Hallison Paz

Computer Vision & Graphics Researcher

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Education

Instituto Nacional de Matemática Pura e Aplicada (IMPA) **Mar. 2020 – Oct. 2024 (Expected)**
Doctoral Degree in Mathematics (Computer Graphics and Vision) *Rio de Janeiro, RJ*

- Conducting research on the multiresolution representation of images using neural networks (implicit neural fields).
- Collaborated on projects in neural rendering, human face generation, and implicit representation of surfaces and scenes.
- Developed MR-Net, an open-source framework on PyTorch for training multi-stage architectures.

Instituto Nacional de Matemática Pura e Aplicada (IMPA) **Mar. 2015 – Apr. 2017**
Master's Degree in Mathematics (Computer Graphics and Vision) *Rio de Janeiro, RJ*

- Thesis on the reconstruction of implicit surfaces from depth images (e.g., Microsoft Kinect data).

Instituto Militar de Engenharia (IME) **Jan. 2010 – Dec. 2014**
Bachelor's Degree in Computer Engineering and Graduated as a Brazilian Army Officer *Rio de Janeiro, RJ*

Télécom Paristech **Aug. 2013 – Feb. 2014**
Exchange Student in Image Processing and Computer Vision (Auditeur Libre, no degree) *Paris, France*

Research Experience

Meta **Jul. 2022 – Dec. 2022**
Research Scientist Intern *Pittsburgh, PA, USA*

- Contributed to the **Codec Avatars** project, supervised by Jason Saragih, focusing on the creation of photorealistic human avatars for VR/AR applications. A **paper** based on this internship was accepted at **Siggraph Asia 2024**.
- Leveraged PyTorch to tackle **3D modeling** and **image registration** challenges using neural and **inverse rendering** techniques, alongside amortized optimization, and other machine learning methodologies for data-driven graphics.
- Trained **large-scale generative models**, including *Variational Autoencoders*, to achieve realistic avatar motion.

IMPA **2021 - 2023 (multiple intervals)**
Graduate Teaching Assistant *Rio de Janeiro, RJ*

- Served as a Teaching Assistant for the courses 3D Graphics Systems: **AI Graphics** (Mar-Jun/2021); Image Processing for Graphics and Vision: **Generative Models** (Aug-Nov/2021); 3D Graphics Systems: **Machine Learning for Modeling and Rendering** (Mar-Jun/2022); and **AI Graphics: Theory and Practice** (Mar-Jun/2023).
- Led practical laboratory sessions and, in 2023, **taught 50% of the course content**, including theoretical lectures.
- Designed, graded, and provided feedback on weekly assignments, while actively assisting students with their challenges.

Selected Publications

- **Hallison Paz**, Tiago Novello, and Luiz Velho. 2024. *Spectral Periodic Networks for Neural Rendering.* In Special Interest Group on Computer Graphics and Interactive Techniques Conference Posters (**SIGGRAPH** Posters '24), July 27–August 01, 2024, Denver, CO, USA. ACM, New York, NY, USA 2 Pages. https://doi.org/10.1145/3641234.3671087
- Guilherme Schardong, Tiago Novello, **Hallison Paz**, Iurii Medvedev, Vinicius da Silva, Luiz Velho, Nuno Gonçalves. *Neural Implicit Morphing of Face Images.* Proceedings of the IEEE / CVF Computer Vision and Pattern Recognition Conference (**CVPR**), 2024.
- **Hallison Paz**, Daniel Perazzo, Tiago Novello, Guilherme Schardong, Luiz Schirmer, Vinícius da Silva, Daniel Yukimura, Fabio Chagas, Hélio Lopes, Luiz Velho. *MR-Net: Multiresolution sinusoidal neural networks.* **Computers & Graphics**. Volume 114, 2023, Pages 387-400.
- **Hallison Paz**, Tiago Novello, Vinicius Silva, Guilherme Shardong, Luiz Schirmer, Fabio Chagas, Helio Lopes, and Luiz Velho. *Multiresolution Neural Networks for Imaging.* In Proceedings of SIBGRAPI Conference on Graphics, Patterns and Images, 2022.

Main Technical Skills

- **Programming Languages:** Python; Julia; C++; Kotlin; Swift; Java.
- **Frameworks and Libraries:** PyTorch; PyTorch3D; OpenCV; OpenGL; Android SDK; iOS SDK.
- **Technical Expertise:** Deep learning; 3D modeling; 3D vision; image processing; surface reconstruction; visual generative models; applied mathematics; communication; teaching; documentation.

Work Experience

Programação Dinâmica (youtube.com/@pgdinamica) **Sep. 2017 – Now**
YouTube Creator *Brazil*

- Co-created a YouTube channel about programming, data science, and artificial intelligence, accumulating **over 200K subscribers** and **6.5M views**. Achieved these numbers with all content in Portuguese, which is a much smaller niche!
- Published **over 300 videos** on topics like image processing, deep learning for computer vision using PyTorch, ray tracing and 3D modeling, data structures and algorithms, mathematics for computer science, and the societal impacts of AI.
- Enhanced community engagement through live streams and interactive content, fostering a learning environment that promotes practical understanding of complex topics.
- Speaker at several tech events, including Python Brazil and *Prototyping Ideas* by Google Brazil.

Cyberlabs **Jan. 2020 – Jun. 2020**
AI Engineer *Rio de Janeiro, RJ*

- Developed Android and iOS modules for the KeyApp, a face recognition mobile app, implementing efficient preprocessing workflows that improved image quality before sending it to server-side deep learning models.
- Collaborated with cross-functional teams to ensure the seamless integration of facial recognition technology into client devices such as local cameras at doors, tablets, or drones, enhancing user experience.

Instituto Infnet **Apr. 2018 – Apr 2020**
Lecturer & Executive Coordinator of Postgraduate Studies *Rio de Janeiro, RJ*

- Taught courses on mobile application development for undergraduate I.T. students, focusing on the Android platform.
- Authored foundational teaching material for two courses and updated syllabi to use Kotlin.
- **Top Performance Award** for ranking among the top 20% of the institution's lecturers based on student evaluations.
- Led the postgraduate program in Mobile Development, coordinating a team of instructors and **modernizing the curriculum** to align with industry standards, such as transitioning from Java to Kotlin and from Ionic to React Native.

Honors and Awards

- **Criadores de Impacto 2024 (Creators of Impact)**: Recognized by **YouTube** as a high-quality content creator, selected to participate in periodic discussions on relevant community topics.
- **YouTube Black Voices Fund 2022**: Selected by **YouTube** as part of the 2022 class of the Black Voices grant.
- **Keynote Speaker at Python Brazil 2021**: Delivered a keynote on *Challenges in teaching Artificial Intelligence in Brazil* at the largest Python conference in Brazil.
- **Top Performance Lecturer 2019**: Ranked among the top 20% of lecturers at **Infnet** based on student evaluations.
- **2nd Place at Hackathon SESI Cultura Digital (2015)**: Developed a mobile augmented reality app for museums.
- **Winner of the INOVApps Contest (2015)**: Designed and developed the mobile application "+Doações" for iOS, that was licensed to the **Brazilian Ministry of Science, Technology and Innovations**.
- **Honorable Mention in the Brazilian Olympiad of Physics (OBF - 2009)**.

Languages

- **English**: full professional proficiency.
- **French**: professional working proficiency.
- **Portuguese**: native.

Featured Projects

MR-Net Framework | *Python, PyTorch, Deep Learning* **2023**

- Developed the MR-Net framework, implementing neural networks for multiresolution signal representation, and components for training multi-stage architectures. Added features for periodic networks and material texture representation, as presented at SIGGRAPH '24. See the repository: github.com/visgraf/mrnet.

Synthetic Data Generation for Machine Learning | *Python, Unity, Machine Learning* **2021**

- Presented a series of three seminars (4.5 hours total) on the advantages and limitations of synthetic data for training machine learning models. Covered tools and techniques in computer graphics for creating 3D environments and generating large-scale synthetic data for computer vision tasks. See the website: visgraf.github.io/syntheticlearning.

When AI Renders a New Perspective in Graphics | *Python, PyTorch3D* **2020**

- Final project for the course 3D Graphics Systems, where I used a differentiable renderer to visualize a panoramic scene and applied inverse rendering techniques to augment it. Used PyTorch3D and Soft Rasterizer implementations. Experiments available on the website: hallpaz.github.io/3dsystems20.