Jonathan Koch

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OVERVIEW

Languages: Python, C & C++, C#, Java, Julia, Lua, JavaScript, Perl, R
Competencies: ROS, Stable-Baselines3, PyTorch, Vector Math, Sockets, NumPy, Linux, Computer Networks, 2D & 3D Physics and Simulation Engines
Research Background: Robotics & AI; Object Manipulation, Audio & Image Processing, Probabilistic Robotics, Reinforcement Learning, Transformers
Interests: Domestic Robotics, Multi-Agent Learning & AI, Action-Based Generative Models, Cognitive Modeling, Acoustic Guitar, Piano, BJJ

EDUCATION

Bachelor of Science in Computer Science, Concentration in Robotics and Automation
University of South Florida College of Engineering, Tampa, FL

Courses Taken: Automata Theory, Intro to AI, Control of Mobile Robots, Operating Systems, Linear Algebra, Vector Calculus

Cumulative GPA:
3.6/4.0

Fall 2020 - Spring 2024

EXPERIENCE

Software Engineering R&D Co/Op
Canadian Aerospace Engineering Research and Development Facility https://cae.com/

May 2022 - Present
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
Robot Perception and Action Laboratory, *University of South Florida,* https://rpal.cse.usf.edu/

Fall 2021 – Present
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
theCoderSchool Tampa https://github.com/theCoderSchoolTampa/CoderSchoolAI

Fall 2021 – Summer 2023
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; VEX Robotics, AI Group
USF IEEE Student Chapter

Fall 2020 - Present
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
https://github.com/Johnnykoch02/VirtualAssistant

August 2022 - Present
(Demo) https://www.instagram.com/reel/Cu2ECSlPcfw/

- Expand the abilities of a computers ability to solve problems through language modeling and automation.
- 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
https://devpost.com/software/robbie-the-dancibull-robot

March 2023
(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
https://github.com/Johnnykoch02/BullBot

August 2021 – Present
(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.