



# **WORLD AUTOMATION CONGRESS**

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# **Lifetime Achievement Keynote No. WED-PM3**

**Bahram Shafai  
Northeastern University  
Boston, MA, USA**

**Time: 16:30-17:30**

**Date Wednesday June 6, 2018**

**Chair: Mehrdad Saif, University of Windsor, Canada**

**Venue: Stevenson Ballroom "A"**



## *Positive Control and Estimation of Dynamic Systems with Applications*

**ABSTRACT:** Positive systems are rapidly gaining more attention and popularity due to their appearance in numerous applications. The response of these systems to positive initial conditions and inputs remains in the positive orthant of state space. They offer nice robust stability properties which can be employed to solve several control and estimation problems not only for positive systems but also for general dynamic systems with positivity constraints. Examples of positive systems are

industrial processes involving chemical reactors, heat exchangers, distillation columns, and compartmental systems. They also found applications in economics, finance, social sciences, biology, and medicine. This talk will give the audience an overview of positive systems and provide variety of models having positivity behaviors. Stabilization, estimation and control problems are formulated and solution strategies will be discussed. It is also shown that positive systems have direct tie to symmetry and passivity, which makes their characteristics even more important for control design of aforementioned applications. Several illustrative examples with simulation results support the theoretical development.

**Bio: Bahram Shafai** is a professor in the Department of Electrical and Computer Engineering at Northeastern University, Boston, MA, USA. He received his BS and MS degrees in electrical engineering from the Swiss Federal Institute of Technology (ETH) Zurich, Switzerland, in 1976 and 1978, respectively, and the Ph.D. degree in electrical engineering from George Washington University in 1985. He joined the Department of Electrical and Computer Engineering at Northeastern University in 1985 and served as the director of the university's Communications and Digital Signal Processing Center from 1990 to 1992. Since 1996, he has been the director of the ECE Capstone Design Program and its associated laboratory. He has served as associate editor of two major journals and IEEE sponsored conferences. He served on the conference editorial board of the IEEE Control Systems Society for many years. Professor Shafai has also been a member of the organizing committees for various international and IEEE-conferences, such as CDC, ACC, CCTA, WAC, and IASTED. He has published one book and more than 200 journal articles and conference papers and has been the recipient of several honors and awards. He is a Life Senior Member of IEEE. His research interests include robust stability and control of multivariable systems, observer theory, identification and estimation, fault detection, time-delay systems, positive systems, and distributed control of multi-agent systems.