

Perceptually-Guided 3D Drawing Interpretation

Postdoctoral Fellowship

Scientific Host: George Drettakis

Contact: George.Drettakis@sophia.inria.fr

<http://www-sop.inria.fr/reves>

The goal of this postdoctoral fellowship is to study ways to interpret 2D drawings and subsequently create 3D models automatically, using a perceptually-guided methodology. As virtual 3D interaction is tedious and error-prone, a particular focus has been placed on understanding 2D drawings, which if possible would allow designers and architects to leverage their existing artistic skill sets. Several recent techniques have been developed which attempt to interpret 2D drawings and subsequently create 3D models (e.g., [Sketch] [Teddy]). Recent tests have shown however, that while designers can directly transfer their pencil-and-paper drawing skills given an appropriate tool, the resulting 3D geometry did not correspond to what they had imagined.

In essence, a number of underlying hypotheses made by these systems are questionable. For example, researchers in visual perception have found that in addition to not being able to draw accurate projections, we can't even accurately perceive drawings. For example, we will (on average) judge a vertical line to be 10% longer than a horizontal line of the same length [RangeImageStats]. This issue is particularly acute in perspective drawings.

The goal of this postdoctoral fellowship is to investigate perceptual principles that will allow more accurate interpretation of 2D drawings, by explicitly encoding the perceptual limitations mentioned above. This approach will apply both for input and for output (renderings). Possibly methodologies include probabilistic and machine learning solutions.

Requirements

The successful candidate should have a Ph.D. degree in Computer Science (alternatively in cognitive or neuroscience, but in a CS context), and preferably be knowledgeable in computer graphics.

Bibliography

[RangeImageStats] C. Howe and D. Purves, Range image statistics can explain the anomalous perception of length, Proc. Nat. Acad. Science 99:13184-13188, 2002.

[Teddy] Takeo Igarashi, Satoshi Matsuoka, Hidehiko Tanaka, "Teddy: A Sketching Interface for 3D Freeform Design" ACM SIGGRAPH'99, Los Angeles, 1999, pp.409-416.

[Sketch] SKETCH: An interface for sketching 3D scenes, by R. C. Zeleznik, K. Herndon, and J. F. Hughes. Proceedings of SIGGRAPH 1996