IMI RESEARCH SEMINAR

DATE: 08 December 2015, Tuesday

TIME: 11:00 am – 12:30 pm

VENUE: IMI Seminar Room, Research Techno Plaza, XFrontiers, Level 03-01,

50 Nanyang Drive, Singapore 637553

*Lunch will be served

11.00am – 11.25am

An Immersive Bidirectional System for Life-size 3D Communication

Dr Tobias MARTIN – BTC Key Researcher, ETH Zurich, Switzerland

Telecommunication and video conferencing are an integral part of modern society with implications in many aspects of everyday life. However, compared to a face-to-face conversation or a meeting in person, the sense of presence is still limited in electronic communication. Reasons for this include lack of 3D perceptual cues, limited body language, discontinuity of the physical environments, and cropped or resized views of the participants.

In this talk, I present a novel bi-directional system for life-size 3D telepresence system, which addresses these challenges. In my talk I give an overview of the system's key components and present related technologies, which have been recently developed in the context of the BeingThere Centre. I conclude my talk by summarizing achievements, but also give an outlook to future challenges.

About Dr Tobias MARTIN

Tobias Martin is a postdoctoral researcher at ETH Zurich (Switzerland) and is currently visiting the BeingThere Centre at NTU in Singapore. He did his PhD at the University of Utah with Elaine Cohen. His dissertation research focused on the generation of appropriate geometric and simulation attribute representations for the design and the visualization at several stages in the emerging area of Isogeometric Analysis. His research interest focuses on geometric computations in combination with physics-based simulation for various domains in engineering and computer graphics.

11.25am – 11.50am

Biologically-inspired Control Framework for Insect Locomotion

Dr Shihui GUO – Research Fellow, IMI

Natural-looking insect animation is very difficult to simulate. The fast movement and small scale of insects often challenge the standard motion capture techniques. As for the manual key-framing or physics-driven methods, significant amounts of time and efforts are necessary due to the delicate structure of the insect, which prevents practical applications. This talk will discuss the approaches to address this challenge, based on some biological inspirations, including the Central Pattern Generator and the fixed gait pattern. The goal is to allow animators to directly author insects' behavior among a wide range of locomotion repertoire.

About Dr Shihui GUO

Shihui Guo is a research fellow at Institute of Media Innovation, NTU. He received his PhD at National Centre for Computer Animation, Bournemouth University, UK. His previous research is about animating the virtual insects with biologically-inspired approaches. He is currently working together with Prof Nadia Thalmann and Daniel Thalmann in the area of social robotics.

11.50am – 12.10pm

Blind Image Quality Assessment Using Statistical Structural and Luminance Features

Blind image quality assessment (BIQA) aims to develop quantitative measures to automatically and accurately estimate perceptual image quality without any prior information about the reference image signals. We introduce a novel BIQA metric by structural and luminance information, based on characteristics of human visual perception for distorted image. We extract the perceptual structural features of distorted image by the local binary pattern (LBP) distribution. Besides, the distribution of normalized luminance magnitudes is extracted to represent the luminance changes in distorted image. After extracting the features for structures and luminance, support vector regression (SVR) is adopted to model the complex nonlinear relationship from feature space to quality measure. The proposed BIQA model is called NRSL (No-Reference quality assessment using statistical Structural and Luminance features) for short. Extensive experiments conducted on three public singly-distorted image databases and one multiply distorted database have demonstrated that the proposed NRSL metric compares favorably with the relevant state-of-the-art BIQA models in terms of high correlation with human subjective ratings.

About LI Qiaohong (SCE & IMI)

Qiaohong is currently pursuing the PhD degree with the School of Computer Engineering, Nanyang Technological University, Singapore. She received the B.E. degree in 2009 and M.E. degree in 2012 in School of Information and Communication Engineering from Beijing University of Posts and Telecommunications, Beijing, China. Her research interests include image quality assessment, speech quality assessment, computer vision, and visual perceptual modelling.

Her Supervisor is Assoc Prof LIN Weisi, SCE and Co-Supervisor is Prof Daniel THALMANN, IMI.

12.10pm – 12.30pm

Efficient G3 Approximation of Clothoids with Quintic Bézier Curves for Path Planning
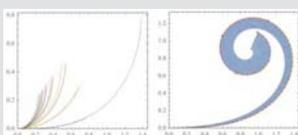
Clothoids are also referred to as Euler spirals and are very common in path planning applications due to its property of linear curvature changes with its curve length. However they are difficult to use in real-time scenarios because the Fresnel integrals involved have no closed form. Thus different approximation methods are used to compute or approximate clothoids. We propose a new G^3 approximation algorithm by creating a lookup table with quintic Bézier curves for a class of basic clothoidal curves. Using the lookup table we are able to approximate general clothoidal curves with any parameters while most up-to-date algorithms can only handle clothoids with specific constraints. At the same time, compared with other methods, our algorithm always (1) generates smaller curvature errors; (2) requires no extra numerical optimization procedures thus can be used in real-time applications; (3) guarantees G^3 continuity which is sufficient for most path planning problems.

About CHEN Yong (MAE & IMI)

Yong is currently pursuing his PhD degree at Nanyang Technological University. He received the B.Eng degree in Mechanical Engineering from University of Science & Technology of China. His research interests: path planning, robotics, and related applications in industrial engineering.

His Supervisor is Assoc Prof CAI Yiyu, MAE and Co-Supervisor is Prof Daniel THALMANN, IMI.