ADRIAN AZZARELLI

MEng, PhD Candidate

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My research involves designing algorithms and tools that push the boundaries of machine learning innovation for filmmaking applications. This focuses on 3-D neural reconstruction with specialization in dynamic and re-lightable objects and scenes. Moving forward, my ambition is to support the creative industry with my technical skills in computer vision, working in an R&D role that enhances creative capabilities for future generations.

Languages	English, French	**Systems**	Linux, SLURM, Git	**Specializations**	3-D Reconstruction
Software	Blender, Unity	**Programs**	Python, C, C#, C++, Matlab		Gaussian Splatting (GS)
	FFmpeg, COLMAP	**Libraries**	PyTorch, Optix, Cupy		Virtual Production (VP)

EDUCATION

Sep. 2022 - Mar. 2026 | **Intelligent Cinematography, PhD @ University of Bristol, UK**
Funded by MyWorld and UKRI || Supervised by David Bull and Pui Anantrasirichai (see "Publications")

Sep. 2018 - Mar. 2022 | **Electronic Engineering with AI, MEng (First Class) @ University of Southampton, UK**
Thesis on multi-modal decision making for social, legal and ethical dilemmas; supervised by Mark Weal.

Relevant Modules (all graded First Class)
Advanced Programming (C++), Robotic Systems, Image Processing (MatLab), Numerical Methods, Mathematical Optimization, Reinforcement & Online Learning, Engineering Management & Law

PROJECTS

Aug. 2025 - Jan. 2026 | **Learnable Light Simulations for 3D reconstructions of VP stages**
Collaborated with Lux Aeterna and MyWorld|| `https://interims-git.github.io/`
Designed a GS pipeline for a photorealistic 3D and light simulation of VP stages. This synthesizes a broad range of AOVs for VFX. It allows for un-baking and relighting 3D scenes, so users can easily modify the LED wall settings and images in post production rather than doing it live on set. Linked to publication [0].

June 2024 - June 2025 | **Sparse-Multi-View Dynamic GS pipeline for Human Performers in Film Production**
Collaborated with Condense Reality and MyWorld|| `https://bit.ly/492T8vE`
Developed a new workflow and reconstruction pipeline for dynamic GS on sparse-multi-view datasets with human performers. This trains pipelines for foreground and background content on different constraints and introduces point-speed and -sparsity conditions for instancing points. Also developed GS-based VFX (e.g. blooming) to showcase downstream possibilities. Linked to [1] and [2].

Jan. 2026 - Present | **Simulating Blender's Grease Pencil with OpenGL**
Implemented a Bounding Volume Hierarchy in C++ and used the SLAB method for fast ray-AABB intersection. Used k-nearest neighbors on BVH nodes to efficiently draw a path between mouse-clicks on the surface of a mesh. The drawing can be extracted as texture map.

Jan. 2025 - June 2025 | **Deep Learning the Procreate Rendering Pipeline for seamless 2-D Animation Workflows**
(With permission) Built a dataset of procreate renders with various layer structure and rules, and used a UNet architecture to decode the rendering process using deep learning. This decodes layers and 2-D rendering rules that can be used in 2-D animation software, like Unity and CSP.

WORK EXPERIENCE

June 2019 - Jan 2026 | **Engineering Consultant @ AB5Consulting**
Consult on embedded system design, wireless network architectures and computer vision applications for agri-tech in low-income countries. I also review policy and budget documents.

July 2020 - Nov. 2020 | **Research Internship @ Lurtis Rules**
Researched multi-objective reward functions for genetic algorithms. This optimizes wireless sensor placement for irregularly shaped agricultural fields in 2-D.

PUBLICATIONS

[0] First Author | **VSR: Virtual studio 3D reconstruction and relighting with real in-camera image-based relighting** | *Submitted to SIGGRAPH '26 - please email for paper access*
Proposed a fully configurable photorealistic lighting model of a VP sets using GS. This produces AOVs like exposure maps, light-reflection resolution Mip-Maps, unbaked renders, etc.. It's fast to train, requires <5GB of RAM and VRAM, and only requires RGB image data. Collaborated with Lux Aeterna to show that our method can simplify practical VFX workflows.

[1] First Author | **Splatography: Sparse multi-view dynamic Gaussian Splatting for filmmaking challenges** | *International Conference on 3-D Vision 2026*
Designed a dynamic GS pipeline for sparse multi-view camera setups. This naturally segments foregrounds and backgrounds, and introduces a novel training mechanism to prioritize higher quality foregrounds. Developed a reference-free approach to GS adaptive density control using K-NN algorithm and ball-point query.

[2] First Author | **ViVo: A dataset for human volumetric video reconstruction and compression** | *Special Issue on Volumetric Video and Compression, T-CSVT, IEEE 2026*
Produced a multi-view video dataset for volumetric video entertainment; tested on state-of-the-art dynamic GS and multi-view video compression methods. Filmed +30 performances including music and sport using a professional 360 degree multi-camera rig. Includes depth, point-cloud, mask and RGB image data.

[3] First Author | **Intelligent Cinematography: A review of AI research for cinematographic production** | *Artificial Intelligence Review, Springer Nature 2025*
The first literature review of AI research for live-action production ($\sim$40 pages). Discussions on current and future AI research for general, virtual, live and aerial productions. Topics include NeRF, GS, Diffusion, LLMs, zero-shot models and more.

[4] First Author | **Waveplanes: A compact wavelet representation for dynamic neural radiance fields** | *Pre-print on arXiv:* `https://arxiv.org/abs/2312.02218`
Developed a novel dynamic Hex Plane representation that compactly learns motion and is generally applicable to both NeRFs and GS. Large compression gains with little quality and speed loss (for GS we observed quality improvements). Developed a compression scheme that further reduces model size by up to $\times$100 smaller.

[5] Second Author | **AquaNeRF: Neural radiance fields in underwater media with distractor removal** | *IEEE International Symposium on Circuits and Systems 2025*
NeRF-based 3D reconstruction for underwater monocular videos. Removes specular floaters and dynamic objects to enahnce 3D reconstruction.

VOLUNTEERING & AWARDS

Years 2020/2	Student Faculty President @ University of Southampton
Years 2020/1	Head of the ECS Mentoring Scheme @ University of Southampton
Year 2021	Biggest Impact @ University of Southampton, ECS Student Society
Year 2022	Biggest Impact @ University of Southampton, ECS Student Society