

IMI RESEARCH SEMINAR

DATE: 25 October 2016, Tuesday

TIME: 11:00 am – 12:25 pm

VENUE: IMI Seminar Room, Research Techno Plaza, XFrontiers, Level 03-01,
50 Nanyang Drive, Singapore 637553

Lunch will be served

11.00am – 11.20am

Clothoid Based Spline-RRT with Bezier Approximation



Finding a feasible path is non-trivial for wheeled robots especially those under nonholonomic constraints. A practical planner should satisfy certain conditions limited by the kinematic and dynamic properties of the robot while avoid obstacles in the environment. A local planner can be formulated by computing a path that connects the initial and goal states which satisfies the upper-bounded curvature constraints imposed by the kinematic properties of the robot. Here we use the clothoid curve as the optimal solution obtained by applying Pontryagin's Maximum Principle on Dubins model. It can be integrated with the RRT algorithm to achieve efficient collision free path planning. Finally, a Bezier approximation is proposed to guarantee real time computation and smoothness.

About CHEN Yong – PhD Student, 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

11.20am – 11.40am

Distributed Formation Control for MultiRobot Systems



This work addresses the problem of distributed 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.

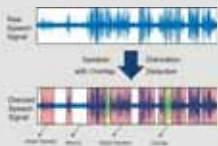
About Shakeel AHMAD – PhD Student, EEE & IMI

Shakeel Ahmad is pursuing his PhD degree at Nanyang Technological University. He completed his BS from University of Engineering and Technology Lahore, Pakistan. His research interests include multi-robot systems, multi-agent systems and formation control.

His supervisor is Asst. Prof. HU Guoqiang, EEE and co-supervisor is Prof Nadia THALMANN, IMI.

11.40am – 12.00pm

Overlap Detection in Speaker Diarization: Key to Social Behavior Understanding



Speaker diarization is one of the essential aspects of any speech processing and recognition systems, as it deals with identifying and assigning sections of speech to their correct speakers. Many solutions to the speaker diarization problem already exist, however, one critical area of speaker diarization remains rather under-addressed, that of detection of speaker overlaps during single-channel speech. It is necessary to identify these overlaps in order to correctly detect such conversational audio cues as interrupts, natural turns, speaker overlap etc., which are key to understand the rapport between the speakers and hence, their social behavior. There is also a lack of well-annotated dataset containing two-person conversations with significant amount of overlap. Hence, we created our own dataset, consisting of conversations taken from audiobooks. We present here an approach to use speech energy and mel-frequency cepstral coefficients (MFCC), and applying various algorithms such as hidden Markov models, Conditional Random Fields etc. to model the differences between the characteristics of silence, single speaker and overlap regions in single-channel speech. Such a system can be used to properly tag single-channel, online videos according to the social behavior displayed in them.

About Debsubhra CHAKRABORTY – PhD Student, IMI & IGS

Debsubhra is currently pursuing his PhD degree with the Institute for Media Innovation, under the Interdisciplinary Graduate School at Nanyang Technological University, Singapore. He received the B. E. (Hons.) degree in Electrical Engineering from Jadavpur University, India in 2009 and M. Tech. degree in Systems and Control Engineering from IIT Bombay, India 2011. His research interests include human social behavior understanding, speech processing, and video processing.

His Supervisor is Assoc. Prof Justin DAUWELS, EEE and Co-Supervisor is Prof Daniel THALMANN, IMI.

12.00pm – 12.25pm

Natural Grasp of Social Robot Nadine with the 3D Printed Hand



TIAN Li – Research Associate, IMI

For realistic or some other kind of humanoid robot for social or business purpose, a couple of dexterity hands with arms are essential. This presentation will show a new design of robotic hand for the realistic female humanoid social robot "Nadine". This robotic hand can be 3D printed and put inside the artificial skin. It also can be assembled to "Nadine" robot or other robot's skeleton as well as integrated to the robot controller to perform the natural grasp like a human.

About TIAN Li

TIAN Li is a research associate at Institute of Media Innovation, NTU. He received his B.Eng. at NTU 2010 and M.Sc. at NTU 2012. He has 5-year firmware engineer working experience in Toshiba and Fuji Xerox. He is working on the area of social robotics under supervising of Prof. Nadia Thalmann. TIAN Li is also pursuing the part-time M.Eng. degree at NTU and his part-time M.Eng.'s supervisor is Assoc Prof ZHENG Jianmin.