

## OVERVIEW

**Languages:** Python, C & C++ (including CUDA, HIP, & oneDNN), C#, Java, RISC-V, Julia, Lua, JavaScript, Perl, R

**Competencies:** ROS, Actor-Critic, Tensor Libraries & Math, Sockets, NumPy, Linux, Computer Networking, 2D & 3D Physics and Simulation Engines

**Research Background:** Robotics & AI; Object Manipulation, Audio & Image Processing, Probabilistic Robotics, Reinforcement Learning, Transformers

**Interests:** Predictive Models, Algorithmic Trading, Multi-Agent Learning & AI, Generative Models, Data Science, Acoustic Guitar, Piano, BJJ

## EDUCATION

**Bachelor of Science in Computer Science, Concentration in Robotics and AI**

**Cumulative GPA:**

*University of South Florida College of Engineering, Tampa, FL*

3.7/4.0

**Courses Taken:** Automata Theory, Intro to AI, Mobile Robotics, Natural Language Processing, Linear Algebra

*Fall 2020 - Spring 2024*

## EXPERIENCE

**Software Engineering R&D Co/Op**

**May 2022 - Present**

Canadian Aerospace Engineering Research and Development Facility <https://cae.com/>

**Tampa FL**

- Development of Windows and Linux lab environments of computer system networks for simulation and hardware testing.
- Oversaw development of specialized Linux-based driver software used for proprietary Sim-based interactive systems.

**Research Scientist**

**Fall 2021 – Present**

Robot Perception and Action Laboratory, *University of South Florida*, <https://rpal.cse.usf.edu/>

**Tampa FL**

- Research in robotic object manipulation through supervised and reinforcement learning; construct and pretrain a transformer network tasked for encoding spatial information, explore methods for improving accuracy of a policy.
- Document and communicate results amongst lab members and incorporate recorded findings into academic publishing.

**Senior Coding Coach and Instructor**

**Fall 2021 – Summer 2023**

theCoderSchool Tampa <https://github.com/theCoderSchoolTampa/CoderSchoolAI>

**Tampa FL**

- **CoderSchoolAI:** Spearheaded an initiative for effectively delivering theoretical CS concepts involving Agent AI in a simpler and more digestible interface for kids. Developed an educational program built on-top of a Python Library designed to remove complexity of Agent AI concepts. Introduced search-based and neural network-based approaches for building AI agents. Guided the development of agents through classic and learning-based methods. (*Snake in Python*)

**Vice Chair; AI Group, VEX Robotics**

**Fall 2020 - Present**

USF IEEE Student Chapter

**Tampa FL**

- Organize and oversee Professional Development events/forums, plan our Spring/Fall Picnics and Banquets, introduce new students and act as the main POC for all USF students interested in joining IEEE's Technical Clubs and Teams.
- Founded AI Group; built mini compute cluster for simulation and training of neural networks, leadership in AI projects
- Created programming team for VEX Robotics, introduce new programing techniques based in RL and simulation

## PROJECTS

**Virtual Assistant**

**August 2022 - Present**

<https://github.com/Johnnykoch02/VirtualAssistant>

(Demo) <https://www.instagram.com/reel/Cu2EC5IPcfw/>

- Expand the abilities of a computer's ability to solve user's problems via interpretation of natural language.
- Keyword Detection via Sequence Modeling and LSTM Network to avoid Speech-To-Text Charges from Google ♥
- By prompting the system, it will retrieve what it thinks your intentions are and execute a sequence to solve the problem.

**HackaBull Entry: Robbie The Danci-Bull Robot**

**March 2023**

<https://devpost.com/software/robbie-the-dancibull-robot>

(Dancing!) <https://youtu.be/zSz2d7ekwHU>

- Our mission was to develop a Simulated Robot that can dance to any song you provide as input.
- Constructed a policy and features extraction network that receives audio data and joint angles as observations that outputs a probability distribution corresponding to a  $d\theta$  in each of the seventeen joints on the Robot.
- Engineered a Data Pipeline that used Just Dance Videos and a Joint-Angle Extraction algorithm for Offline Reinforcement Learning and then perfect the robot's motions through RL-HF. (*See Devpost*)

**TerriBull Robotics Vex Library**

**August 2021 – Present**

<https://github.com/Johnnykoch02/BullBot>

(Competition Video) <https://www.instagram.com/reel/CdJ00oyvc0V/>

- Software Library written for TerriBull Robotics Team for full autonomous capability and task implementation.
- Led a research project in modeling our robots in a simulated environment designed for learning to solve our dynamic time-based objectives. Utilization of offline and online reinforcement learning algorithms (DDPG+HER).
- Introspected the challenges of learning in multi-agent systems to improve my own understandings of intelligence.