

Lei Ma (马雷)

Graphics Engineer

Ph.D. in Computer Application Technology

[Curriculum Vitae \(PDF\)](#)(2018/09)

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Interests

Having more than 10+ years in software development specializing in the computer graphics, I worked for several experienced teams mainly as a senior software engineer. My specialities include enterprise graphics system architecture, modern testing, system configuration, project management, general software product R&D and IT consultant. I would describe myself as an initiative and customer oriented engineer with skills for teamwork, collaboration and leadership.

My research interests lie in appearance modelling, real-time ray tracing, sampling and reconstruction theory. I have brought original research ideas to Computer Graphics, such as detailed real-time multi-layers refraction on GPU, real-time sampling and high quality stippling for dynamic scenes. And I am taking the first steps exploiting optimal control and machine learning approaches for complex scenes rendering, both for high quality and real-time purpose.

Education

Institute of Software, Chinese Academy of Science

Ph.D. in Computer Application Technology, advised by Prof. [Yanyun Chen](#), 2014-2018

Shanghai Jiao Tong University

M.Sc. in Computer Science and Engineering, advised by Prof. [Yang Xubo](#) and Xiao Shuangjiu, 2007-2010

Zhejiang University

B.Eng. in Software Engineering, GPA (86/100), 2003-2007

Others

Visiting researcher in CUHK by Prof. [Hangju Sun](#), 2016; exchange student in Singapore by [Robert H. Deng](#), 2006-2007

Employment

Shitu Digital Technology Co, Ltd

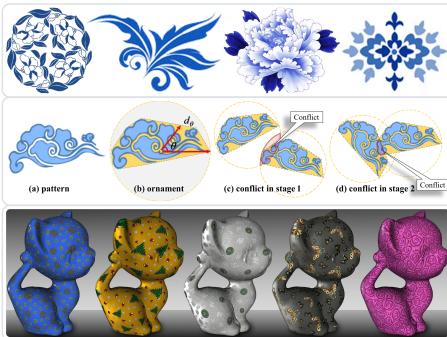
Co-Founder and Cheif Tech. with [Dallas Yuan](#), 2012-2014

Autodesk

OGS team and Labs Team, reported to [Zhenggang Yuan](#), 2010-2012

More information can be found in the [Projects](#) section.

Projects - Research oriented

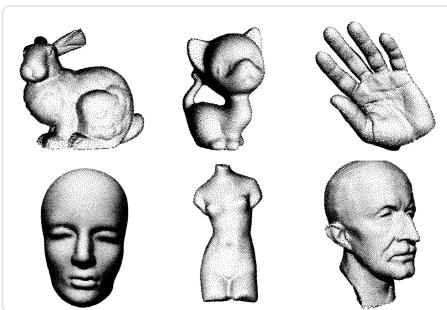


Real-time Ornaments on Mesh Surfaces

Lei Ma, Yanyun Chen
Under submission to TVCG.

We introduce an approach to present high-quality 2D ornaments distribution on arbitrary triangle surfaces in real-time. It facilitates the design processes. Our technique supports both equivalent patterns and patterns with hierarchical relationships. Experiments demonstrate the ability and versatility of our system through various applications in computer graphics.

[Project Website(soon)]

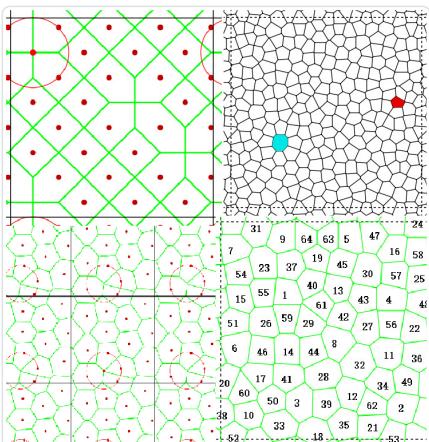


Instant Stippling on 3D Scenes

Lei Ma , Jianwei Guo, [Dongming Yan](#), Hanqiu Sun, [Yanyun Chen](#)
Computer Graphics Forum (Proceeding of Pacific Graphics 2018)

We presented novel techniques to generate stipbles for dynamic 3D objects/scenes in real-time. The key idea is to map a 2D incremental and parallel IVS sequence to the surfaces by carefully eliminating the distortions caused by parameterizations and the change of geometric primitives' areas after perspective projections. The shading effect of the scenes is also considered for the stipple generation. To further enrich the visual effect, we propose two extensions to generate stippling with varying-radius and multi-tone styles, the tone similarity among continuous frames are preserved. Our approach achieves real-time frame rate and the distribution of the generated stipbles exhibits good blue-noise properties. The incremental property of the IVS sequence results in good temporal coherence between frames.

[Paper] [Video] [Supplementary] [Code(soon)] [BibTeX(soon)]

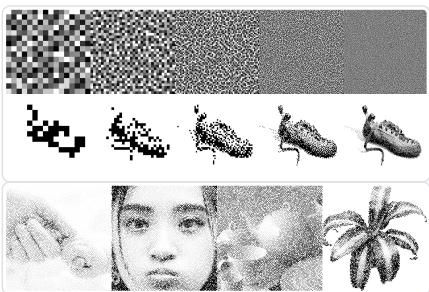


Optimizations for Incremental Voronoi Sets Generation

Lei Ma
Self-interested Tool.

Although IVS can be pre-computed. However, it is time-consuming for generation a super large IVS sequence. In this project, I push to the limit of the optimization. The optimization is mainly based on the information of a linked voronoi diagram structure and a sorted distance map/heap. [CGAL](#) is used for the windows binary implementation. [Geogram](#) is used for the online (js) implementation.

[Online Demo] [Win-Binaries(VS2017)] [Code]



Incremental Voronoi Sets For Instant Stippling

Lei Ma , Yanyun Chen, Yinling Qian, Hanqiu Sun
The Visual Computer (Proceeding of Computer Graphics International 2018)

The algorithm is based on precomputed blue noise point sets constructed by incremental Voronoi sets and a real-time parallelized rejection strategy. The IVS can also be regressed to generate blue noise masks for digital halftoning..

[Paper] [Video] [Supplementary] [Appendix]
[Demo Video 1] [Demo Video 2] [Win-Binaries(VS2017)] [BibTeX]



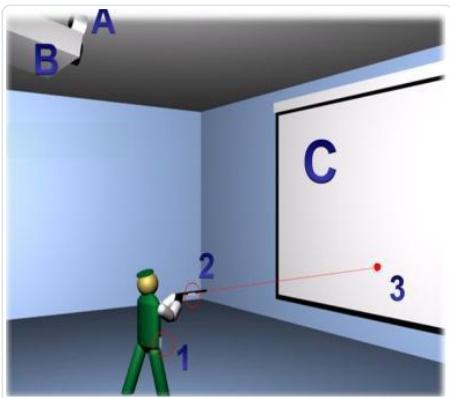
Multi-interfaces based refractive rendering

Lei Ma, Shuangjiu Xiao, Xubo Yang

ACM SIGGRAPH 2010 Posters

We presented an multi-interfaces image based method to simulate the refraction and related light effects in real time on a normal graphic card. The multi-interfaces based representation of the refractor is obtained by hiring depth peeling ideas. This leads to significantly better results than two interfaces refraction where only the front and back face of the object was captured.

[\[Paper\]](#) [\[Video\]](#)



3D Augmented Reality System under Multi-Projectors

Lei Ma, Shuangjiu Xiao and etc.

[Dalab](#) project in 2008-2009

I took charge of a group to design and implement a simulation system for shooting game. The system is comprised of about 4 projectors to simulate the real environment and more than 6 infrared sensors to report positions and gestures of the person.

[\[Video\(dropbox\)\]](#)



Image-based Rendering of Transparent Object with Caustic Shadow

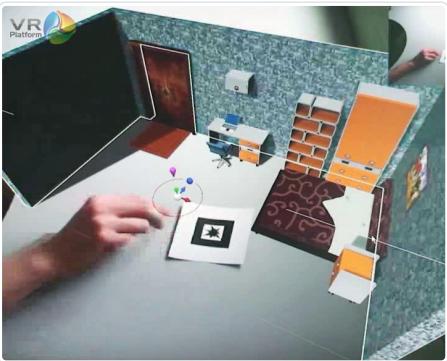
Lei Ma, Qi Duan

IEEE YCIC 2009

A novel image-based method to synthesize realistic result of transparent object under arbitrary illuminations is presented. Image-based relighting, environment matting and shadow matting algorithms are used to render refractive object as well as caustic shadow and specular property. On the basis of just several pictures of the transparent object, our algorithm eliminates the necessity for precise geometric modeling. Various kinds of artifacts which are caused by inaccurate modeling and material property of object can be eliminated. It is useful for simulating various transparent objects in many practical applications such as special effects manufacture in film industry.

[\[paper\]](#)

Besides these projects listed above, I posted an [paper](#) regarding anti-phishing problems in IEEE ISDPE 2007. I have done a detailed study of [bread baking simulation](#) process. And I spent much time on [growing leaf](#) simulation as well. I also studied real-time [2d shapes](#) arrangements. Back in 2006, I used to implement a face aging prediction system based on machine trained data, the application is used by [163.com](#).



Augment Reality

Lei Ma as the Co-founder @Shitu, Cheif Tech @Vistandard, Shanghai, 2012-2014

Integration of our AR APIs into [VRP platform](#).

Project Arorua, a original, cross platform, image tracking and 3d rendering lib.

AR software products: AR Designer, AR-Gaming, etc..

Presented AR Demo on Inside AR 2012 held by Metaio GmbH in Munich.

A profitable team with 30+ people in 2 years when I leave.

[\[More.\]](#)

OGS

Lei Ma, in OGS Team @Autodesk, 2010

Feature development, maintaining benchmark, system configuration, project collaboration, fixing bugs. Including but not limited to following modules

- Non photo realistic
- Virtual Device
- Material shaders

[\[More.\]](#)

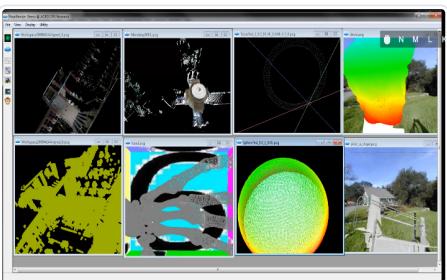


Rapid RT

Lei Ma, in OGS Team @Autodesk, 2010-2011

Integration of Rapid RT with products in Autodesk, inclduing interactive RRT, offline RRT, Cloud RRT (Rendering As A Service).

[\[More.\]](#)



Point Cloud

Lei Ma, in Labs Team @Autodesk, 2011-2012

Working with [Yan Fu](#): implementation of research ideas for [point cloud feature extraction](#) team.

Design and development of a reaseach prototype : **Point Cloud Renderer** , aiming for high qualiy and realtime point cloud rendering, out of core management.

[\[Video\]](#)

Besides these projects listed above, I had worked for several exprienced teams as an freelancer with the focus on computer graphics and realtime system. I developed an industrial environment pollution monitoring system, 20+ severs are distributed in many cities across Zhejiang province in 2006.

Teaching

2008-2009 Spring Teaching Assistant for "Computer Graphics" in Shanghai Jiao Tong University

2008-2009 Fall Teaching Assistant for "Programming & Elem. Data Structures" in [UMich-SJTU Joint Institute](#)

2004-2005 Spring Teaching Assistant for "Discrete Mathmatics" in Zhejiang University

Honors & Awards

- University Scholarship at Shanghai Jiao Tong University, 2008
- Honor Graduate,Excellent Thesis from Zhe Jiang University,2007

- University Scholarship at Zhe Jiang University, 2004/2005/2006
 - Excellent Student,Excellent Student Leader at Zhe Jiang University,2004/2005/2006
 - National Mathematics Competition, Second Class Prize, 2001
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Misc

I love all kinds of sports, including [canoeing](#), [cycling](#), swimming. I played badminton and basketball as well. I know nothing about music but I enjoy [travelling](#).