

Intelligent Sliding Mode Control in Practice

Prof. Okyay Kaynak

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It is a well-known fact that a variable structure controller with a switching output will (under certain circumstances) result in a sliding mode on a predefined subspace of the state-space. This mode has useful invariance properties in the face of uncertainties in the plant model and therefore is a candidate for tracking control of uncertain nonlinear systems. However pure sliding control has limited usage in practice since it requires very fast switching on the input (which cannot be provided by real actuators), is extremely vulnerable to measurement noise (the input depends on the sign of a measured variable which is very close to zero) and employs unnecessarily large control signals. To alleviate these difficulties, several modifications to the original sliding control law have been proposed, the most recent approach being the use of intelligent paradigms, such as fuzzy logic and neural networks in solving the engineering problems of sliding mode controllers. This one day long workshop will focus on such practical implementations. Its outline will be as below.

- * Basic theory of variable structure systems (VSS) and sliding mode controllers (SLC)
- * Engineering problems of SLC
- * Basics of soft computing; fuzzy control of and artificial neural networks
- * "Intelligent" sliding mode controllers
- * Practical implementations in robotics

PROGRAMME

8.30 am	Registration
9.00 am	Opening Address
9.10 am	Commencement of Workshop Session 1
10.30 am	Tea Break
11.00 am	Session 2
12.30 pm	Lunch
2.00 pm	Session 3
3.30 pm	Tea Break
4.00 pm	Session 4
5.00 pm	Question & Answer
5.30 pm	End of Workshop

Details:

Date:	Monday, 25 May 1998
Time:	8.30 am to 5.30 pm
Fee :	S\$300 per participant 10% discount for early registration
Venue:	Changi Room I, 3rd Floor, Concorde Hotel, 317, Outram Road, Singapore 169075
Tel:	(65)7330188

Who should attend:

Engineers, Researchers and Managers from:
* Research Groups on Robotics and/or Control,
* Industries which depend heavily on advanced control technology,
* Organisation related to control implementation.

REGISTRATION

Participants should submit their registration forms together with their payment, in the form of a crossed cheque made payable to **Robotic Games Society (Singapore)**, to:

Ms. Chia Meow Leng
Mechatronics Programme Office
Faculty of Engineering
National University of Singapore
10 Kent Ridge Crescent
Singapore 119260

Applications received before 15 May 1998 are entitled to a 10% Early Bird discount on the Workshop Fees. A letter of confirmation and official receipt shall be sent to you to confirm your participation in the Workshop.

Please note that there will be no refund for cancellation of participation. Replacement of participants may be accepted without any additional cost.

For further information, please contact Dr. Sam Ge through email at:
eleges@nus.edu.sg.

BIOGRAPHY OF PROF. OKYAY KAYNAK

Okyay Kaynak was born in Afyon, Turkey in 1948. He received his B.Sc. (First Class, Honours) and Ph.D. degrees in Electrical and Electronics Engineering from University of Birmingham, UK in 1969 and 1972 respectively. He started his professional life in 1972 at SEKA Pulp and Paper Mills in Turkey where he worked as a project engineer until 1975. He completed his national service during that period too at NATO Infrastructure Department in Ankara, Turkey. He then went to Saudi Arabia where he worked as an electronics expert for the General Directorate of Meteorology for three years, between 1975-78. After this industrial experience, in January 1979, he joined Bogazici (Bosphorus) University, Istanbul, Turkey, where he is currently a full professor and the holder of UNESCO Chair on Mechatronics. At this university, he has served as the chairman of Computer Engineering Department (3 years), as the Director of Biomedical Engineering Institute (1 year), as a member of the university senate (3 years) and as the founding Director of the Mechatronics Research and Application Center (2 years).

Okyay Kaynak is an internationally active person. He has held long term visiting professor/scholar positions in Japan (University of Tokyo, 1981-82 and 1989), Germany (Institute of Robotic Research, University of Dortmund, 1986-87), Canada (Université du Québec à Trois-Rivières, 1984) and USA (Indiana University-Purdue University at Fort Wayne, 1990; Michigan Technological University, 1990-91 and UC Berkeley, 1993). Currently he is a visiting professor at NUS.

He has been involved in the organization of many international meetings. He is an associate editor of IEEE Transactions on Industrial Electronics, a member of the management committee of IEEE/ASME Transactions on Mechatronics and serves on the editorial boards of IEEE Spectrum and International Journal of Advanced Computational Intelligence and on the advisory board of the Journal on Industry & Higher Education. He is active in IEEE too, has been a vice president of Industrial Electronics Society since January 1994.

Dr. Kaynak's research interests are in the areas of mechatronics and intelligent control. He has authored two books and edited three. Additionally he has published more than 120 papers in refereed journals and conference proceedings. His most recent activity (completed in Singapore) has been the co-editing of a book with Prof. Zadeh on Computational Intelligence.

REGISTRATION FORM	
Intelligent Sliding Mode Control in Practice	
<u>COMPANY DATA</u>	
COMPANY: _____	
ADDRESS: _____	
POSTAL CODE: _____	
TEL: _____	FAX: _____
CONTACT PERSON: _____	
<u>PARTICIPANTS FOR THE WORKSHOP</u>	
1. NAME : Mr. / Ms. / Dr. _____	
DESIGNATION : _____	
FOOD: MUSLIM / VEGETARIAN / CHINESE *	
2. NAME : Mr. / Ms. / Dr. _____	
DESIGNATION : _____	
FOOD: MUSLIM / VEGETARIAN / CHINESE *	
3. NAME : Mr. / Ms. / Dr. _____	
DESIGNATION : _____	
FOOD: MUSLIM / VEGETARIAN / CHINESE *	
* CANCEL WHERE APPLICABLE	
Fees enclosed : S\$ _____. Cheque should be crossed and made payable to Robotic Games Society (Singapore) . Completed forms and cheques should be sent to: Ms. Chia Meow Leng Mechatronics Programme Office National University of Singapore 10 Kent Ridge Crescent, Singapore 119260	



ONE-DAY ROBOTICS WORKSHOP
ON

Intelligent Sliding Mode Control In Practice

25 MAY 1998
9.00 AM TO 5.00 PM
CONCORDE HOTEL

JOINTLY ORGANISED BY
National University of Singapore
Nanyang Technological University
Robotic Games Society (Singapore)
Nanyang Polytechnic
Ngee Ann Polytechnic
Singapore Polytechnic
Temasek Polytechnic
Singapore Science Centre

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