UNIVERSITÄT PADERBORN
Die Universität der Informationsgesellschaft

FAKULTÄT FÜR
ELEKTROTECHNIK,
INFORMATIK UND
MATHEMATIK

REGELUNGS- U. AUTOMATISIERUNGSTECHNIK · EIM-E · UNIVERSITÄT PADERBORN · 33095 PADERBORN

Vortragsankündigung

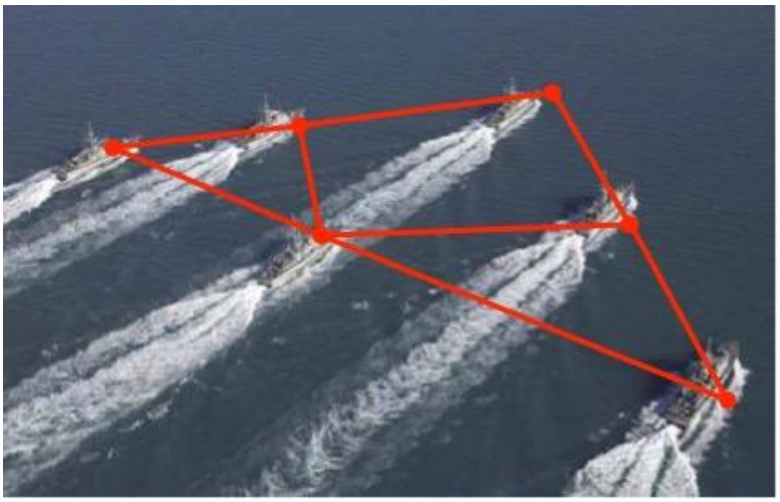
Am

Donnerstag, den 27.07.2017
in Raum P1.3.02 um 11:00 Uhr

hält Herr Prof. Minyue Fu von der Universität Newcastle (Australien) einen Vortrag über

A complex-valued Laplacian based approach to formation control with size scaling

Abstract:
In many applications, a network of multiple autonomous agents holds eminent promises to achieve a level of performance, capability, robustness, and efficiency beyond what a single agent can provide. However, to be advantageous, multiple agents have to work in an organized manner. A basic requirement is to achieve certain desired internal group formation shape. This talk considers autonomous mobile agents in the plane and aims to provide a distributed algorithm to steer a team of agents to a formation shape of variable size. A new approach based on complex-valued Laplacian will be introduced, i.e., the local interaction weights with the neighbors of each agent are complex values. Based on this approach, two fundamental questions will be addressed. First, what are the sensing and control architectures that are needed to maintain the shape of a formation regardless of its size? For this question, a necessary and sufficient condition will be given in terms of a new type of graph connectedness, called 2-rooted connectivity. Second, what are the distributed control strategies that can steer a group of autonomous agents in the plane into a desired formation shape for arbitrary initial configuration? A linear distributed control law will be provided using relative position measurements on the local frames attached to the agents, which are no necessary to be of the same orientation. The design of proper control gains in the linear distributed control law, however, needs a centralized technique related to the multiplicative inverse eigenvalue problem (MIEP). By permitting local communications between neighboring agents, a modified linear distributed control law will also be introduced, that is fully distributed in both the design stage and implementation stage.



Bio:

Minyue Fu received the B.Sc. degree in electrical engineering from the University of Science and Technology of China, Hefei, China, in 1982, and the M.S. and Ph.D. degrees in electrical engineering from the University of Wisconsin-Madison, Madison, WI, USA in 1983 and 1987, respectively. From 1987 to 1989, he was an Assistant Professor in the Department of Electrical and Computer Engineering, Wayne State University, USA. He joined the Department of Electrical and Computer Engineering at the University of Newcastle, Australia, in 1989. Currently, he is a Chair Professor of Electrical Engineering. He has been a Visiting Associate Professor at the University of Iowa, USA, Nanyang Technological University, Singapore and Tokyo University, Tokyo, Japan. He has held a ChangJiang Visiting Professorship at Shandong University, Jinan, China, a Qian-ren Professorship at Zhejiang University, China, and a Qian-ren Professorship at Guangdong University of Technology, China. He has been an Associate Editor for the IEEE Transactions on Automatic Control, Automatica, IEEE Transactions on Signal Processing, and the Journal of Optimization and Engineering. His main research interests include control systems, signal processing, and communications. His current research projects include networked control systems, smart electricity networks, and super-precision positioning control systems. He is an IEEE Fellow.