



Practical System Identification - A MATLAB Hands-on Workshop

INTRODUCTION

Knowledge about the relationships between the input-output of a particular system - a model - is necessary when there is a need to predict the behaviour of this system under conditions different from those with which the system was determined. Based on the amount of available information, the determination of such a model can be carried-out analytically or numerically. Analytical approaches involve first-principles (basic physical equations), when there is enough a-priori information about the system. Numerical solutions can be obtained through system identification when such information is not available or when the system's behavior is highly non-linear.

COURSE OBJECTIVES

On the successful completion of this course, participants should be able to use the MATLAB System Identification and Neural Network toolboxes to identify unknown linear and non-linear dynamic systems.

OBJECTIVE & PEDAGOGY

This course will expose participants to the practical usage (through MATLAB) of system identification using a real system (problem-based learning approach). Theoretical developments will be kept to a strict minimum. A parametric modeling will be used as a platform to demonstrate the establishment of the input-output relationship without specific knowledge about the physical equations governing the system (black-box modeling).

COURSE CONTENT

Session 1: Getting started

1. Presentation of the real systems to identify
2. Signals & Systems
3. Dynamic Systems

Session 2: The basics

1. Frequency-Domain System Identification (SI)
2. Parametric Techniques

Session 3: System Identification by Linear Parametric Modeling

1. The MATLAB SI environment
2. Selection of the model structure
3. Selection of the model order
4. Model Validation

Session 4: Non-linear System Identification (SI) using Neural Networks

1. Selection of the architecture
2. Practical SI using Neural Network Toolbox
3. Neural Network Model validation in Simulink

TARGET AUDIENCE

Undergraduate and Postgraduate students,
Academics and Researchers,
Engineers and Scientists

DATE

Thursday October 02, 2014, 9 am – 5 pm

REGISTRATION

CONTACT: mypsoc@ieee.org

DEADLINE: Thursday September 25, 2014

VENUE

BL-3-010, Control Systems Laboratory,
College of Engineering,
UNITEN, Putrajaya Campus.

FEES (To be approved)

Students (IEEE Member)	RM 400
Students (Non-IEEE Member)	RM 450
IEEE Member	RM 500
Non-IEEE Member	RM 600

*Certificate from IEEE Signal Processing Society (Malaysia Section) given.
Course materials and morning/afternoon refreshments and lunch included.*

FIRST SPEAKER'S PROFILE

Edmond Zahedi is a holder of a Diplome d' Ingenieur (Ir.) and Diplome d'Etudes Approfondies - DEA (1985) in Control, Electronics and Informatics as well as a Ph.D. (1989) in Biomedical Engineering. He is currently holding academic positions at the Electrical School of Engineering, Sharif University of Technology (Iran) and the Department of Electrical, Electronics and Systems Engineering, National University of Malaysia (UKM). His teaching is split between two fields: medical engineering and data communication. His research area has always been medical instrumentation with emphasis on finding efficient ways for healthcare technology assimilation in the context of developing countries. He routinely uses system identification techniques for characterization of the human vascular system investigated with optoelectronic biosignals. He has successively served as chairman of the 7th Iranian Biomedical Engineering Conference in 1997 and as the scientific chair of the same conference (19th) in 2012. He is a member of the editorial board of the Iranian Journal of Biomedical Engineering (IJBME) and member of the board of the Iranian Society for Biomedical Engineering (ISBME). Dr. Zahedi is a Senior IEEE Member.

SECOND SPEAKER'S PROFILE

Farah Hani Nordin is currently a senior lecturer at Universiti Tenaga Nasional, Malaysia. She received her PhD in Engineering from Universiti Tenaga Nasional and her M.Sc. in Control, Communications and Digital & Signal Processing from University of Strathclyde, UK. She obtained her B. Eng. (Hons.) in Electrical & Electronic Engineering from Universiti Tenaga Nasional, Malaysia. Her research interest is not only in identifying linear and nonlinear systems but also includes in identifying and simulating faults using artificial intelligence.