$\boxed{4}$ **11:00–11:30**

Animating a Camera for Viewing a Planar Polygon*

Dani Brunstein
Computer Science, Technion

Many applications, ranging from visualization applications (such as, architectural walkthroughs) to robotic applications (such as, surveillance), could benefit from an automatic camera trajectory planner. Thistalk shows an algorithm for dealing with that problem. We have automated the process of inspecting the outside of a simple two-dimensional polygon, given a few user parameters. Our algorithm preprocesses the polygon using Visibility-Graph-like concepts, and creates a data structure for each polygon edge. From these structures, "good" camera zones are computed. Natural cubic splines are then used to create a closed camera trajectory that passes solely inside the zones. An iterative process refines the trajectory by minimizing a cost function until it converges to the optimal result.

*** Joint work with Gill Barequet and Craig Gotsman.**

$\boxed{5}$ **11:30–12:00**

Hierarchical Mesh Decomposition Using Fuzzy Clustering and Cuts*

Sagi Katz
Electrical Engineering, Technion

Cutting up a complex object into simpler sub-objects is a fundamental problem in various disciplines. In image processing, images are segmented while in computational geometry, solid polyhedra are decomposed. In recent years, in computer graphics, polygonal meshes are decomposed into sub-meshes. In this paper we propose a novel hierarchical mesh decomposition algorithm.

Our algorithm computes a decomposition into the meaningful components of a given mesh, which generally refers to segmentation at regions of deep concavities. The algorithm also avoids over-segmentation and jaggy boundaries between the components. Finally, we demonstrate the utility of the algorithm in control-skeleton extraction.

*** Joint work with Ayellet Tal.**

$\boxed{6}$ **12:00–12:30**

Breaking the Walls: Scene Partitioning and Portal Creation*

Alon Lerner, Tel-Aviv University

In this talk we revisit the cells-and-portals visibility methods, originally developed for the special case of architectural interiors. We define an effectiveness measure for a cells-and-portals partition, and introduce a two- pass algorithm that computes a cells-and-portals partition. The algorithm uses a simple heuristic that creates short portals as a means for generating an effective partition. The input to the algorithm is a set of half edges in 2D, that can be extracted from a complex polygonal model. The first pass of the algorithm creates an initial partition, which is then refined by the second pass. We show that our method creates a partition that is more effective than the common BSP partition, even when the latter is further refined with the application of our second pass. Our cells-and-portals algorithm is designed to deal with arbitrarily oriented walls. The algorithm also supports outdoor scenes, where the vertical walls of the buildings serve as occluders and portals are extended above the buildings. We show that the extended portals al- low an output-sensitive rendering of large urban scenes. Finally, since our two- pass method is fully automatic and local, it supports incremental changes of the model by locally recomputing and updating the partition. We call our method "Breaking the Walls" (BW) since it breaks out of indoor scenes to outdoor scenes, and allows walls to be broken interactively, with an instant updating of the partition.

*** Joint work with Yiorgos Chrysanthou (University of Cyprus) and Daniel Cohen-Or.**

INVITATION

ISRAEL SIGGRAPH PROFESSIONAL CHAPTER MEETING

Sponsored by

Silicon Graphics (Israel) Ltd.

May 23, 2003
8:30–12:30
Lev Hall
Tel-Aviv University
Tel-Aviv

Chair: Dan Gordon
University of Haifa

Free parking is available on-campus through gate 1 at Tel-Aviv University.

8:30–9:00

Refreshments

$\boxed{1}$

9:00–9:30

Bilateral Mesh Denoising*

Shachar Fleishman
Tel-Aviv University

We present an anisotropic mesh denoising algorithm that is effective, simple and fast. This is accomplished by filtering vertices of the mesh in the normal direction using local neighborhoods. Motivated by the impressive results of bilateral filtering for image denoising, we adopt it to denoise 3D meshes; addressing the specific issues required in the transition from two-dimensions to manifolds in three dimensions. We show that the proposed method successfully removes noise from meshes while preserving features. Furthermore, the presented algorithm excels in its simplicity both in concept and implementation.

*** Joint work with Daniel Cohen-Or and Iddo Drori.**

$\boxed{2}$

9:30–10:00

Tolerance Envelopes of Parametric Planar Part Models*

Yaron Ostrovsky-Berman
School of Computer Science and Engineering, The Hebrew University

We present a framework for modeling parametric variation in planar parts and for efficiently computing approximations of their tolerance envelopes. Part features are specified by algebraic equations defining their position and shape as a function of parameters whose nominal values vary along tolerance intervals. Their tolerance envelopes model perfect form Least and Most Material Conditions (LMC/MMC). We derive geometric properties of the tolerance envelopes and describe efficient algorithms for computing first-order linear approximations with successive accuracy. We show that the tolerance envelope of a parametric arc-line polygonal part with n features has $O(nk^2)$ segments and can be computed in $O(nk^2 \log k)$ time, where k is the maximum number of non-zero partial feature functions derivatives evaluated at nominal parameter values. Our implementation shows that the algorithms are practical on part models with tens of parameters.

*** Joint work with Leo Joskowicz.**

$\boxed{3}$

10:00–10:30

Placement of Deformable Objects*

Sagi Schein
Computer Science, Technion

With the increasing complexity of photo-realistic scenes, the question of building and placing objects in three-dimensional scenes is becoming ever more difficult. While the question of placement of rigid objects has captured the attention of researchers in the past, this work presents an intuitive and interactive scheme to properly place deformable objects with the aid of free-form deformation tools. The presented scheme can also be used to animate the locomotion of non-rigid objects, most noticeably animals, and adapt the motion to arbitrary terrain.
The automatic construction of our free-form deformation tool is completely hidden from the end user, and hence, circumvents the difficulties typically faced in manipulating these deformation functions. Further, a precise bound on the error that is introduced by applying free-form deformations to polygonal models is presented, along with an almost-optimal adaptive refinement algorithm to achieve a certain accuracy in the mapping.

*** Joint work with Gershon Elber.**

10:30–11:00

Coffee Break