# Libing Zeng (曾立兵)

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## EDUCATION

**Texas A&M University** **2019.08－Present**
Ph.D. in Computer Science

**Hunan University** **2007.09－2011.06**
Bachelor in Electronic Information Engineering

## RESEARCH

My current research interests are using deep learning techniques to solve various problems in 3D reconstruction, neural rendering, view synthesis, and video denoising.

## PAPERS

**3D-aware Facial Landmark Detection via Multiview Consistent Training on Synthetic Data**
*Libing Zeng, Lele Chen, Wentao Bao, Zhong Li, Yi Xu, Junsong Yuan, Nima Khademi Kalantari.*
*In Submission.*
In this paper, by leveraging synthetic data, we propose a novel multi-view consistent learning strategy to improve 3D facial landmark detection accuracy on in-the-wild images. The proposed 3D-aware module can be plugged into any learning-based landmark detection algorithm.

**Uncertainty-aware State Space Transformer for Egocentric 3D Trajectory Forecasting**
Wentao Bao, Lele Chen, Libing Zeng, Zhong Li, Yi Xu, Junsong Yuan, Yu Kong.
*In Submission.*
In this paper, we set up an egocentric 3D hand trajectory forecasting task that aims to predict hand trajectories in a 3D space from early observed RGB videos in a first-person view.

**Test-Time Optimization for Video Depth Estimation Using Pseudo Reference Depth**
Libing Zeng, Nima Khademi Kalantari.
*Computer Graphics Forum (CGF) 2023.*
we propose a learning-based test-time optimization approach for reconstructing geometrically consistent depth maps from a monocular video. Specifically, we optimize an existing single image depth estimation network on the test example at hand. We do so by introducing pseudo reference depth maps which are computed based on the observation that the optical flow displacement for an image pair should be consistent with the displacement obtained by depth-reprojection. Additionally, we discard inaccurate pseudo reference depth maps using a simple median strategy and propose a way to compute a confidence map for the reference depth. We use our pseudo reference depth and the confidence map to formulate a loss function for performing the test-time optimization in an efficient and effective manner.

**Multi-Stage Raw Video Denoising with Adversarial Loss and Gradient Mask**
Avinash Paliwal, Libing Zeng, Nima Khademi Kalantari.
*International Conference on Computational Photography (ICCP) 2021.*
we propose a learning-based approach for denoising raw videos captured under low lighting conditions. We

propose to do this by first explicitly aligning the neighboring frames to the current frame using a convolutional neural network (CNN). We then fuse the registered frames using another CNN to obtain the final denoised frame. To avoid directly aligning the temporally distant frames, we perform the two processes of alignment and fusion in multiple stages. We train our multi-stage system using an adversarial loss with a conditional discriminator. Specifically, we condition the discriminator on a soft gradient mask to prevent introducing high-frequency artifacts in smooth regions.

**Rectifying Proposal Failures in Metropolis Light Transport**
Libing Zeng, Li-Yi Wei.
*Preprint (HAL)*.
Based on MMLT, we propose a novel algorithm, Rectifying Proposal Failure MLT (RPFMLT), which distinguishes proposal failure paths from normal proposed paths and excludes them from the states of Markov chain. PFMLT better approximates the original path distributions especially for high proposal rejection rates, and can be easily integrated with various MLT algorithms.

## PROJECTS (Prior to Ph.D.)

**A Renderer Written from the Scratch (BART Animations with High-Frequency Textures)**
Advised by Dr. Li-Yi Wei.
This renderer mainly has two components. First, parsing animation description files (AFF); Second, rendering the three animations of BART, which is presented by Dr. Ulf Assarsson.
Some key implementations: "Multi-Jittered" sampler + "Gaussian" filter for reconstruction + Mipmap + EWA filter for texture anti-aliasing.

**A Renderer Extended from The Book, Ray Tracing from the Ground Up**
Self-study.
I read the book and extended it from the following aspects: various objects, tessellations, 2D textures and several scenes.

**A Renderer with Implementations of Various NON-TRIANGULATE Surfaces**
Self-study.
This render is based on the framework of Peter Shirley's “ray tracing in one weekend” and is extended with tracing almost all of the NON-TRIANGULATE surfaces mentioned in the book, An Introduction to Ray Tracing.

## WORK EXPERIENCE

**OPPO US Research Center** **2022.12 – Present**
Research Intern (remote) with Dr. Lele Chen
Working on explicitly controllable personalized face image generation.

**OPPO US Research Center** **2022.06 – 2022.12**
Research Intern (onsite) with Dr. Lele Chen
Worked on 3D-aware facial landmark detection, and egocentric 3D hand trajectory forecasting task. Two corresponding papers submitted.

**Adobe Research** **2018.09 – 2019.03**
Research Intern (remote, unofficial) with Dr. Li-Yi Wei
worked on light transport simulation problems. One paper submitted.

**Guo-Yuan-Li Fruit Store** **2014.06 – 2016.02**
“Guo-Yuan-Li” is Chinese pinyin which means fresh fruit in orchard.

I started the fruit business, and got everything working well with annual sales of millions of RMB, then transferred it to my younger brother.

**MediaTek** **2011.09 – 2014.05**
Senior Software Engineer, Customer Project Leader
Developed secure and robust services and applications on embedded systems using C language.
Led customer project groups to build 4 blue-ray disc player for Pioneer Japan.

## OPEN SOURCE

**Github**
https://github.com/libingzeng

**Blog**
https://blog.csdn.net/libing_zeng
I summarized every topic I learned, every problem I solved and every verifiable idea I had in the journey of computer graphics, and I posted more than 200 technical reports of the summaries on my blog (written in simplified Chinese) which has over 800 followers and over 1.6 million visitors now.

## UNDERGRADUATE THESIS

**The Design and Development of Experiment Teaching Management System** **2011**
Advised by Dr. Shaoyuan Wang
Top 1% Thesis Award
I designed a novel experiment teaching management system and implemented it with J2EE.

## AWARDS

**Innovation of Graduation Project, Hunan Univ., P.R. China** **2011**
The First Prize. (top 1% in the class of 2011)

**National Inspirational Scholarship, Ministry of Education, P.R. China** **2010**
(top 5% in the class of 2011)

**National University Students Intelligent Car Race, Ministry of Education, P.R. China 2010**
The First Prize in Southern China (Top 10 in more than one hundred teams.)
I developed the software on embedded system with C language. The software controls a car model to run very fast along a challenging path.

## Programming Languages

PyTorch, Python, C++, and C.