Reachsak Ly

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Blacksburg, Virginia, 24060, USA

EDUCATION

Virginia Polytechnic Institute and State University — Blacksburg, VA
Doctor of Philosophy in Environmental Design and Planning — *Aug. 2022- May 2025*

Zhejiang University — Hangzhou, China
Bachelor of Engineering in Civil Engineering — *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]

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.
- Developed digital building twin using Autodesk platform service, IoT sensors, and Raspberry Pi.

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*
- Conduct research on Machine Learning applications in Structural health monitoring.
- Develop damage identification and crack segmentation system using Deep Convolutional Neural Networks.

TECHNICAL SKILLS

Language: Python, C#, JavaScript, C++, Java, HTML/CSS, ROS, Solidity and MATLAB
Data Science & Machine Learning: TensorFlow, PyTorch, Scikit-Learn, Pandas, NumPy, Matplotlib, MLX, CUDA, Llama.cpp, Llamaindex, Huggingface, Langchain, Unsloth 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)