

# Amirpooya Shirazi

Curriculum vitae

## CONTACT INFORMATION

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🌐 Amirpooya Shirazi

## SKILLS

ROS 1.5 years +  


Gazebo 1.5 years +  


Revit/Navisworks 2.5 years +  


## LANGUAGES

English Advanced  


Persian Native  


## EDUCATION

Master's of Engineering in Construction Engineering and Management: 4.0/4.0  2022 - Expected 2024  
University of Nebraska-Lincoln, Nebraska, United States

Bachelor's of Science in Civil Engineering: 3.5/4.0  2016 - 2021  
University of Tehran, Tehran, Iran

Mathematics and Physics Diploma: 3.94/4.0  2012 - 2016  
Allameh Tabatabayee Complex of Cultural and Educational - Advanced Unit, Tehran, Iran

## TEACHING EXPERIENCES

Teaching Assistant  2018 - 2019  
University of Tehran

- **C++ Programming course:** School of civil engineering, University of Tehran, Tehran, Iran.
- **Visual Basic .NET Programming course:** School of civil engineering, University of Tehran, Tehran, Iran.

## HONORS AND AWARDS

- **Full-time Graduate Research Assistant at University of Nebraska-Lincoln:** Fully-Funded Graduate Research Assistant under supervision of [Dr. Kyungki Kim](#).
- **Ranked 18th (out of 120 undergraduate students) in the School of Civil Engineering, University of Tehran.**
- **Ranked 685th among more than 500000 participants in the Nationwide University Entrance Exam (Summer 2016).**

# RESEARCH AND WORK EXPERIENCES

Graduate Research Assistant  
University of Nebraska-Lincoln

2022 - Present

- **Development of Rule-Based Safety Checking System for Autonomous Heavy Construction Equipment:** Ensuring job site safety remains a paramount concern, particularly within roadway construction work zones. To enhance safety measures, I developed an innovative solution that leverages Robotics Operating Systems (ROS), Autonomous Vehicle (AV) technologies, and the utilization of pre-trained Convolutional Neural Network algorithms (CNNs). This application is designed to establish a comprehensive 360-degree awareness around heavy construction equipment, detecting potential hazards by precisely locating workers and vehicles within the work zone. This is achieved through the combined use of RGB-D and LiDAR sensors, coupled with commonly used sensor fusion logic.
- Under Supervision of [Dr. Kyungki Kim](#).
- **Human-Aware Safe Robot Control and Monitoring System for Operations in Congested Indoor Construction Environment:** Using robots in indoor construction areas can make work safer and more efficient in many ways. In this joint effort, we're studying how robots interact with human workers while they perform different construction tasks. Our main goal is to create clear safety rules for robots as they handle various jobs in these work zones. So far, we've mostly used simulations of robots like the **Husky Robot** and **Tiago Robot** to observe how workers behave and how robots can facilitate the project's continued adherence to a secure framework. [\[Ongoing Project\]](#)
- Under Supervision of [Dr. Kyungki Kim](#), [Dr. Matthew D. Peavy](#), [Dr. Luis Merino](#).
- **Patient Behavior Monitoring:** Ensuring patient well-being in hospitals is a paramount concern. This project endeavors to integrate robotics into post-surgery patient care, serving as a liaison between nurses and patients. By consistently monitoring vital signs and patient behaviors, including posture and movements, we aim to enhance and expedite assistance and observation. The project's ongoing progress involves designing an autonomous system and validating it through **Gazebo** simulation, marking the initial steps toward achieving our ultimate goal. [\[Ongoing Project\]](#)
- Under Supervision of [Dr. John R. Windle](#), [Dr. Kyungki Kim](#), [Dr. Hoang-Dung Tran](#), [Dr. Erica Ryherd](#).

Undergraduate Research Assistant  
University of Tehran

2020 - 2021

- **4D Simulation and Construction Planning:** In this research project, I designed a 3D **Revit** model of an 18-story residential building, simulated its construction timeline using **Navisworks**, and developed a fundamental C based application to extract the structural elements by a given 3D bounding box.
- Under Supervision of [Dr. Hosein Taghaddos](#).
- **Finite Element Modeling:** This project aimed to develop a C++ application to compute displacements on 2D-frames based on input loads and joint constraints, using stiffness matrix and **Cholesky** method.
- Under Supervision of [Dr. Reza Attarnejad](#).

Undergraduate Internship  
Mehregan Boland Payeh Consulting and Construction Inc.

2019 - 2019

- **Tehran Urban Metro Terminal Construction Project:** Throughout my summer internship, I developed a 3D model using **Revit** for the urban metro terminal construction project in Ekbatan, Tehran, Iran. The primary objective was to oversee cost-effectiveness and project scheduling by employing the Revit Quantity Takeoff method and 4D Naviswork scheduling.

## PUBLICATIONS

- [\(Submitted\)](#) Shirazi A. and Kim K., "Development of Rule-Based Safety Checking System for Autonomous Heavy Construction Equipment" *CI and CRC Joint Conference 2024*, Des Moines, Iowa, United States, 2024.
- [\(Submitted\)](#) Oyediran H., Shirazi A., Peavy M., Merino L., and Kim K., "Human-Aware Safe Robot Control and Monitoring System for Operations in Congested Indoor Construction Environment:" *CI and CRC Joint Conference 2024*, Des Moines, Iowa, United States, 2024.

States, 2024.

- *(To Be Submitted by October 2023)* Shirazi A. and Kim K., "TBD" *Automation in Construction Journal*. This journal paper is an extended version of the conference paper including the results of the simulation as well as the field tests documented as a novel approach to implement autonomy into heavy construction equipment for roadway work zone safety which is expected to be submitted by 2023 October.
- Shirazi A. and Shirazi A, "Energy and Cost Optimization for Residential Improvement Options" *The 54th International Conference of the Architectural Science Association (ANZAScA)*, Auckland, New Zealand, 2020.

## SKILLS

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- **Robots Operating Systems (ROS):**
  - C++
  - Python
  - PCL-Libraries
  - Gazebo Simulation
- **Machine Learning (ML):**
  - Supervised Machine Learning: Regression and Classification - [\[Certificate\]](#)
  - Advanced Learning Algorithms - [\[Certificate\]](#)
  - Unsupervised Learning, Recommenders, Reinforcement Learning - [\[To Be Earned\]](#)
- **Building Information Modeling (BIM):**
  - Revit
  - Navisworks (Simulation and Manage)
- **Civil Engineering Softwares:**
  - ETABS
  - AutoCAD
  - Civil3D
  - SAP
  - TecPlot

## REFERENCES

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- **Dr. Kyungki Kim**  
School of Construction Engineering  
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- **Dr. Hoang-Dung Tran**  
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- **Dr. Matthew D. Peavy**  
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- **Dr. Luis Merino**  
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