

IVT - Seminar***“The Particle Swarm Approach to Optimization with an Application in Semi-obnoxious Facility Location”***

by Alice E. Smith, Ph.D., P.E.
Professor of the Industrial and Systems Engineering Department, Auburn University

Monday, April 7th, 2014, 12:30-13:30hr
HIL E 36.1
ETH Zurich, Hönggerberg



Abstract:

In this talk, the heuristic optimization method of particle swarm is introduced. This paradigm was inspired by natural swarms such as birds and bees and blends individual action by the agents with collective behavior. Particle swarm optimization (PSO) is applied to a common location problem - the semi-obnoxious facility location problem. This problem arises when a facility which has both positive and negative effects when considering proximity. Examples are airports and recycling centers. The problem model is composed of a weighted minimum function to represent the transportation costs and a distance-based piecewise function to represent the obnoxious effects, or social costs, of the facility. Both single objective and two objectives are considered. Results are compared on a suite of test problems and show that the bi-objective PSO produces a diverse set of non-dominated solutions more efficiently than the single-objective PSO and is competitive with the best results from the literature. Computational complexity analysis estimates only a linear increase in effort with problem size.

Organizer: Prof. Dr. Ulrich Weidmann (weidmann@ivt.baug.ethz.ch)

No reservation is required.

Presenter's bio:

ALICE E. SMITH is the W. Allen and Martha Reed Professor of the Industrial and Systems Engineering Department at Auburn University, where she served as Department Chair from 1999-2011. She also has a joint appointment with the Department of Computer Science and Software Engineering. Previously, she was on the faculty of the Department of Industrial Engineering at the University of Pittsburgh from 1991-99, which she joined after industrial experience with Southwestern Bell Corporation. Dr. Smith has degrees from Rice University, Saint Louis University and Missouri University of Science and Technology.

During her tenure as Chair, the Industrial and Systems Engineering Department at Auburn University witnessed unprecedented growth in student enrollments (+200%), research funding (+500%) and private donations (+400%). Facilities expanded significantly and the department became a leader of three federally funded research centers. Interdisciplinary educational programs were developed and diversity of student body and faculty flourished. Ranking (*U.S. News*) significantly surpassed all other Auburn University engineering departments.

For accomplishments in research, education and service she was named the H. Allen and Martha Reed Endowed Professor in 2012. Dr. Smith was awarded the IIE Albert G. Holzman Distinguished Educator Award in 2012 and the INFORMS WORMS Award for the Advancement of Women in OR/MS in 2009. Dr. Smith was named the Philpott- WestPoint Stevens Distinguished Professor in 2001, received the Senior Research Award of the College of Engineering at Auburn University in 2001 and the University of Pittsburgh School of Engineering Board of Visitors Faculty Award for Research and Scholarly Activity in 1996. She has served as Chair of the Council of Industrial Engineering Academic Department Heads and as President of the INFORMS Association of Chairs of Operations Research Departments.

Dr. Smith holds one U.S. patent and several international patents and has authored more than 200 publications which have garnered over 1,900 citations and an H Index of 20 (ISI Web of Science). She won the E. L. Grant Best Paper Awards in 1999 and in 2006, and the William A. J. Golomski Best Paper Award in 2002. Several of her papers are among the most highly cited in their respective journals including the 2nd most cited paper of *IEEE Transactions on Reliability* and the 2nd most cited paper of *Reliability Engineering & System Safety*. Dr. Smith is an Area Editor of both *INFORMS Journal on Computing* and *Computers & Operations Research* and an Associate Editor of *IEEE Transactions on Evolutionary Computation*.

Dr. Smith has been a principal investigator on over \$6 million of sponsored research. Her research in analysis, modeling and optimization of complex systems has been funded by NASA, U.S. Department of Defense, Missile Defense Agency, NIST, U.S. Department of Transportation, Lockheed Martin, Adtranz (now Bombardier Transportation), the Ben Franklin Technology Center of Western Pennsylvania and U.S. National Science Foundation, from which she has been awarded 16 grants including a CAREER grant in 1995 and an ADVANCE Leadership grant in 2001. Her industrial partners on sponsored research projects have included DaimlerChrysler Electronics, Eljer Plumbingware, Extrude Hone, Ford Motor and Crucible Compaction Metals. International research collaborations have been sponsored by the federal governments of Japan, Turkey, United Kingdom, the Netherlands, Egypt, South Korea, Iraq, China, Algeria and the U.S., and by the Institute of International Education. In 2011 she was named a Fulbright Specialist candidate and in 2013 was a Fulbright Senior Scholar at Bilkent University in Turkey.

Five of her doctoral students are in tenured positions at U.S. universities and two of these are NSF CAREER awardees. A further five doctoral students are tenured or tenure track faculty at foreign institutions. Dr. Smith is a fellow of the Institute of Industrial Engineers, a senior member of the Institute of Electrical and Electronics Engineers (IEEE) and of the Society of Women Engineers, a member of Tau Beta Pi, and the Institute for Operations Research and Management Science, and a Registered Professional Engineer in Alabama and Pennsylvania. She was elected to serve on the Administrative Committee of the IEEE Computational Intelligence Society from 2013-15 and as IIE Senior Vice President – Publications from 2014-17.