ZIXUN HUANG

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SUMMARY

Zixun Huang is a graduate student researcher in FHL Vive Center, leading the OpenARK team in EECS Dept @UC Berkeley, working closely with Dr. Allen Y. Yang. Prior to this, he obtained his Bachelor of Architecture from Zhejiang University and gained experience in the AEC industry. His research interests focus on 3D Vision, Human-AI Interaction and Autonomous Robots with a strong emphasis on their integration into Architectural Construction and Urban Accessibility scenarios.

EDUCATION

University of California, Berkeley *CA, United States*
GPA: 4.0 (*CS-related*) / 4.0 | Master of Design in **Human-AI Interaction** **Dec. 2023 expected**

- *Relevant Courses:* CS280 Computer Vision, CS282 Deep Neural Network, CS294-026 Computational Photography, CS294-196 GenAI & LLM, CS285 Reinforcement Learning, CS294-137 Immersive Computing
- *Thesis:* Universal AR-Enhanced Interface for ROS: Enabling Multi-Type Robot Control

Zhejiang University *Zhejiang, China*
GPA: 3.99 (*Math-related*) / 4.0 | Bachelor of Engineering in **Architecture** **Jun. 2020**

- *Activities:* Co-Founded Robotic Fabrication Lab; Excellent in SRTP (*Student Research Training Project*)

PUBLICATIONS

- **Huang, Z.***, Yao, K.*, Zhao, S. Z.*, Pan, C.*, Xu, T., Feng, W., & Yang, A. Y. (2023). Robust Digital-Twin Localization via An RGBD-based Transformer Network and A Comprehensive Evaluation on a Mobile Dataset. arXiv preprint arXiv:2309.13570.
- Zhuang, X.*, **Huang, Z.***, Zeng, W., & Caldas, L. (2023). MARL: Multi-scale Archetype Representation Learning for Urban Building Energy Modeling. In Proceedings of the IEEE/CVF International Conference on Computer Vision (pp. 1565-1572).
- Xu, W., & **Huang, Z.** (2020). Robotic Fabrication of Sustainable Hybrid Formwork with Clay and Foam for Concrete Casting. In Congreso SIGraDi 2020. São Paulo: Blucher (Vol. 8, No. 4, pp. 377-383).
- Wang, S., Huang, K., **Huang, Z.**, Sodano, M., Xu, W., & Raspall, F. (2019). Fabrication of Topology Optimized Concrete Components Utilizing 3D Printed Clay Mould. In Proceedings of IASS Annual Symposia (Vol. 2019, No. 6, pp. 1-7).

RESEARCH EXPERIENCE

Lead Graduate Researcher, Open-Sourced AR SDK **Sep. 2022 - present**
FHL Vive Center for Enhanced Reality, supervised by Dr. Allen Y. Yang *University of California, Berkeley*

- Supervising over 5 EECS students to achieve a comprehensive digital-twin tracking dataset featuring moving robots and diverse depth sensors: Microsoft Azure Kinect, IPhone LiDAR, ZED Camera.
- Collaborating closely with the UI/UX and robotics teams to develop a universal AR interface on HoloLens for robot controlling.
- Led the development of DTTDNet: a 3D object localization algorithm; achieved **SOTA** accuracy on multiple datasets; conducted over 25 recorded ablation experiments. (code)
- Calibrated optical motion tracking system and camera system; collaborated to build a novel RGBD dataset specific to iPhone LiDAR with ARKit; Achieved over 13k frames' annotation using optical motion tracking system and programmed Python &C++ toolkits.

Student Researcher **May. 2023 - Sep. 2023**
XR Lab - Immersive Design Student Club *University of California, Berkeley*

- Co-First authored a VQAE-based method for residential buildings' latent embedding and clustering.
- Reduced the computation time by **133.7 times** for NYC's residential energy consumption estimation.

Teaching And Research Assistant, Robot Laboratory Lead **May. 2019 - Jun. 2020**
College of Civil Engineering and Architecture *Zhejiang University*

- *Assisted teaching in undergrad courses:* (1) Architectural Robotics (2) Computational Design & Robotic Fabrication.
- Developed a rapid 3D clay printing system using high-torque stepper motors, Arduino, C programming, Grasshopper, KUKA Robots, and Rhino3D; enabled robotic printing on quadric surfaces.

AWARDS

MIT Reality HACK 2023 Winner - Spatial Audio Track **Jan. 2023**
Massachusetts Institute of Technology, MA, USA

MDes Distinguished Scholar Award **Aug. 2022**
Jacobs Institute of Design Innovation, University of California, Berkeley, CA, USA

Third Prize in CMO (Chinese Mathematical Olympiad) **2015**
Zhejiang Province, China

ZJU Merit-based Scholarship **2016**
School of Material Science and Engineering, Zhejiang University

WORKING EXPERIENCE

3D Software Engineer, Server-end Development Lead **Jun. 2021 - Apr. 2022**
INSOME Technology Co. Ltd *Shenzhen, China*

- Developed a modular building information management (BIM) system from 0 to 1; Enabled efficient and scalable structure customization with real-time 3D visualization; Achieved an immersive user experience built on Android using Unreal Engine and Blueprints.

Product & Technology Development Lead **Jan. 2021 - Jun. 2021**
Hezhu Digital Technology Co. Ltd *Shanghai, China*

- Led and prototyped an urban sustainability mapping system from 0 to 1; Enabled cost management and carbon emission optimization for urban design evaluation; Specified application into launched urban planning projects.

Robotics Engineer Intern **Jan. 2019 - May. 2019**
RoboticPlus.AI *Shanghai, China*

- Designed and fabricated the **China's first** all-carbon fiber pavilion; Achieved the 4 meters high and 3.8 meters wide entire structure weaved with a continuous line of carbon-fiber. Density of the structure is controlled at 18KG per cubic meter and the bearing capacity of 400KG is achieved. (simulation, video, poster)
- Collaborated with architects on a carbon-fiber weaving and resin curing system using KUKA Robots and programmable 3D modeling.
- Programmed the robotic weaving path and ran the simulation for the robotic construction on 40% modules of the pavilion.

SKILLS

Programming Languages:	Python, C/C++, Java, Shell Script, C#, JavaScript, HTML, CSS, LaTeX.
Frameworks & Tools:	PyTorch, OpenCV, CUDA, TensorRT, Open3D, ARKit, Django, React, Nginx, MySQL, Bash.
3D Modeling Tools:	COLMAP, Grasshopper, Rhinoceros, Unity, Unreal Engine, Blueprints, Blender.
Hardwares:	Optical Motion Tracker, KUKA Robots, Raspberry Pi, Arduino, Meta Quest, HoloLens.

PROJECTS

Immersive Work Environment Editor
MIT Reality HACK 2023, sponsored by Dolby.io *Massachusetts Institute of Technology*

- Collaborated and prototyped a XR work environment editor built upon Snapdragon AR Glasses, using Unity, C# and SocketIO.
- Led the team and won the Best Use of Spatial Audio Prize among over 100 teams and was a semi-finalist for Grand Prize.

Automating Robotic Resin Printing in the Air
School of Architecture, supervised by Dr. Dan Luo *Tsinghua University*

- Evaluated the capacities of different deep neural networks to autonomously control a robotic 3D resin printing system.
- Managed the camera system and automated image processing for train set data collection with applied computer vision based on OpenCV; Programmed the IO ports for KUKA Robots to manage material extrusion speed and robotic motion speed.

Efficient Discrete Construction: An Experimental Design-to-Fabrication Workflow with Automatic UAV Integration
DigitalFUTURES 2019, supervised by Prof. Xiang Wang *Tongji University*

- Calibrated the motion tracking system; Integrated drone tracking and controlling into Grasshopper and ROS; Designed and implemented discrete building components and the gripping mechanism for the UAV. [video, poster]

INVITED TALKS

A010125: AI Architecture Before and After **Oct. 24th, 2023**
Title: From Robotic Fabrication to 3D Scene Understanding.
Dept. of Architecture, Xi'an University of Architecture and Technology

Design@Large Panel: Landing a Research Position **Sep. 22nd, 2023**
Title: Multidisciplinary Research Journey in Computer Vision and AEC.
Jacobs Institute of Design Innovation, University of California, Berkeley

Architectural Robotics: From Design to Construction **Nov. 20th, 2019**
Title: Basic Robotics Concept in Digital Fabrication.
College of Civil Engineering and Architecture, Zhejiang University

SELECTED PRESS

Shrine of Whatslove / Wutopia Lab, *ArchDaily* [link] **Mar. 27th, 2019**

China's first all carbon-fiber structure designed architecture., *Gooood* [link] **May. 13th, 2019**

Discrete Elements Construction of Automatic UAV, *SOHU* [link] **Aug. 16th, 2019**