NANYANG TECHNOLOGICAL UNIVERSITY

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# IMI RESEARCH SEMINAR

**DATE:** 25 August 2015, Tuesday
**TIME:** 11:00 am – 12:45 pm
**VENUE**: IMI Seminar Room, Research Techno Plaza, XFrontiers, Level 03-01
50 Nanyang Drive, Singapore 637553
*Lunch will be served

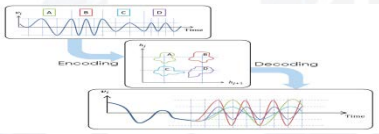
**Prof Hyewon SEO –** Visiting Professor, University of Strasbourg, France

Hyewon Seo is a CNRS (Centre National de la Recherche Scientifique) research scientist at the University of Strasbourg and Telecom Physique Strasbourg, France, since 2009. She has BSc and MSc degrees in computer science from the Korea Advanced Institute of Science and Technology (KAIST). After obtaining the PhD degree from University of Geneva in 2004, she worked as an assistant professor at the Computer Science and Engineering Department at the Chungnam National University, South Korea. She has served the CAVW journal as an associate editor and Computer Graphics International 2015 as a co-conference chair. Her research interests include data-driven graphical modeling, virtual prototyping, mesh segmentation and registration.

### *Topic - SHARED: SHape Analysis and REgistration of people using Dynamic data*

Shape analysis and matching constitute fundamental problems in virtual and augmented realities, where the reconstruction and recognition of moving objects (people in particular) play a central role. In this talk, we present our recent work on the shape analysis and registration of people using dynamic data. In developing a novel, efficient deforming shape analysis and correspondence framework for deforming meshes, we make use of a profitable set of motion data exhibited by deforming meshes with time-varying embedding. Our correspondence framework is composed of several contributions: a new dynamic feature detection technique based on multi-scale deformation characteristics, new dynamic feature descriptors, and an adaptation of a robust graph-based feature correspondence followed by a fine matching. In the aim of finding spatio-temporal correspondence that maximizes the motion similarity, we have next developed a tempo-spatial segmentation of deforming mesh sequence that computes the temporal and spatial segmentation of the given mesh sequence, so as to maximize the within- segment affinities. We have further extended the work towards similarity measure on movement data, which can be used for the (dynamic) shape query.

**GU Yuanlong William –** PhD Student, MAE / IMI




### *Topic - Perception-linked Behavior Model: Gesture Decoder*

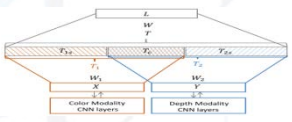
Telepresence robot is an emerging distance telecommunication medium where it empowers the user to explore and interact with the remote environment. However, face-to-face communication is still the de-facto communication medium as it provides both verbal and nonverbal information. Existing telepresence robot design has a number of social gaps, notably the lack of nonverbal communication. Thus, EDGAR an individualistic anthropomorphic telepresence robot was proposed. The perception-linked behavior model was the proposed user-interface to control EDGAR. The objective of the model is to provide a flexible control and exhibit expressive nonverbal cues without compromising safety and operator cognitive load. The basic components in this model include Encoder, Decoder and Associator. In this presentation, we will revisit the gesture encoder and present the details of gesture decoder.

**Shakeel AHMAD –** PhD Student, EEE / IMI

### *Topic - Distributed Neighbour Selection Problem in Multi-Robot Distributed Formation Control*

This work addresses the problem of ddistributed neighbour selection which helps in achieving scalable, reconfigurable formations for multi-robot systems. The global objective of achieving a desired formation is obtained by dividing it into a set of local objectives which are achieved in a distributed manner. The previous work made use of a neighbor selection algorithm which relied on centralized information. Another drawback of previous neighbor selection algorithm was that it could not be generalized. In this work, the possibility of having scalable and reconfigurable formations for multi-robot systems is considered without relying on the centralized information. The local task functions are accomplished using task-priority inverse kinematics controllers and the conflicts among them are resolved using Null Space Behavioral approach.

**WANG Anran -** PhD Student, SCE / IMI




### *Topic - Multi-modal Feature Learning for RGB-D Object Recognition*

Most of the feature-learning methods for RGB-D object recognition either learn features from color and depth modalities separately, or simply treat RGB-D as undifferentiated four-channel data, which cannot adequately exploit the relationship between different modalities. Motivated by the intuition that different modalities should contain not only some modal-specific patterns but also some shared common patterns, we propose a multi-modal feature learning framework for RGB-D object recognition. We first construct deep CNN layers for color and depth separately, and then connect them with our carefully designed multi-modal layers, which fuse color and depth information by enforcing a common part to be shared by features of dif ferent modalities. In this way, we obtain features reflecting shared properties as well as modal-specfic properties in different modalities. The information of the multi-modal learning frameworks is back-propagated to the early CNN layers. Experimental results show that our proposed multi-modal feature learning method outperforms state-of-the-art approaches on two widely used RGB-D object benchmark datasets.

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