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Jonathan Koch

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OVERVIEW

***Languages**: Python, C & C++ (including CUDA, OpenCL, & 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:** *3.7/4.0*
University of South Florida College of Engineering, Tampa, FL — *Fall 2020 - Spring 2024*
***Courses Taken**: Automata Theory, Intro to AI, Mobile Robotics, Natural Language Processing, Linear Algebra*

EXPERIENCE

Software Engineering R&D Co/Op — **May 2022 - Present**
CAE USA 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***
- Instructed young aspiring software developers in Computer Science concepts and brought their creativity to life
- ***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

CoderSchoolAI **(pip install CoderSchoolAI)** — **May 2023 - Present**
https://github.com/theCoderSchoolTampa/CoderSchoolAI/blob/master/README.md — ***(Demo)* https://youtu.be/_cpspql8Chw?si=III8mxfdjF8rDdph**
- Neural Network API and Reinforcement learning library built on-top of Python & PyTorch designed for beginners.
- MDP implementation in 10 lines of code, created basic API for developing many-to-many DNN function approximators, various data and tensor utilities for efficient data manipulation, implementation of PPO, DQN, and DDPG algorithms.
- Used in my robotics research in RPAL. Continuously developing and expanding capabilities. Find it on PyPi.

Virtual Assistant — **August 2022 - Present**
https://github.com/Johnnykoch02/VirtualAssistant/blob/main/README.md — ***(Demo)* https://www.instagram.com/reel/Cu2ECSlPcfw/**
- 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.

Autonomous Robotics Motion 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.