



Nathan Corral

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Computer Engineer with a master's specialization in AI and 3+ years of experience in robotics and software engineering, seeking a full-time role in AI/ML development.

Job Experience

- **Humanoid Robots Lab – University of Bonn** 09.2021 – 09.2022
Research Assistant Bonn, Germany
 - Contributed to research and publications in personalized robot navigation.
 - Programmed the ROS interface for 3D localization of humans from an RGBD camera using deep learning and implemented this on a real robot for autonomous navigation.
 - Used the photo-realistic simulator iGibson (Py-Bullet backend) to generate data for a deep reinforcement learning-based path planning algorithm.
 - Conducted a user study evaluating human-robot-interaction in a VR headset, with a follow-up on real robot hardware.
- **Head Rush Technologies** 12.2019 – 04.2020
Contract Engineer Boulder, USA
 - Contracted to code the firmware on a ATmega328PB Microchip for a proof-of-concept system.
 - Programmed an interrupt triggered gear tooth sensor, RS485 communication, a PWM powered brake, and finite state machine logic.
 - Completed field tests and project documentation.
- **Aqronos** 11.2018 – 12.2019
Software Engineer Denver, USA
 - Designed ROS nodes for visualization of the company's LiDAR prototype.
 - Structured UDP packets and coded both ends of sending and receiving modules.
 - Interacted with a REST API to set parameters on an embedded system.
 - Filtered point clouds and grouped objects using the C++ Point Cloud Library.

Education

- **Rheinische Friedrich-Wilhelms-Universität Bonn** 10.2020 – 09.2023
M.Sc. *Computer Science* Note: 1.7
Thesis: *Stochastic Transformer for Prediction of Multiple Futures*
 - Developed a novel transformer-based predictor architecture, able to learn a distribution over potential futures.
 - Detailed comparison against other stochastic-based models in video prediction, boasting higher structural similarity in frame-wise comparisons.
 - Applied in the domain of human pose prediction, generated 8 seconds of continued walking after the initial 0.3 seconds of seed motion.
- **University of Illinois Urbana-Champaign** 08.2013 – 05.2017
B.Sc. *Computer Engineering* GPA: 3.55/4.0

Projects

ROS 2 Whisper

2024

Maintainer

[Video](#), [Source](#)

- Extended this open source project to support boarder-less, live transcription – leading the the release of version 1.4.
- Implemented the C++ code to place special attention on code efficiency and scalability.
- Further, I deployed this onto an Nvidia Jetson Orin NX for continuous audio transcription.

ROS 2 Computer Vision

2024

Author

[Video](#), [Source](#)

- Designed a ROS 2 pipeline to run multiple Computer Vision (CV) tasks (Object Detection, Per-Pixel Segmentation) in parallel.
- Automatically download modern CV models (such as DETR, Maskformer).
- Re-index the model output labels, which may be trained on different datasets, into a universal database.
- Run the pipeline on both live camera feed and a dataset, which allowed time comparisons between the asynchronous running of multiple models.

Semantic Search using Facebook AI Similarity (FAISS)

2024

Author

[Source](#)

- Implemented the first steps in Retrieval-Augmented Generation (ending before "Generation").
- Programmed web-scraping, dataset embedding, and similarity comparisons to recover matches in the dataset from a natural language query.

Publications

- J. de Heuvel, **N. Corral**, et al. "Learning depth vision-based personalized robot navigation from dynamic demonstrations in virtual reality" *IROS*, 2023

Skills

Languages	• English (Native) • German (fluent, C1 self-assessed)
Strengths	• Problem Solving • Cross-Team Collaboration • Reliable • Technical Documentation • Hard Working
Coding	• C++ • Python • Bash • C • LaTeX • Java • Go
Software	• Linux/Ubuntu • GitHub • Docker • ROS/ROS2 • QEMU • Hyperstack • AWS EC2
Libraries (C++)	• std • chrono • Point Cloud Library • nlohmann/json • curl
Libraries (Py)	• PyTorch • Hugging Face • TensorFlow • Matplotlib • Pandas • OpenCV • NumPy • Scikit-learn
Knowledge	• Agile • REST API • Test-driven Development • POSIX • Object Oriented Programming • Data Structures
Robotics	• Forward/Inverse Kinematics • SLAM • Path Planning • PID / Model Predictive Controllers • Kalman (Bayes) Filters
Deep Learning	• Computer Vision • Generative AI • Large Language Models • Gradient Descent Optimization • Retrieval-Augmented Generation • Reinforcement Learning • Point Cloud Processing • CUDA
Simulators	• CARLA • iGibson • (Py)Bullet • Gazebo • Webots
Microcontrollers	• UART/I2C/SPI • Systems on Chip • Real-Time Systems • Interrupt Triggers • Discrete Signal Processing • Debouncing

Signature:  _____

Date: January 9, 2025

Place: Bonn, DE