

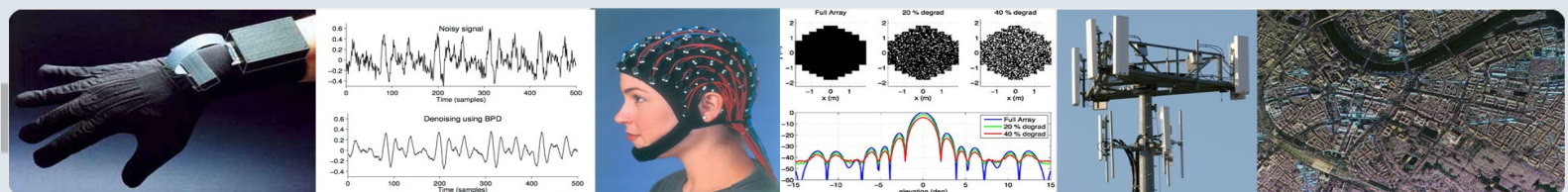
**2 Day Short Course**

on

# The Fundamentals of Subspace-based Techniques with Applications in Signal and Image Processing

**(18-19, May, 2013)**

More details can be found at: [http://www.utp.edu.my/CISIR/index.php?option=com\\_content&view=article&id=131&Itemid=1](http://www.utp.edu.my/CISIR/index.php?option=com_content&view=article&id=131&Itemid=1)



**Course Overview**

**Speaker**

**Assoc Prof Dr Nidal Kamel**



He received the PhD degree (Hons) from the Technical University of Gdansk, Poland, in 1993. His PhD work was focused on subspace-based array signal processing for direction-of-arrival estimation. Since 1993 he has been involved in research projects related to estimation theory, noise reduction, optimal filtering, and pattern recognition. He developed SNR estimator for antenna diversity combining, single-trial subspace-based technique for EEG extraction from brain background noise, and introduced a subspace-based data glove system for online signature verification. His present research interest is in brain signal processing, image enhancement, and pattern recognition.

Currently, he is Associate Professor at the PETRONAS University of Technology. He is IEEE senior member.

The course will cover the fundamentals of subspace-based techniques in linear algebra and statistical signal processing. It will outline the principle of orthogonality and demonstrates its relationship to the singular value decomposition (SVD), the eigenvalue decomposition and the oriented energy. Moreover, the course will focus on the linear estimators, like the minimum Variance, the Time Domain Constraint and the Spectral Domain Constraint for signal and image denoising and will cover some of the widely used algorithms in the areas of array signal processing and spectrum estimation.

The course will also show the implementation of the different subspace techniques using MATLAB codes, in the following areas:

- Signal and Image enhancement (Time Domain Constraint Estimator).
- Array Signal Processing (Multiple Signal Classification (MUSIC)).
- Spectrum estimation (Modified covariance).
- Pattern recognition (Data glove for signature verification).

Participant will get the opportunity to run MATLAB codes with the various applications and have the experience in writing similar codes.

**For Any Further Information, Please contact**

Mr. Dileep Kumar (Research Scientist)  
Centre for Intelligent Signal and Imaging (CISIR), UTP  
Email: [dileep.utp@gmail.com](mailto:dileep.utp@gmail.com) Phone: 0195591650

**Venue:**

UTM Razak School of Engineering and advance technology,  
UTM International Campus, Jalan Semarak  
54100 Kuala Lumpur  
Malaysia

**Organized By:**

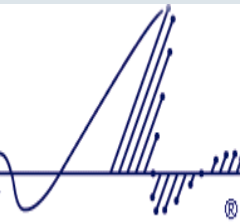


UNIVERSITI  
TEKNOLOGI  
PETRONAS  
engineering futures



IEEE (MALAYSIA SECTION)

Signal Processing Society



## Objectives

- To introduce the fundamentals of subspace techniques in linear algebra and signal processing.
- To explain the different subspace-based estimators.
- To show the power of subspace techniques in comparison to the classical techniques.

## Target Audience

Electrical engineers, Mathematicians, Researchers and Postgraduate students, Industry Researches

## Programme Schedule

### Day 1: 18 May, 2013

08:00	REGISTRATION AND OPENING REMARKS
09:00	BASIC IDEAS FROM LINEAR ALGEBRA AND MATRIX ANALYSIS
10:30	TEA BREAK
11:00	ORTHOGONALITY AND THE SVD
12:30	LUNCH BREAK
14:00	ORTHOGONALIZATION AND LEAST SQUARES
15:30	TEA BREAK
16:00	THE SYMMETRIC EIGENVALUE PROBLEM

### Day 2: 19 May, 2013

08:00	ASSUMPTIONS IN SUBSPACE METHODS
09:00	TEA BREAK
09:30	ADDITIVE NOISE AND SVD
10:30	TEA BREAK
11:00	LINEAR SIGNAL ESTIMATORS
12:30	LUNCH BREAK
14:00	APPLICATIONS USING MATLAB ON SIGNAL AND IMAGE PROCESSING
15:30	TEA BREAK
16:00	APPLICATIONS ON ARRAY SIGNAL PROCESSING AND PATTERN RECOGNITION.

## Fees

IEEE Student Member	RM 1,200
Full IEEE SPsoc Member\Student Non-Member	RM 1,250
Full IEEE Member	RM 1,300
Non-Member.	RM 1,400

The fee is per person and includes lunch, refreshments and short course materials. A certificate of attendance will be given at the end of the course. **Participants are required to bring their own Laptop.** However, PC rental with full Matlab installation is available at a cost of RM 150 for 2 days workshop.

## Registration Form

### Participants Registration Form

PARTICIPANT INFORMATION										
Name										
Organization										
Position										
Full Address										
Phone Number										
Email Address										
SHORT COURSE INFORMATION (PLEASE PROVIDE THE DETAILS OF SHORT COURSE)										
Short Course Title										
Dates & Venue of Course										
Registration Fees Amount										
Registration As (Please tick (x) on appropriate)	<table border="1"> <tr> <td>IEEE Student Member</td> <td></td> <td rowspan="4">Please provide the proof of membership or proof as student</td> </tr> <tr> <td>Student Non-Member</td> <td></td> </tr> <tr> <td>Full IEEE Member</td> <td></td> </tr> <tr> <td>Non-Member</td> <td></td> </tr> </table>	IEEE Student Member		Please provide the proof of membership or proof as student	Student Non-Member		Full IEEE Member		Non-Member	
IEEE Student Member		Please provide the proof of membership or proof as student								
Student Non-Member										
Full IEEE Member										
Non-Member										
Mode of Payment (Please tick (x) on appropriate)	<table border="1"> <tr> <td>Bankers Cheque</td> <td></td> <td rowspan="4">Please Attach the proof of payment</td> </tr> <tr> <td>Demand Draft</td> <td></td> </tr> <tr> <td>On-line Transaction to ITP Account*</td> <td></td> </tr> <tr> <td>Case deposit to ITP bank account*</td> <td></td> </tr> </table>	Bankers Cheque		Please Attach the proof of payment	Demand Draft		On-line Transaction to ITP Account*		Case deposit to ITP bank account*	
Bankers Cheque		Please Attach the proof of payment								
Demand Draft										
On-line Transaction to ITP Account*										
Case deposit to ITP bank account*										
Signature of the participant										

For On-line transaction and cash deposit to ITP account, please use the account information below

INSTITUTE OF TEKNOLOGY PETRONAS SDN BHD (352875-U):  
0809-0004124-054 (CIMB Bank Berhad, Batu Gajah)

Kindly fill the registration form and send a scan copy of filled form to one of the below e-mails:

[dileep.utp@gmail.com](mailto:dileep.utp@gmail.com) or [dileep.kumar@petronas.com.my](mailto:dileep.kumar@petronas.com.my)

**Note:** - Registration should be completed 7 days before course commencement. First-come, first-served policy is implemented due to limited seats

## Accommodation

Participants are required to make their own arrangements for accommodation near by UTM, KL. However, for student participants, UTM hostel room can be arranged at a cost of RM60-RM70/Night.

## For Any Further Information, Please contact

Mr. Dileep Kumar (Research Scientist)  
Centre for Intelligent Signal and Imaging (CISIR),  
Universiti Teknologi Petronas, Malaysia  
Email: [dileep.utp@gmail.com](mailto:dileep.utp@gmail.com)  
or  
[dileep.kumar@petronas.com.my](mailto:dileep.kumar@petronas.com.my)  
Phone/Mobile : 0195591650