INVITATION

ISRAEL SIGGRAPH PROFESSIONAL CHAPTER MEETING

Sponsored by

Silicon Graphics (Israel) Ltd.

December 7, 2001
8:30–12:30
Lev Hall
Exact Sciences bldg.
Tel-Aviv University

Chair: Ayellet Tal
Technion

This invitation is an entry permit for your car at gate 1 of the Tel-Aviv University campus.

4

11:00–11:30

Automatic Lighting Design using a Perceptual Quality Metric*

Ram Shacked
Hebrew University

Lighting has a crucial impact on the appearance of 3D objects and on the ability of an image to communicate information about a 3D scene to a human observer. This work presents a new automatic lighting design approach for comprehensible rendering of 3D objects. Given a geometric model of a 3D object or scene, the material properties of the surfaces in the model, and the desired viewing parameters, our approach automatically determines the values of various lighting parameters by optimizing a perception-based image quality objective function. This objective function is designed to quantify the extent to which an image of a 3D scene succeeds in communicating scene information, such as the 3D shapes of the objects, fine geometric details, and the spatial relationships between the objects. Our results demonstrate that the proposed approach is an effective lighting design tool, suitable for users without expertise or knowledge in visual perception or in lighting design.

*** Joint work with Dani Lischinski.**

5

11:30–12:00

Morphing Stick Figures Using Compatible Triangulations

Vitaly Surazhsky
Technion

A “stick figure” is a connected straight-line plane graph, sometimes called a “skeleton”. Compatible stick figures are those with the same topological structure. We present a method for naturally morphing between two compatible stick figures in a manner that preserves compatibility throughout the morph. In particular, this guarantees that the intermediate shapes are also stick figures (e.g. they do not self-intersect). Our method generalizes existing algorithms for morphing compatible planar polygons using Steiner vertices, and improves the complexity of those algorithms by reducing the number of Steiner vertices used.

6

12:00–12:30

Surface Parameterization and Seam Cutting

Alla Sheffer
Technion

Providing a two-dimensional parameterization of three-dimensional tesselated surfaces is beneficial to many applications in computer graphics, finite-element surface meshing, surface reconstruction and other areas. The applicability of the parameterization depends on how well it preserves the surface metric structures (angles, distances, areas). For a general surface there is no mapping which fully preserves those structures. The distortion usually increases with the rise in surface complexity. For highly complicated surfaces the distortion can become so high as to make the parameterization unusable for application’s purposes. One possible solution is to subdivide the surface or introduce seams in a way which will reduce the distortion.

This talk presents a new method for introduction of seams in three-dimensional tesselated surfaces. The addition of seams reduces the surface complexity and hence reduces the metric distortion produced by the parameterization. Seams often introduce additional constraints on the application for which the parameterization is used, hence their length should be minimal. The new method minimizes the seam length while reducing the parameterization distortion.

8:30–9:00

Refreshments

1

9:00–9:30

Temporal and Spatial Level of Details for Dynamic Meshes

Ariel Shamir
The Interdisciplinary Center Herzelia

Multi-resolution techniques enhance the abilities of graphics and visual systems to overcome limitations in time, space and transmission costs. Numerous techniques have been presented which concentrate on creating level of detail models for static meshes. Time-dependent deformable meshes impose even greater difficulties on such systems. In this talk we describe a solution for using level of details for time dependent meshes. Our solution allows for both temporal and spatial level of details to be combined in an efficient manner. By separating low and high frequency temporal information, we gain the ability to create very fast coarse updates in the temporal dimension, which can be adaptively refined for greater details.

2

9:30–10:00

Exact and Efficient Computation of Moments of Free-Form Surface and Trivariate Based Geometry*

Octavian Soldea
Technion

Two schemes for computing moments of free-form objects are developed and analyzed. In the first scheme, we assume that the boundary of the analyzed object is represented using parametric surfaces. In the second scheme, we represent the boundary of the object as a constant set of a trivariate function. These schemes rely on a pre-computation step which allows fast reevaluation of the moments when the analyzed object is modified. Both schemes take advantage of a representation that is based on the B-spline blending functions.

*** Joint work with Gershon Elber and Ehud Rivlin.**

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10:00–10:30

Multiresolution Representation of CSG Model for 2D Polygons*

Liat Eytan
Technion

Multiresolution is one of the main representations used today in 3D CAD modeling. Multiresolution geometric models enable designers to represent and process geometric shape at different levels of detail (LOD). In this paper we have considered the problem of multiresolution representation of CSG models for 2D polygonal shapes. The multiresolution CSG algorithm generates a hierarchy of multiresolution CSG trees where at each level the shape is represented with minimal CSG primitives. Most of the techniques convert the CSG model to a mesh and then apply the LOD technique. This multiresolution approach is not applied uniformly on the envelope of the CSG model but rather on the CSG area primitives. Thus, the technique utilizes the size of the CSG primitives and is not applied uniformly. Therefore, this multiresolution approach converges rapidly while preserving the initial global area, connectivity, topology and shape smoothness. The CSG multiresolution algorithm can be applied sequentially on a general CSG model at time complexity, where n is the number of the object vertices. In order to achieve a better quality and more precise multiresolution representation, the algorithm is applied in parallel at time complexity. This algorithm can also generate a multiresolution CSG tree that can be extracted at the same complexity time with mixed multiresolution levels.

*** Joint work with A. Fischer and M. Shpitalni.**

10:30–11:00

Coffee Break