This involved developing a fully autonomous car for city driving. Each year the OSU team had international participation. In 2004, a group from University of Parma, in 2005 a group from Karlsruhe University participated. Finally in 2007, groups from Italy and Turkey

joined the Team. Each Team consisted of about 30 faculty, staff and students. The budget in 2007 was over $600,000, supplied by contributions and donations.

- Leading the OSU portion of the Consortium Kapedokya, organized by the Turkish Company Aselsan, as they participated in the international ground robot competition: MAGIC. The Team passed through all the elimination rounds and reached the finals in Australia. The competition was based on multiple ground based, wheeled autonomous robots collaborating to map out a village while dealing with adversaries.

- Leading the Consortial Program on "Crash Imminent Safety" as Director of the Center of the same name at OSU. The Consortium also involves four other Universities and performs research focused as seven projects and outreach activities.

Other Education Related Activities:

- Prof Ozguner is one of the first to develop advanced digital control laboratories for senior/graduate students. Through the years at OSU he has developed four different control laboratories, the last one on technologies related to autonomous ground vehicles.
- He has developed a number of Senior and Graduate level control courses including a long-running Large Scale Systems course and a recent Autonomy in Vehicles course, both transferring leading-edge research to students.

Publications:

Over 400 publications in journals, conference proceedings and as book chapters. (See separate list)

Through the years, Prof. Ozguner's research has been supported by NSF, NASA, AFOSR, AFRL, DARPA, NAHSC, Honda R&D, GM, Ford, OKI among others. He has been consulted by a number of companies and organizations all over the world, including Japan, Taiwan, Korea and Turkey.

Funded Research:

Principal Investigators in all Grants and Contracts below (unless indicated):

- "Low order models for decentralized systems," $33,000. National Science Foundation. July 1, 1982-Dec. 30, 1984.
- "Control Strategies for Combining Route Guidance and Signalization" $62,093 Department of Transportation. Sept. 5, 1983-March 15, 1985.
- "Testing of a Decentralized Control Algorithm," $4,400 NASA Langley Research Center and $1,214 OSU. Sept. 5, 1985-Aug. 31, 1996.
- "A Computer Facility for Real-Time Control Studies," $54,000 National Science Foundation and $24,698 OSU and $ 35,000 DEC. Sept. 15, 1985-Feb. 28, 1987.

- "Decentralized/Relegated Control of a Class of Large Scale Systems," $150,000, Lawrence Livermore Laboratories Jan. 1, 1986-Nov. 30, 1987.
- "Establishment of a Control Research Center," $50,000. The Ohio State University. June 30, 1985-June 30, 1987.
- "Development of a Terminal Plug Assurance Systems," $10,000. Packard Electronic. March 1, 1986-Sept. 30, 1986.
- "Development of Decentralized Control Algorithms for Flexible Structures," (Co-PI: S. Yurkovich) $17,000. NASA Langley Research Center. Sept. 1, 1986-Dec. 31, 1986.
- "Development of Control Algorithms for Flexible Structures," $167,113, NASA, LaRC (1986-90). (S. Yurkovich, Co-PI).
- "Controller Design Approaches and Evaluations," Air Force, Wright Research and Development Center. (1987-91). $361, 000. (S. Yurkovich, Co-PI). Addendum on "Distributed Computational Approaches" (1991-92) $18,000. (F. Özgüner, Co-PI).
- "Relegation for Decentralized Control," $231,900. Air Force Office of Scientific Research (March 1989-February 1992).
- "Identification and Control of a Flexible Manipulator," $38,000. SANDIA (1989-90). (S. Yurkovich, Co-PI)
- Experimental Study of Decentralized Control" $34,000. NASA Jet Propulsion Laboratory (1989-90). (K. Ossman, Co-PI)
- "Study on Fast Development of a Truss": $42,500. Lawrence Livermore Labs. (1989-92).
- "Fault Tolerant Control Using Neural Nets for Large Flexible Space Structures" $40,000. (NASA GSR Program) NASA (1989-91).
- "Analysis of a Pneumatic Servo," Packard Electric, $17,640. (1991).
- "Automotive Data Communications and Active Suspension Control," Center of Automotive Research (O.S.U. Transportation Endowment Program), $32,580 (April 1991-July 1992).
- "A Hierarchical Framework for Vehicle Dynamics and Brake and Traction Control," Center of Automotive Research (O.S.U. Transportation Endowment Program), $25,500. (July 1992-December 1993).
- "Integrated Circuits for Distributed Control," AFOSR, $74,788. (1992-95)
- "Control of Interconnected Distributed Systems," AFOSR, $154,890. (1992-95)
- "Brake Control Algorithms for Interactive Vehicle Dynamics," Ford Motor Company, $33,090. (1992-93)
- "Dynamic Systems and Control Working Group Organization," Ohio Aerospace Institute, $15,164. (1992)
- "Studies on Intelligent Control", (J. Davis and A. Chandrasakaran, Co-PI), OSU College of Engineering and Vice President, special allocation. $66,000. (1993-94)
- "Establishment of the Center IVHS-OSU", OSU College of Engineering, (OSU Transportation Research Endowment Program), $380,000 (1993-94).
  $250,000 per year 1994 through 1999. (Administered with Advisory Committee)
- "Radar Based Convoying Using a Frequency Selective Patch for Trucks, Railroads and AHS," National Academy of Sciences, Jan. 1996-Feb. 1997, $108,781.
- "Radar Reflective Stripe for Vehicle Guidance," CMU subcontract from NAHSC's contract from FHWA. $630,890. 1996-97. (J. Young, Co-PI).
- "Preparation for the NAHS 1997 Technology Demonstration", Honda R&D of America, 1996-97, $271,200, (J. Young, Co-PI)
- "Research on Optimal Operating Point Selection," Ford Motor Co., 1997-98, $49,000.
- "Advanced Traffic Network Simulation Technology," Honda R&D Americas, 1998-99, $80,771

- “AHS Vehicle Operating Environment,” Honda R&D Americas, 1998, $30,000
- “VSS’98 Workshop Support,” (V. Utkin, Co-PI) NSF 1998-99, $8,000
- “Position Control with Discontinuous Feedback Nonlinearities,” Visteon, 1999, $36,000
- “Optimal Operating Points Determination,” Visteon, 1999, $58,824
- "Vision Based Lane Tracking for ACAS/FOT." Delphi Automotive, 1999-2000, $248,613.
- "Development of Evaluation Tools for Steering Assist Systems." Honda R&D, 1999-2000. $168,925.
- "Nonstandard actuation in vehicles," 1999-2001, CAR-IT Consortium, $62,960.
- "The Honda-OSU SAFENET Project," Honda R&D Americas, 2000-2003, $500,000. (Fitz, F.Özgüner, Takeshita, Co-PI)
- Engineering Design of the VDTV Steer-by-wire subsystem," NHTSA, 2000-2002, $130,360. (K.Redmill Co-PI)
- "IVI Evaluation," Battelle, 2000-2002, $168,000, (K. Redmill Co-PI).
- "Remote Sensing of Transportation Flows," DOT, 2000-2002, $160,846. (R. Mishalani Co-PI).
- "A Dual-Range Integrated Wireless System, Phase I" OKI Electronics, 2001-2006, $546,427 + $50K cost-share. (F. Ozguner, O. Takeshita, Co-PI.)
- "Control Authority Transition," 2001-2002, CAR-IT Consortium, $62,500.
- "Intermittent Short Range Communication for ITS Applications," 2001-2002, CAR-IT Consortium, $22,500. (K. Redmill, Co-PI)
- “Intelligent Cockpit Design” CAR-IT Consortium, 2002-3, extended 2003-4 ($125,000) (R. Butter, Co-PI.)
- "Strategies for human automation resource entity deployment," 2001-2005, subcontract $399,999, DARPA. (Main Contract: $3,475,000, J. B. Cruz, PI).
- “Collaborative Center for Control Science,” 2001-2004, subcontract $130,00 for 2001-2., Air Force Same for 2002-3, etc. Present total: $441,761, (K. Passino, PI)
- “Truck Rollover System,” 2003-2004, CAR-IT Consortium, $62,500.
- "A Dual-Range Integrated Wireless System, Phase II and III" OKI Electronics, 2004-2005, $411,201 + $80K cost-share. (F. Ozguner, O. Takeshita, E. Ekici, Co-PI.)
- “Collaborative Center of Control Science: Testbed development,” AFRL ($254,500), cost-share, OSU and BOR, $150,000. 2004-05. (K. Passino, K,Redmill, Co-PI)
- “Continued development of SAVEME System”, NHTSA 2004-05, $128,882. (K. Redmill, PI)
- “Tracking of Mobile Systems and Hospitability map Concepts,” MRLets Technologies, 2004, $25,000.
- “Novel, biologically inspired integrative architecture for ultra-tightly coupled GPS/INS”, Orbital Research, $26,583. 2003-2004.
- “Data Registration with UAV’s”, AFRL $160,000. 2005-08.
- CAR Consortium, “ITS Focus: Sensor Fusion,” $60,000. 2007-2008.
- “V2V Consortium”, $180,000. (F. Ozguner, K. Redmill, E. Ekici, co-PI’s.) 2006-08.
- “Intersection Access Research,” $316,000. Honda Research Americas. 2006-2011.
- “CPS: Autonomous Driving in Mixed Urban Environments,” $1,500,000, NSF, Sept 2009-Aug. 2012.
- “Participation in MAGIC 2010,” ASELSAN. $430,000, November 2009-Jan. 2011.
- “Workshop on Energy-ITS”, (Co-PI) $50,000, NSF, Jan. 2010, Aug. 2010.
- CAR Consortium, “ITS-Energy”, $30K. 2010.
- “Development of Standard Lane Departure Warning & Lane Departure Prevention Test Methods,” Toyota, Sept 2012 – July 2015, $475,000. (K. Redmill, PI).

- "Cloud-based routing and velocity profile optimization for everyday driving," Ford Research, URP. April 2012-March 2015. $120,000. (G. Rizzoni, Co-PI).
- "A Desktop Driving Simulator," OSU-Honda TREP, Oct. 2012, $33,000. (K. Redmill, PI)
- "Agile Rugged Terrain Vehicle –Special Ops Transport Challenge," AFRL, 6/12-11/13. (C. Cantemir and K. Redmill, Co-PI's).
- "Crash Imminent Safety," UTC. DOT RITA 10/2014—9/2017. ($4.2M)

The above does not include Budgets for the 2004, 2005 (about $300,00 each) and 2007 (over $600,000) DARPA Challenge Teams, and about $500K cost sharing for the CPS project.