### XIAO LIU · CV

# Coordinated data analysis and fraud detection with the operation team. Conducted competitor tracking and advising on driver incentives.

### Hitachi, Ltd.

Design Engineer

 Assisted in product development by analyzing cable and power converter sizing, heat release, and power supply design. Revised design parameters to meet customer requirements and national standards while optimizing manufacturing and logistical processes for cost reduction.

### Developed state-space modeling for long-horizon robot learning within Large Language models (LLMs), where LLMs perform planning and reasoning while maintaining state tracking.

- Embodied AI: Proposed Diff-Control, an Action diffusion policy incorporating ControlNet from the domain of image generation to robot actions. [C7]
- Created a multimodal learning framework (α-MDF) using attention mechanism and differentiable filtering, which conducts state estimation in latent
- Developed differentiable Ensemble Kalman Filters (DEnKF) framework incorporating algorithmic priors for robot learning, i.e., learning system dynamics from observations, and learning representations from high-dimensional space. [C4]
- Deployed the differentiable filtering framework with smartwatch for ubiquitous robot control tasks, i.e., teleoperation, drone piloting. [C6]

## RadiusAl. Inc.

COMPUTER VISION DATA SCIENTIST (PART-TIME)

- Refined Multi-object tracking (MOT) algorithms using Bayes Filter for Video Analytics for indoor and outdoor cameras, improved ~9% accuracy.
- Developed multi-objective optimization technique base on Frank-Wolfe algorithm for monocular depth prediction model across multiple datasets.
- Researched on monocular depth prediction models with varied advanced architecture, Vision Transformer and multi-scale local planar guidance blocks, achieved depth estimation with 0.117, 0.416 on abs REL and RMS error metrics and 0.868 on d1 metric on NYU depth testset.

## **Case Western Reserve University**

### **RESEARCH ASSISTANT**

- Led social robot project "Woody and Philos" project, developed advanced algorithms in Computer Vision for social robots. [C2]
- Real-time Human Facial Emotion Expression Recognition for Human-robot Interaction using deep learning and machine learning technique. (featured on Case Western Daily) [C1] [J1]
- Human-Robot Interaction: Developed social robots-"Philos" & "Woody" platform and investigated the potential of social robots as cognitive assessment applications for older adults. (featured on ideastream)

## **CWRU & ASU**

**TEACHING ASSISTENT** 

- Served as the teaching assistant for EMAE250 (Computers in Mechanical Engineering), instructing students on numerical problem-solving using Matlab and providing guidance throughout the learning process.
- TA for CSE205 (Object Oriented Programming), instructing students on conding with varied data structure and OOP tasks in Java.

## Uber Technologies, Inc.

DATA ANALYST

Sep. 2020 - Dec 2023

Sep. 2024 - present

June. 2020 - Aug. 2024

2018 - 2019, 2023 - 2024

Aug. 2017 - Aug. 2019

June 2015 - Dec. 2015

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POSTDOC SCIENTIST · ROBOTICS & Al · HE/HIM/HIS

# Santa Clara, California

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# Summary\_

I am currently a Postdoctoral Scientist in the Physical Interaction Group at Honda Research Institute - US, where we are developing AI-assisted robotic systems. My current research focuses on robotic learning, representation learning, especially how to enable robots to understand task scene for longhorizon reasoning. My work has been presented at conferences such as CoRL, ICRA, and IROS. I earned my Ph.D. in Computer Science from the School of Computing and Augmented Intelligence at Arizona State University, supervised by Prof. Heni Ben Amor, and completed my Master's degree at Case Western Reserve University under the guidance of Prof. Kiju Lee.

Experience \_\_\_\_\_

## Honda Research Institute USA, Inc.

POSTDOC SCIENTIST

- Developed a scene graph-based assistant generation framework for a teleoperated avatar robot. This framework facilitates task understanding, encodes spatial relationships during rearrangement tasks, and constructs planning-capable graphs using graph edit distance.
- Improved human intention estimation and action recognition by leveraging attention-based dynamic scene graphs for dexterous teleoperation.

# Interactive Robtoics Lab, ASU

**RESEARCH ASSOCIATE** 

- space with multiple modalities. [C5]

Jan. 2016 - Aug. 2016

# Education

Arizona State University	Tempe, Arizona	
Рн.D. IN COMPUTER SCIENCE, ADVISOR: PROF. НЕМ ВЕМ АМОК • Thesis Focus: Robot Learning via Deep State-Space Model GPA: 4.0/4.0	Aug. 2019 - Aug. 2024	
Case Western Reserve University	Cleveland, Ohio	
M.S. IN MECHANICAL ENGINEERING, ADVISOR: PROF. KIJU LEE Thesis Focus: Automated Facial Emotion Recognition for Human-Robot Interaction GPA: 3.8/4.0	Aug. 2016 - May. 2019	
Southwest Jiaotong University Chengdu, China		
B.S. IN MECHANICAL ENGINEERING	Aug. 2011 - May. 2015	
Project: Roller bearing fault diagnosis based on wavelet analysis GPA: 3.6/4.0		

# Publications

2025	[C9], Baskaran, P, Liu, X, Li, S & Iba, S. "eXplainable Intention Estimation in Teleoperated Manipulation using	IROS 2025
	Dynamic Graph Neural Networks" IEEE/RSJ IROS (under review)	
2025 2024	[C8], Zhou, Y, Liu, X, Vuong, Q & Ben Amor, H. "AutoMA: Automated Modular Attention enables Context-Rich	ICRA 2025
	Imitation Learning using Foundation Models" IEEE International Conference on Robotics and Automation (ICRA)	101012020
	[C7], Liu, X, Zhou, Y, Weigend, F, Sonawani, S, Ikemoto, S & Ben Amor, H. "Diff-Control: A Stateful Diffusion-based	IRO.S 2024
	Policy for Imitation Learning" IEEE/RSJ IROS	
	[W2], Liu, X, Weigend, F, Zhou, Y & Ben Amor, H. "Enabling Stateful Behaviors for Diffusion-based Policy	ICPA 2024
2024	Learning" ICRA 2024 Workshop - Back to the Future: Robot Learning Going Probabilistic	ICIA 2024
2024	[C6], Weigend, F, Liu, X, Sonawani, S & Ben Amor, H. "iRoCo: Intuitive Robot Control from Anywhere using a	1004 2024
2024	Smartwatch" IEEE International Conference on Robotics and Automation (ICRA)	ICRA 2024
	[W2], Liu, X, Zhou, Y, Ikemoto, S & Ben Amor, H. "Multimodal Learning of Soft Robot Dynamics using	CoDI 2022
	Differentiable Filters" CoRL 2023 Workshop on Learning for Soft Robots	CORL 2023
2022	<b>[C5]</b> , Liu, X, Zhou, Y, Ikemoto, S & Ben Amor, H. " $\alpha$ -MDF: An Attention-based Multimodal Differentiable Filter for	CoDI 2022
2023	Robot State Estimation" 7th Conference on Robot Learning	CORE 2023
2022	[W1], Weigend, F, Liu, X, & Ben Amor, H. "Probabilistic Differentiable Filters Enable Ubiquitous Robot Control	
2023	with Smartwatches" IROS 2023 Workshop on Differentiable Probabilistic Robotics	IRUS 2023
2022	[C4], Liu, X, Clark, G, Campbell, J, Zhou, Y & Ben Amor, H. "Enhancing State Estimation in Robots: A Data-Driven	
2023	Approach with Differentiable Ensemble Kalman Filters" IEEE/RSJ IROS	IRUS 2023
2022	[C3], Liu, X, Ikemoto, S, Yoshimitsu, Y & Ben Amor, H. "Learning Soft Robot Dynamics using Differentiable Kalman	1005 2022
2023	Filters and Spatio-Temporal Embeddings" IEEE/RSJ IROS	IRUS 2023
2021	[J1], Liu, X, Cheng, X & Lee, K. "GA and SVM based Facial Emotion Recognition using Geometric Features" IEEE	IEEE concore 2021
	sensors Journal on Machine Vision and automated systems	IEEE SEIISOIS 2021
2020	[C2], Hayosh D, Liu, X & Lee, K. "Woody: Low-Cost Open-source Humanoid Torso Robot" IEEE 17th International	110 2020
	Conference on Ubiquitous Robots (UR)	UR 2020
2020	[C1], Liu, X & Lee, K. "Optimized Facial Emotion Recognition Technique for Assessing User Experience" IEEE	CEM 2020
	Games Entertainment and Medias Conference (GEM)	GEIVI 2020

# Skills

• **Programming**: Python, C/C++, Java; **Tools & Library**: PyTorch, TensorFlow, OpenCV, ROS, Matlab, MuJoCo, Unity, Docker, Git, Kubernetes;

# References\_\_\_\_\_

Heni Ben Amor	Tempe, Arizona
Associate Professor, Ph.D. Advisor	Arizona State University
School of Computing and Augmented Intelligence   Google DeepMind Researcher	Tel: 480.965.2253, Email: hbenamor@asu.edu
Kiju Lee	College Station, Texas
Associate Professor, M.S. Advisor	Texas A&M University
Engineering Technology and Industrial Distribution and Mechanical Engineering	Tel: 979.458.6479, Email: kiju.lee@tamu.edu