Pyramids, Tetris, and Spirals: New Geometry Problems for 3D Printing

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Abstract:

Recent advances in 3D printing technologies have piqued the interests of the computer graphics community, as the desire to improve efficiency and quality of 3D fabrication is shedding new lights on several classic geometry problems such as shape approximation, decomposition, and packing. In this talk, I will cover several new geometry problems we have come across and tackled in recent years that are strongly tied to 3D printing. However, what started our initial investigation were often the intrigue and potential generality of the geometry problems, beyond their specific applications to 3D printing. I will show you how pyramid-like shapes, the Tetris game, and spirals, in particular the lesser known Fermat spirals, all have interesting and surprising connections to the geometry of 3D printing. It will be encouraging to see that what we could offer are all first solutions and there is great room to improve. Given time, I can also talk about a few other problems we studied for computational design.

About the Speaker:

Hao (Richard) Zhang is a full professor in the School of Computing Science at Simon Fraser University (SFU), Canada, where he directs the graphics (GrUVi) lab. He obtained his Ph.D. from the Dynamic Graphics Project (DGP), Dept. of Computer Science, University of Toronto, and his M.Math. and B.Math degrees from the University of Waterloo. Richard’s research area is computer graphics with a focus on geometry modeling and processing, shape analysis, and 3D content creation. He has published more than 100 papers on these topics. He is an editor-in-chief of Computer Graphics Forum and an associate editor of Graphical Models and the Visual Computer. He has served on the program committees of all major computer graphics conferences including SIGGRAPH, SIGGRAPH Asia, Eurographics, Symposium on Geometry Processing (SGP), among others, and is SIGGRAPH Asia 2014 course chair and a paper co-chair for SGP 2013 and Graphics Interface 2015. He received an NSERC DAS (Discovery Accelerator Supplement) Award in 2014, the Best Paper Award from SGP 2008, a Most Cited Paper Award for the journal Computer-Aided Design in 2010, a Faculty of Applied Sciences (FAS) Research Excellence Award at SFU in 2014, a National Science Foundation of China (NSFC) Overseas, Hongkong, and Macau Scholar Collaborative Research Award in 2015, and is an IEEE Senior Member.

All are welcome!
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