

LINCAN ZOU

Senior Research Engineer

Robert Bosch LLC, Sunnyvale, CA

✉ lczou20@gmail.com

☎ 1(650)285-2158

🌐 lczou.github.io/page

I am currently a Senior Research Engineer at Bosch Research and Technology Center, North America, focusing on the development of platforms to explore cutting-edge algorithms and technologies, developing software systems to transform research findings into prototypes or products. I have more than 10 years of software engineering and software system design experience targeting on large software system, more than 10 years of 3D graphics rendering and system optimization experience on mobile and embedded devices, and more than 4 years of deep learning pipeline and system experience.

EXPERIENCE

📅 2019 – Current

Senior Research Engineer

Robert Bosch LLC, Sunnyvale, CA

Conducted research platform development and Machine Learning engineering to improve traffic light detection, movable objects segmentation, and panoptic segmentation.

- Developed machine learning pipeline, including data engineering, panoptic training and deployment modules, and web platform for research systems.
- Developed semseg training modules and web service backend to test and verify the effectiveness of visual analytics approach for diagnosing and improving semantic segmentation of movable objects. The work contributed to research paper [J1], which was accepted by IEEE VIS 2021. Patent granted: US Patent No. 11,803,616 [P1].
- Developed object detection training modules and web service backend to test and verify the effectiveness of VATLD: a visual analytics system to assess, understand and improve traffic light detection. The work contributed to research paper [J2], which won [IEEE VIS 2020 best paper award](#). Patent granted or under application: US Patent No. 11,301,724 [P2], US Patent App. 17/186,392 [P3].

📅 2018 – 2020

Senior Research Engineer

Robert Bosch LLC, Sunnyvale, CA

Conducted algorithm research and system development for I4.0 manufacturing solutions.

- Developed software systems and key algorithms for Bosch Intelligent Glove, the world's first industrial solution in market for I4.0 manufacturing solutions. The innovation of the Bosch Intelligent Glove is highlighted in Bosch US website [\[web archive link\]](#).
- Developed software systems for connected application and methods providing solutions to key features, such as cycle duration measurement, repetitive cycle detection, standardized evaluation. Patents granted or under application: US Patent No. 11,733,259 [P4], US Patent No. 11,224,359 [P5], US Patent No. 10,996,235 [P6], US Patent No. 10,860,845 [P7], US Patent No. 11,537,901 [P8], US Patent App. 16/236,790 [P9].

📅 2011 – 2017

Research Engineer, Senior Research Engineer

Robert Bosch LLC, Palo Alto, CA

Researched and developed 3D map visualization and interaction algorithms, technologies and system. Related technologies and prototypes were demonstrated at CES 2014, 2015 and 2016.

- Developed orientation sensitive shadowing technologies to simulate shadow effects of 3D objects. That improved visual realism of 3D map on low GPU capability devices, such as embedded or mobile devices. Granted patents: US Patent No. 10,553,025 [P10], US Patent No. 9,886,790 [P11], US Patent No. 9,792,724 [P12].

- Developed procedural generating technologies to generate augmented forest and buildings in a 3D map system to discover and explore map region on embedded/mobile platform. Granted patents: US Patent No. 10,102,670 [P13], US Patent No. 10,157,498 [P14].
- Integrated weather effects rendering technologies in a 3D map system. Patents granted or under application: US Patent No. 10,901,119 [P15], US Patent No. 10,535,180 [P16], US Patent No. 11,373,356 [P17].
- Developed and integrated intuitive interaction technologies for 3D map systems. Granted patents: US Patent No. 9,528,845 [P20], US Patent No. 9,196,088 [P21].

2015 – 2016

Senior Research Engineer

Robert Bosch LLC, Palo Alto, CA

Developed software system for a research platform connecting multiple virtual reality (VR) devices to explore immersive VR technologies for industry 4.0 applications.

2008 – 2011

Research Engineer

Bosch China Investment Limited, Shanghai

Researched and developed 3D map visualization technologies, system and product.

- Developed 3D artMap, the world's 1st stylized 3D map for navigation, deployed in many products since 2010. The innovation of the 3D artMap is highlighted in Bosch US website [\[web archive link\]](#).
- Developed technologies and algorithms for real-time 3D non-photorealistic rendering on low GPU capability devices, such as embedded and mobile devices. Patents granted: US Patent No. 9,589,386 [P18], US Patent No. 8,471,732 [P19].

2007 – 2008

Research Intern

Robert Bosch LLC, Palo Alto, CA

Developed 2D map visualization and interaction technologies for a 2D map navigation system.

2004 – 2007

Research Student

State key Lab of CAD & CG, Zhejiang University, Hangzhou

Developed systems to explore and research nature simulation and rendering algorithms and technologies. Works contributed to papers [\[J3\]](#)[\[J4\]](#)[\[J5\]](#).

2006 – 2007

Visiting Student

Microsoft Research Asia, Beijing

Implemented related 3D modeling and editing algorithms for experiments and results comparison, generated demo and video materials for research paper "Gradient Domain Editing of Deforming Mesh Sequences", which was accepted by SIGGRAPH 2007.

📅 2005 – 2005

Visiting Student
Microsoft Research Asia, Beijing

Improved the performance of a graphic engine to enable multi-modal interaction, and developed several special effects using D3D.

TECHNICAL SKILLS

🔗 Programming Languages

- C, C++: > 10 years
- Python: > 5 years
- JavaScript

🔗 Libraries, Frameworks & Tools

- C++: C++ STL, Boost C++
- Graphics: OpenGL, OpenGL ES, WebGL, GLSL, Vulkan, Three.js
- Deep learning: PyTorch, TensorFlow, Numpy, OpenCV
- Web application: Flask, React, D3.js
- Toolchain: format & lint tool, CMake, Git, Docker, CI/CD tools

EDUCATION

📅 Aug 2005 – June 2007

M.E. in computer science and technology
Zhejiang University, Hangzhou

Graduate with Honor

📅 Sep 2001 – June 2005

B.E. in computer science and technology
Zhejiang University, Hangzhou

Graduate with Honor

HONORS & AWARDS

🏆 2007 Zhejiang University excellent graduate award

🏆 2006 Zhejiang University top-grade Guanghua scholarship

🏆 2005 Zhejiang University excellent graduate award

PATENTS & PUBLICATIONS

🌟 Patents

VA System and Method

[P1] He, W., Gou, L., **Zou, L.**, and Ren, L. (2023). Function testing for movable objects in safety critical applications with spatial representation learning and adversarial generation. US Patent No. 11,803,616.

- [P2] Gou, L., **Zou, L.**, Wendt, A., and Ren, L. (2022). Semantic adversarial generation based function testing method in autonomous driving. US Patent No. 11,301,724.
- [P3] Gou, L., **Zou, L.**, He, W., and Ren, L. (2022). Visual Analytics System to Assess, Understand, and Improve Deep Neural Networks. US Patent App. 17/186,392.

Wearable Technology

- [P4] **Zou, L.**, Song, H., and Ren, L. (2023). Methods and system for cycle recognition in repeated activities by identifying stable and repeatable features. US Patent No. 11,733,259.
- [P5] Song, H., Ren, L., and **Zou, L.** (2022). Repetitive human activities abnormal motion detection. US Patent No. 11,224,359.
- [P6] **Zou, L.**, Ren, L., and Zhang, C. (2021). System and method for cycle duration measurement in repeated activity sequences. US Patent No. 10,996,235.
- [P7] Chen, Y.-I., **Zou, L.**, and Ren, L. (2020). Method and system for automatic repetitive step and cycle detection for manual assembly line operations. US Patent No. 10,860,845.
- [P8] Song, H., Shen, Y., Li, N., **Zou, L.**, and Ren, L. (2019). System and method for unsupervised domain adaptation with mixup training. US Patent No. 11,537,901.
- [P9] **Zou, L.**, Ren, L., Song, H., and Zhang, C. (2018). System and method for standardized evaluation of activity sequence. US Patent App. 16/236,790.

Shadow Simulating

- [P10] **Zou, L.**, Ren, L., Dai, Z., and Zhang, C. (2020). Method and device for efficient building footprint determination. US Patent No. 10,553,025.
- [P11] **Zou, L.**, and Ren, L. (2018). System and method of shadow effect generation for concave objects with dynamic lighting in three-dimensional graphics. US Patent No. 9,886,790.
- [P12] **Zou, L.**, and Ren, L. (2017). System and method for generation of shadow effects in three-dimensional graphics. US Patent No. 9,792,724.

Procedural Generation

- [P13] Ren, L., and **Zou, L.** (2018). System and method for procedurally generated building graphics within a street network of a three-dimensional virtual environment. US Patent No. 10,102,670.
- [P14] **Zou, L.**, and Ren, L. (2018). System and method for procedurally generated object distribution in regions of a three-dimensional virtual environment. US Patent No. 10,157,498.

Weather Rendering

- [P15] Dai, Z., Ren, L., and **Zou, L.** (2021). Method and system for efficient rendering of accumulated precipitation for weather effects. US Patent No. 10,901,119.
- [P16] Dai, Z., Ren, L., and **Zou, L.** (2020). Method and system for efficient rendering of cloud weather effect graphics in three-dimensional maps. US Patent No. 10,535,180.
- [P17] Dai, Z., Ren, L., and **Zou, L.** (2022). Method and system for efficient rendering of 3D particle systems for weather effects. US Patent No. 11,373,356.

Nonphotorealistic Rendering

- [P18] Ren, L., and **Zou, L.** (2017). System and method for display of a repeating texture stored in a texture atlas. US Patent No. 9,589,386.
- [P19] Ren, L., and **Zou, L.** (2013). Method for re-using photorealistic 3d landmarks for nonphotorealistic 3d maps. US Patent No. 8,471,732.

Interaction

- [P20] Ren, L., and **Zou, L.** (2016). Occlusion-reduced 3d routing for 3d city maps. US Patent No. 9,528,845.
- [P21] Ding, Z., **Zou, L.**, and Ren, L. (2015). System and method for classification of three-dimensional models in a virtual environment. US Patent No. 9,196,088.
- [P22] Weng, F., Ren, L., Feng, Z., **Zou, L.**, Yan, B., and Shen, Z. (2015). System and method for multi-modal input synchronization and disambiguation. US Patent No. 9,123,341.

Publications

- [1] He, W., **Zou, L.**, Shekar, A. K., Gou, L., and Ren, L. (2022). Where can we help? a visual analytics approach to diagnosing and improving semantic segmentation of movable objects. *IEEE Transactions on Visualization and Computer Graphics*, vol. 28, no. 1, pp. 1040-1050, Jan. 2022, doi: 10.1109/TVCG.2021.3114855.
- [2] Gou, L., **Zou, L.**, Li, N., Hofmann, M., Shekar, A. K., Wendt, A., and Ren, L. (2021). VatId: A visual analytics system to assess, understand and improve traffic light detection. *IEEE transactions on visualization and computer graphics*, 27(2), 261–271. doi:10.1109/TVCG.2020.3030350
- [3] Guan, Y., Chen, W., **Zou, L.**, Zhang, L., and Peng, Q. (2006). Modelling and rendering of realistic waterfall scenes with dynamic texture sprites. *Computer Animation and Virtual Worlds*, 17(5), 573–583.
- [4] **Zou, L.**, Li, D., Guan, Y., Chen, W., and Peng, Q. (2006). A new video texture based fluid modeling approach. *Chinagraph 2006 / Journal of Image and Graphics (Supplement)*(In Chinese).
- [5] Guan, Y., **Zou, L.**, Chen, W., and Peng, Q. (2004). Particle system based real time waterfall simulation. *China-graph 2004 / Journal of System Simulation* (In Chinese).