NANYANG TECHNOLOGICAL UNIVERSITY

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IMI PHD INTERDISCIPLINARY SEMINAR

DATE: 26 November 2013, 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

Claudia KUSTER
Visiting PhD Student
ETH, Zurich Switzerland

Spatio-Temporal Geometry Fusion for Multiple Hybrid Cameras Using Moving Least Squares Surfaces

Multiview reconstruction aims at computing the geometry of a scene observed by a set of cameras. Accurate 3D representations of dynamic scenes are a key component in a large variety of applications, ranging from special effects to telepresence and medical imaging. We propose a method based on Moving Least Squares surfaces which robustly and efficiently reconstructs dynamic scenes captured by a set of hybrid color + depth cameras. Our reconstruction provides spatio-temporal consistency and seamlessly fuses color and geometric information. We use a single generic kernel function in all steps of our pipeline, from geometric fusion to scene texturing. We illustrate our formulation on a variety of real sequences and demonstrate that it favorably compares to state-of-the-art methods.

CHENG Peng
PhD Student
IMI/SCE

Tangent Adjustment for the Initial Value Problem of Discrete Geodesics

Computing geodesic paths and distances is a common operation in computer graphics and computer aided geometric design. The existing methods for computing the straightest geodesic paths and distances restrict the geodesic curve to a line segment in a triangle. Due to large cumulative error, these methods often produce poor results when the geodesic path is long and such issue cannot be fixed by mesh refinement. This paper presents a tangent adjustment method for solving the initial value problem of the discrete geodesics. Our method adjusts the direction of the geodesic curve in a triangle by considering its local tangent and normal variation.

ZHANG Yuzhe
PhD Student
IMI/SCE

Customize Garment Pattern for Made-To-Measure

In fashion industry, the garment is designed by several 2D patterns. And thousands of designed 2D garments are provided online. For a customer, he or she wants to buy the design of garment and aspires to the fit. As a result, a garment customization system to generate patterns made to measure for specific customer is useful. To achieve this goal, the pipeline of our method goes through procedures from fitness evaluation; developable surface based 3D garment deformation and 2D pattern flattening. Experimental results show that our method could generate MTM garment for manufacturing in a digital way.

Shakeel AHMAD
PhD Student
IMI/EEE

Multi-Robot Formation Control Using Distributed Null Space Behavioural Approach

This work proposes a distributed formation control method for a group of robots. 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. A basic repetitive pattern in the desired formation is identified and a corresponding unique differentiable task function is defined based on the position coordinates of the robots forming the pattern. Neighbor selection rules are designed for the robots in such a way that each robot is part of one or more such patterns. A singularity-robust task-priority inverse kinematics method is used to design velocity controllers to achieve such patterns. Since a robot can receive multiple control actions being part of multiple task functions or patterns, a distributed Null Space Behavioral (NSB) approach is designed to combine such multiple control actions in a prioritized way. A comprehensive stability analysis of the proposed approach based on Lyapunov methods is presented. Simulation results are provided to verify the effectiveness of the proposed approach.

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