

Raphael Ruschel

Santa Barbara – California – USA

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Summary

Computer vision and machine learning expert finishing a Ph.D. in Electrical & Computer Engineering (UCSB) specializing in dynamic scene-graph generation and human-object interactions. 5+ years of experience building scalable ML pipelines, transformer-based architectures, and synthetic 3D datasets. Published in top-tier conferences (CVPR, WACV). Seeking to drive innovation in Human-Object Interaction applications.

Education

University of California, Santa Barbara <i>Ph.D., Electrical & Computer Engineering</i> Developing scalable activity tracking pipelines and dynamic scene-graphs for human-object interactions.	Santa Barbara, CA 2019–Present
Universidade Federal do Rio Grande do Sul <i>M.S., Electrical Engineering</i> Focused on Facial Spoofing algorithms with deep learning.	Porto Alegre, Brazil 2017–2019
Universidade Estadual do Rio Grande do Sul <i>B.S., Computer Engineering</i> Graduated with honors, specializing in image processing and computer vision.	Guaíba, Brazil 2010–2016

Professional Experience

Vision Research Lab, UCSB <i>Graduate Student Researcher</i> <ul style="list-style-type: none">Currently working on multi-camera activity tracking and segmentation.Created dynamic scene-graph generation algorithms using transformer architectures to model human-object interactions with 400%+ accuracy improvement in real-world scenarios.Engineered temporally consistent tracking pipelines that maintain identity and action consistency across video frames, doubling temporal recall on Action Genome dataset.Developed synthetic 3D datasets using Unity Engine to simulate human interactions, enhancing model training for production-level scenarios.Optimized BisQue (cloud-based image platform) with ML modules, enhancing performance for processing large-scale human activity data.	Santa Barbara, CA 07/2021–Present
Synaptics <i>Computer Vision Research Intern</i> <ul style="list-style-type: none">Developed a data pipeline and ML models for touchscreen data on Android, boosting performance across diverse human interaction conditions.Compiled a robust user interaction dataset, increasing model generalization by 30% for human-device interactions.Enhanced touchscreen moisture detection accuracy from 60% to 92% with convolutional networks, improving human-interface reliability.	San Jose, CA 06/2023–09/2023
University of California, Santa Barbara <i>Graduate Teaching Assistant</i> <ul style="list-style-type: none">Mentored 500+ students in several courses, including Machine Learning, Computer Vision, and Digital Image Processing.Prepared and delivered weekly discussing sections, office hours, and maintained the course webpage.Recognized as Outstanding Teaching Assistant (2020, 2022, 2023) for effectively communicating complex technical concepts.	Santa Barbara, CA 09/2019–12/2023

UCSB Summer Sessions

Research Mentoring Program Teaching Assistant

Santa Barbara, CA

06/2021–07/2021

- o Mentored 15 high school students in the prestigious 6-week RMP program, guiding them through complete research cycles from concept to presentation, resulting in 100% successful project completion.
- o Coached students in scientific paper writing, research poster design, and technical presentations.
- o Developed engaging workshops on Computer Vision, inspiring multiple students to pursue further studies in Computer Science.

Key Projects

Temporally Consistent Dynamic Scene Graphs: Developed Hungarian Matching algorithms for maintaining temporal consistency in video sequences of human actions, achieving 100%+ improvement in temporal recall and enabling continuous tracking of human-object interactions.

Dynamic Scene-Graph Generation: Built transformer-based architectures for modeling human activities and interactions, increasing detection accuracy by 400%+ in production environments. Created novel attention mechanisms for human-object relationship inference.

Synthetic Dataset Creation for Activity Detection: Engineered a multi-camera synthetic data generation pipeline using Unity Engine, featuring parametrized human models with skeletal animations. Implemented procedural generation algorithms to create diverse indoor environments with physics-based interactions between digital humans and objects.

Facial Spoofing Detection: Trained deep learning models with environmental features for face authentication, optimizing performance on NUAA/CASIA datasets and laying groundwork for digital human authenticity verification.

UAV Orientation Estimation: Integrated sensor data (cameras, altitude) for real-time estimation, enhancing UAV functionality and establishing foundations for 3D spatial reasoning.

Selected Publications

Under Review: Temporally Consistent Dynamic Scene Graphs: An End-to-End Approach for Action Tracklet Generation. *Novel framework for continuous human action tracking and interaction modeling across video sequences.*

2025 IEEE/CVF WACV: DDS: Decoupled Dynamic Scene-Graph Generation Network. *Transformer-based architecture for human-object interaction detection with state-of-the-art performance.*

2019 IEEE I2MTC: Data Conditioning for Facial Spoofing Attacks Detection using Deep Learning.

2018 IEEE EMBS: Automatic Recognition of Cell Damage in Microscopic Images using Artificial Neural Networks.

2015 IEEE CVPR: UAV Sensor Fusion with Latent-Dynamic Conditional Random Fields in Coronal Plane Estimation.

Awards

Outstanding Teaching Assistant: UCSB Electrical & Computer Engineering Dept. (2020, 2022, 2023).

Technical Skills

Programming: Python, MATLAB, C++, C#, CUDA (basic).

ML & Computer Vision: PyTorch, scikit-learn, OpenCV, Transformer architectures.

Data Science: Numpy, Pandas, Matplotlib, Seaborn.

Tools: Docker, Unity Engine, Git, AWS, Large-scale computing infrastructure.

Languages

Portuguese (Native), English (Fluent), Spanish (Intermediate), Italian (Intermediate).