Tobias **Brandner**

MSc Computer Science · Specialization in Artificial Intelligence

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Education

MSc in Computer Science - Specialization in Artificial Intelligence

Grade 1.5

Julius-Maximilian-University Würzburg — *Apr. 2021 - Sep. 2024*

- Focused on data processing and machine learning, specialized in the field of computer vision.
- Thesis topic: Real-Time Rendering Super Resolution with Unreal Engine 5
- Notable Courses: Computational geometry, Machine learning for NLP, Programming with neural nets

BSc in Games Engineering

Grade 1.8

Julius-Maximilian-University Würzburg — *Oct. 2017 - Sep. 2021*

- Focused on of math, algorithms/datastructures and programming for real-time interactive systems.
- Thesis topic: Crowdsourced Help Facility Design and Management for Authoring Platforms
- Notable Courses: Algorithms and datastructures, Software technology, Logic for informatics

Physics studies

No degree

Friedrich Alexander University Erlangen — *Oct. 2013 - Mar. 2017*

Abitur

Grade 2.7

Werner-von-Siemens-Gymnasium Weissenburg i. Bay. — *Sep. 2005 - Jul. 2013*

Experience

Research Assistant - C# Developer

Würzburg, Bayern

Julius-Maximilian-University — *Nov. 2021 - Sep. 2024*

- Worked on a de-serializer for 3D scene data (json) to import scenes from the Mozilla Spoke editor into the Unity editor.
- Ensured that the behavior of the scene objects is mimicked correctly, e.g. lights in the scene influence other objects correctly.
- Encapsulated this functionality in modules (implemented in C#) to remove the dependency once the scene is converted.

Teaching Assistant - C++ Developer

Würzburg, Bayern

Julius-Maximilian-University — *Aug. 2021 - Aug. 2024*

- Taught a course about building real-time interactive systems (used as game engines) in C++ while using CMake.
- Illustrated by a small 2D space shooter game, handling rendering (OpenGL), input (GLFW), 3D models (GLTF), physics (Box2D), audio (SoLoud) and GUI (Dear ImGui).
- Re-/worked on an existing C++ code base, hosted on Gitlab, and maintaining the documentation (Markdown).
- Supervised students on their own code projects.

Internship - C# Developer

Würzburg, Bayern

Gentle Troll Entertainment GmbH — *Mar. 2021 - Jun. 2021*

- Programmed game play logic in C# for a serious game teaching children about sport management developed with Unity.
- Worked together with the team in a agile Scrum environment.

Projects

Neural Rendering - Unreal Real-Time Rendering Super Resolution

Owner — *Dec. 2023 - Sep. 2024*

- Developed a neural network to increase the resolution (1080p to 4k) as well as mitigating artefacts (e.g. aliasing) of rendered frames in real-time.
- Collected and labeled my own dataset (around 500GB) using Unreal Engine 5, containing different animated 3d-person characters traversing four different open-source environments.
- Designed and implemented my own neural network architecture (CNN, U-Net and ViT) in Pytorch (Python) and compared it to other SOTA methods on the image quality metrics (PSNR, SSIM and LPIPS), as well as VRAM usage and inference speed.

Abyssal Engima - Dive In Edition (VR)

Member — *Mar. 2023 - Nov. 2023*

- Designed a first person deep sea exploration game in Unreal Engine 5 in a team of 6 people, where you uncover the conspiracy of the subnautic research institute.
- Implemented the first person controller, including animations, particle/audio effects and in-game cinematic.
- Ported the game to Virtual Reality (VR), incorporating anti-motion sickness techniques, e.g. virtual nose.

Multi Language Image Classification

Owner *Apr. 2023 - Sep. 2023*

- Modified existing vision-language classification models to explore them in a multi-lingual context.
- Extended a Python/Pytorch code base with other open-source pretrained vision-language models (Roberta-ViT-B32) and few-shot trained them on Caltech101 dataset.
- Compared and evaluated the results and failed to get the models running on actual multi-lingual tasks.

Exploring Game Flow - Boss'n'Run

Member *Sep. 2022 - Jun. 2023*

- Implemented a 3D Jump'n'Run prototype with two colleagues in Unreal Engine 5, where the level layout is procedurally generated based on e.g. the movement parameters of the player character.
- Designed, animated and rigged the player character (Blender) and implemented multiple different movement mechanics, e.g. climbing.
- Collected data from different 3D jump'n'runs, e.g. Super Mario 64, and analyzed the data in 3D plots (Matplotlib & Python).
- Presented this work at the Conference of Games (CoG) in Milan - 2024.

Crowd sourcing Help Facilites

Owner *Mar. 2021 - Sep. 2021*

- Implemented a plugin (GDScript) to display, create and vote on tips about the Godot Engine.
- Designed the UI (Figma) and the database (SQLite).

Eternal Game Engine

Owner *Mar. 2020 - Mar. 2021*

- Programmed my own game engine in C++ with its own editor to make a simple 2D jump'n'run about leading a duck egg back into its nest.
- Implemented a functional editor (Dear ImGui) to design and save my levels as .yaml files.

Publications

Analysis and Generation of Flow in 3D Jump'n'Run Games

Tobias Brandner, Marc Mussmann and Sebastian von Mammen *IEEE CoG - 2024*

Investigating Crowdsourced Help Facilities for Enhancing User Guidance

Sooraj Babu, Tobias Brandner, Samuel Truman and Sebastian von Mammen *IMET - 2023*

Skills

Interests	Computer Vision, Data Science, Real-Time Interactive Systems, Virtual Reality, Open Source, Linux
Programming	Python, C++, C#, Java, Rust
Frameworks	Pytorch, OpenCV, Matplotlib, Pandas, OpenGL
Game Engines	Unreal, Unity, Godot
Tools	Git, CMake, Blender
Languages	German, English

Honorable Mentions

2024	**Speaker**, IEEE Conference of Games	*Milan*
2024	**Member of the winning team**, Healtcare Hackathon	*Würzburg*
2024	**Visitor**, GodotCon	*Berlin*
2024	**Participant**, Residenzlauf	*Würzburg*
2023	**Visitor**, GodotCon	*Munich*
2023	**Participant**, Residenzlauf	*Würzburg*