

# Sketch-based Modeling

**Keywords:** Sketch-based Modeling, 3D Reconstruction, Stroke Acquisition and Processing

**ACM Classification system:** Shape modeling

## **Presenters' details:**

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## **Abstract:**

Sketching is one of the most natural ways to exchange ideas. It has been used by human beings since prehistory. Research has shown that human beings have an inherent ability to understand sketches. This is why sketch-based interfaces for 3D modeling are so appealing; creating and animating 3D shapes could become as simple as drawing with a tablet and a digital pen.

The purpose of this tutorial is to explore the most important aspects of sketch-based modeling, from the preprocessing of sketch strokes to the problem of 3D reconstruction. We will first explain some aspects of how humans interpret sketches. The second part of the tutorial will be dedicated to the problem of filtering and processing strokes. Other parts of the tutorial will focus on the sketch-based modeling of curves and surfaces using multi-view and single-view sketches. Sketch-based modeling using prior-knowledge will be also discussed; this class of methods is particularly well adapted to the 3D reconstruction of complex shapes. The last part of the tutorial addresses sketch-based interfaces for editing 3D shapes.

### **Tutorial Schedule (2x90 minutes):**

1. **Introduction (Frederic Cordier, 10 minutes)**
2. **Sketch stroke acquisition and processing (Karan Singh, 45 minutes)**
3. **Multi-view sketch-based modeling of 3D curves and surfaces (Yotam Gingold, Karan Singh , 35 minutes)**

#### **Coffee Break**

4. **Sketch-based modeling using prior knowledge (Even Entem, 20 minutes)**
5. **Single-view sketch-based modeling of 3D curves and surfaces (Frederic Cordier, Yotam Gingold, 35 minutes)**
6. **Sketch-based editing (Yotam Gingold, 20 minutes)**
7. **Conclusion / Q & A (Yotam Gingold, 15 minutes)**

**Intended audience:** Industry professionals and researchers interested in recent advances in sketch-based interfaces for shape modeling

**Prerequisites:** Basic knowledge in geometry and shape modeling is expected.

#### **Presenters 'bios:**

**Frederic Cordier** is an Associate Professor of Computer Science at the University of Haute-Alsace and at the University of Strasbourg. His research interests include sketch-based modeling, 3D modeling, texturing and human-computer interaction. Frederic holds a Ph.D. in Computer Science from the University of Geneva, Switzerland. He is an associated editor of Visual Computer.

**Yotam Gingold** is an Assistant Professor in the computer science department at George Mason University. He runs the the Creativity and Graphics Lab (CrAGL), whose mission is to solve challenging visual, geometry, and design problems and pursue foundational research into human creativity. Previously he was a post-doctoral researcher in the computer science departments of Columbia University, Rutgers University, Tel-Aviv University, and Herzliya IDC. Yotam earned his Ph.D. in Computer Science from New York University in 2009 for his dissertation "2D-Centric Interfaces and Algorithms for 3D Modeling."

**Even Entem** is a third year PhD student in Computer Graphics at Grenoble University (LJK/Inria). He is co-directed by Marie-Paule Cani and Loïc Barthe (Université de Toulouse, IRIT) His research is focused on shape modeling from sketch using a priori knowledge.

**Marie-Paule Cani** is a Professor of Computer Science at Grenoble University (Grenoble Institute of Technology & Inria). Her research interests cover both Shape Modelling and Computer Animation. She contributed over the years to a number of high level models for shapes and motion such as implicit surfaces, multi-resolution physically-based animation and hybrid representations for real-time natural scenes. Following a long lasting interest for virtual sculpture, she has been recently searching for more efficient ways to create 3D content such as combining sketch-based interfaces with procedural models expressing a priori knowledge. She received the Eurographics outstanding technical contributions award in 2011 and a silver medal from CNRS in 2012 for this work.

**Karan Singh** is a Professor of Computer Science at the University of Toronto. He holds a BTech. from IIT Madras and MS/PhD from the Ohio State University, in Computer Science. His research interests lie in art and perception driven interactive graphics spanning geometric design and fabrication, character animation, and sketch interfaces. He has been a technical lead on the Oscar winning animation software Maya. He co-directs a reputed graphics and HCI lab, DGP [www.dgp.toronto.edu](http://www.dgp.toronto.edu) and was the R&D Director for the 2005 Oscar winning animated short Ryan.