ZIXUN HUANG

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SUMMARY

Zixun Huang is a machine learning researcher with a primary focus on **Machine Perception**, **3D Scene Understanding** and **Multi-Modality**. His research interests span across various domains, encompassing Computer Science and the AEC (*Architecture, Engineering, and Construction*) industry. These interests include topics such as **Indoor Reconstruction**, **Robot Learning**, and **Enhanced Reality**.

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
- *Awards:* MDes Distinguished Scholar Award; MIT Reality HACK 2023 Winner - Spatial Audio Track

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*); ZJU Merit-based Scholarship

INVITED TALKS

A010125: AI Architecture Before and After **Oct. 24th, 2023 expected**
Title: From Digital 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

RESEARCH EXPERIENCE

Lead Graduate Researcher **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.
- Lead-Authored the paper of DTTD2: Robust Digital-Twin Localization via An RGBD-based Transformer Network and A Comprehensive Evaluation on a Mobile Dataset. [arXiv preprint]
- 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.

Graduate Researcher **May. 2023 - Sep. 2023**
XR Lab - Immersive Design Student Club, supervised by Prof. Luisa Caldas *University of California, Berkeley*

- Co-First authored a VQAE-based method for residential buildings' latent embedding and clustering. [ICCVW 2023]
- Reduced the computation time by 133.7 times for NYC's residential energy consumption estimation.

Research Assistant **Jun. 2021 - present**
Architectural Intelligence Group, supervised by Prof. Hao Zheng *City University of Hong Kong*

- Designed and implemented an urban data mapping and learning-based simulation system from 0 to 1.
- Reduced the average time cost for urban quantitative analysis from 3 days to 3 seconds per designer by developing automatic pipelines.
- Led over 100 designers with urban data crawling and Pix2pixHD model training for multiple urban sense simulation.
- First-Authored a learning-based urban research: Can Machine Learning Uncover Insights into Vehicle Travel Demand from Our Built Environment? [*in submission to Cities*]

Research And Teaching 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 PRC, and Rhino3D; enabled robotic 3D printing on quadric surfaces.
- *Publication:* (1) Fabrication of Topology Optimized Concrete Components Utilizing 3D Printed Clay Mould; (2) Robotic Fabrication of Sustainable Hybrid Formwork with Clay and Foam for Concrete Casting. [IASS 2019, SiGraDi 2020]

SKILL SETS

Languages:	Python, C/C++, Java, Shell Script, C#, JavaScript, HTML, CSS, Swift, LaTeX
Frameworks & Tools:	PyTorch, OpenCV, Open3D, ARKit, Django, React, Git, Node.js, Nginx, AWS, MySQL, Android Studio.
3D Modeling Tools:	COLMAP, Nerfstudio, Grasshopper, Rhinoceros, Unity, Unreal Engine, Blueprints, Blender.
Design Tools:	Figma, Adobe Creative Suite (PS, AI, ID, PR), AutoCAD, ArcGIS.
Hardwares:	Optical Motion Tracker, Microsoft Azure Kinect, ZED Stereo Camera, KUKA Robots, Raspberry Pi, Arduino.

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. [*press:* archdaily, domus, gooood]
- 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. [animation]

PROJECTS

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

REFERENCE

From Civil and Env. Engineering

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From Computer Science

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