

# Reachsak Ly

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Charleston, Illinois, 61920, USA

## EDUCATION

### Virginia Polytechnic Institute and State University

Doctor of Philosophy in Environmental Design and Planning

Blacksburg, VA

Aug. 2022- May 2025

*Dissertation:* "Leveraging Artificial Intelligence and Distributed Ledger Technologies Toward Smart and Autonomous Buildings"

### Zhejiang University

Bachelor of Engineering in Civil Engineering

Hangzhou, China

Sept. 2017- July 2021

## PROJECT

### AI assistant and AI agent for Autonomous Building operation using Large Language Model

Feb. 2024 - Present

- Designed and implemented an LLM-based [AI assistant](#) for smart building appliance control. [\[ACM FSE Paper\]](#)
- Developed LLM-based [AI agent for autonomous building operation](#) to enhance occupant comfort. [\[Paper\]](#)

### GenAI-powered chatbot for Detecting Defects and Vulnerabilities in Smart Home Systems

July. 2025 - Present

- Developed [Gen AI powered chatbot for smart home automation risk detection](#) using LLaMA3 and GPT-OSS

### AI assistant for Digital twin query using Large Language Model

Dec. 2024 - Present

- Developed [AI-based digital twin data query system](#) using LLM and Autodesk Tandem.

### Vision Language Model-based AI agent for Construction Site Progress and Safety Monitoring

June. 2024 - Present

- Developed [Multimodal AI agent](#) using Vision Language Models (VLMs) to autonomously monitor construction site progress and safety conditions.
- Deployed open-sourced Vision Language Models (e.g. MinicpmV, LLaMA 3.2 Vision) locally using llama.cpp.

### Small Language Models-based AI assistant for smart building appliance control

May. 2024 - Present

- Developed [AI assistant](#) for building appliance control using small language models (SLMs) and edge devices.
- Deployed open-sourced SLMs such as Phi-3 mini and LLaMA 3.2 on Raspberry Pi 5 using llama.cpp.

### Vision Language Model-based AI assistant and AI agents and (XR) Extended Reality application

May. 2024 - Present

- Deployed open-sourced vision language model (e.g. LLaVA), open-sourced Text-to-speech, and Speech-to-Text model (e.g. Whisper, Piper) onto Microsoft HoloLens 2 with Unity 3D.
- Developed [Multimodal AI agent and AI assistant](#) within the XR environment with voice chat and image understanding capabilities.

### Retrieval-Augmented Generation (RAG) Chatbot for Construction Safety

Mar. 2024 - Jan. 2025

- Developed a retrieval-augmented generation [\(RAG\) chatbot](#) using open-sourced LLM and Vector Database to provide construction personnel information on construction safety protocols and related building codes.

### Data-driven Smart Building Facilities Management using AI Assistant and Digital Twin

June 2024 - Present

- Leveraged LLM to develop an [AI assistant-driven decision support system](#) for analyzing historical IoT and digital twin data to provide visualization, insights, and suggestions to optimize building operation performance.

## EXPERIENCE

### Graduate Research Assistant, Virginia Tech

Aug. 2022 - Present

- Conduct research on emerging technologies such as Blockchain, Deep learning, Large Language Models (LLMs), AR/XR, Digital Twin, and robotics for smart building and built environments.

### Undergraduate Research Assistant, Zhejiang University

Mar. 2019 - June. 2021

- Develop [damage identification](#) and [crack segmentation system](#) using Deep Convolutional Neural Networks.

## TECHNICAL SKILLS

### Language: Python, C#, JavaScript, C++, Java, HTML/CS , Solidity and MATLAB

Data Science & Machine Learning: TensorFlow, PyTorch, Scikit-Learn, Pandas, NumPy, Matplotlib, MLX, CUDA, Llama.cpp, Llmaindex, Huggingface,

Langchain, Unslloth AI and CrewAI Database Systems: MySQL, MongoDB, Qdrant, ChromaDB

## HONORS & AWARDS

- [Pratt fellowship](#) for outstanding PhD students | Virginia Tech, Office of Research and Innovation, 2025
- [Excellent Award](#) in the International Project Competition in Structural Health Monitoring UIUC, 2020
- [1st Place in Microsoft Hackathon](#) : Window App Studio Challenge Microsoft, 2016

## INTELLECTUAL PROPERTY DISCLOSURES

- Large Language Models-based Autonomous Building Operations and Virtual Assistants for Smart Buildings, Virginia Tech IP Disclosure, Invention Id: [INV2025-121](#)(Approved, April 2025)
- Decentralized Autonomous Building Cyber-Physical System (DAB-CPS), Virginia Tech IP Disclosure, Invention Id: [INV2025-123](#) (Approved, April 2025)