Michelangelo **Diamanti**

Software Engineer · Game Developer

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Work Experience

ENVALYS

Reykjavík, Iceland

Software Engineer — *Feb 2024 - Present*

- **Virtual Blönduós** : Optimized and deployed a virtual replica of Blönduós, Iceland, in Unity for **web browsers**, enhancing public and stakeholder engagement in urban planning. Implemented **dynamic resource streaming** and managed **AWS infrastructure** to ensure accessible, real-time urban modification visualization.

Reykjavík University

Reykjavík, Iceland

Postdoctoral Researcher — *June 2023 - Present*

- **VR Air Traffic Controller @ Department of Psychology**
  - Contributed to an ongoing **VR-based air traffic control simulation** project designed to gauge the impact of environmental factors on air traffic controller performance in a virtual, immersive setting.
  - Integrated **hand tracking** for direct, real-hand GUI interactions. Architected **simulation logic** with advanced difficulty tiers. Established a **logging and data transmission module** for survey collection and efficient communication with a dedicated **remote API**.
- **VR Courtroom @ Department of Psychology & Statum**
  - Developed an immersive **virtual reality (VR)** courtroom simulation, with **Unity 3D**, to acclimate victims to court proceedings, creating a realistic spatial layout and customizable avatars with authentic **human behavioral** traits via **keyframe animations** and **inverse kinematics**.
  - Designed a **flexible** JSON-based **director system**, streamlining event orchestration such as speeches and character **interactions**, enhancing the **adaptability** of scenarios based on individual needs, and ensuring a relatable and **immersive user experience**.

Reykjavík University

Reykjavík, Iceland

Teaching Assistant — *Jan. 2019 - Nov. 2022*

- **Game Engine Architecture**: Developed comprehensive **teaching materials** and coordinated practical **lab exercises**. Guided students in designing crucial Game Engine subsystems based on the **OGRE** rendering engine, including **resource management**, **rendering**, **physics**, and **animation**. Collaborated with the lead professor to **evaluate** and **grade** assignments.
- **Virtual Environments**: Conducted hands-on **technical sessions**, enabling students to construct and populate Virtual Environments in **Unity 3D**. I taught diverse topics such as **world representation**, **real-time graphics**, **networked environments**, and **user interfaces**.
- **Virtual Humans**: Coached students in developing interactive virtual humans with Unity 3D and **C#**. Delved on topics such as **character appearance**, **animation**, behavior trees for **AI reasoning**, and showing **emotional** intelligence with blend shapes.

Education

Reykjavík University

Reykjavík, Iceland

Doctor of Philosophy (Ph.D.) in Computer Science — *Jan. 2019 - June 2023*

- Invented **Agora**, a novel theoretical framework for **unifying** crowd simulation **behavioral** models through the use of **heatmaps**.
- Engineered and implemented the **modular software architecture** of Agora, emphasizing **separation of concerns**.
- Conducted and **analyzed** case studies. **Validated** simulation outcomes against **real-world data** underscoring the framework's **performance**.
- **Defended** my dissertation "**Agora: A Framework for Unifying Crowd Simulation Behavioral Models**" before an **international committee**, disseminated research findings at **global venues**, and actively **engaged** with the broader research community. [dissertation | code]

Reykjavík University

Reykjavík, Iceland

Master of Science (M.Sc.) in Computer Science | **Final Grade**: 9/10 (GPA 3.5) — *Aug. 2017 - Feb. 2019*

- Completed a joint Master's program with Reykjavík University and UNICAM, successfully defended my thesis, and earned a **Double Degree** title.
- **Defended** my MSc thesis "**Automatic abstraction and refinement for simulations with adaptive level of detail**" [thesis | code]
- **Courses**: Theory of Computation, Virtual Environments, Computer Game Design & Development, Artificial Intelligence, Research Methodology.

University of Camerino (UNICAM)

Camerino, Italy

Master of Science (M.Sc.) in Computer Science | **Final Grade**: 110/110 *cum laude* (GPA 4.0) — *Nov. 2016 - Oct. 2018*

- **Courses**: Embedded Systems Architecture, Complex System Design, Internetworking Ubiquitous Systems, Distributed Systems, Programming.

University of Camerino (UNICAM)

Camerino, Italy

Bachelor of Science (B.Sc.) in Computer Science | **Final Grade**: 108/110 (GPA 3.9) — *Sep. 2013 - Oct. 2016*

- **Courses**: Calculus and Linear Algebra, Foundations of Computer Science, Logic, Programming, Computer Architecture, Algorithms and Data Structures, Information Management, Software Engineering, IT Security, Web Programming, Operating Systems, Advanced Databases.

Writing

Peer-reviewed Publications

Google Scholar

Academic Writer — *Jan. 2017 - Present*

- **Diamanti, Michelangelo**, and Hannes Högni Vilhjálmsson. "Extending the menge crowd simulation framework: visual authoring in unity." Proceedings of the 22nd ACM International Conference on Intelligent Virtual Agents. 2022.
- **Diamanti, Michelangelo**, and Hannes Högni Vilhjálmsson. "Social crowd simulation: The challenge of fragmentation." 2021 IEEE International Conference on Artificial Intelligence and Virtual Reality (AIVR). IEEE, 2021.
- Pedica, Claudio, **Diamanti, Michelangelo**, and Hannes Högni Vilhjálmsson. "Assessing the Disturbance from Overcrowding in Outdoor Nature Experiences." Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems. 2021.
- **Diamanti, Michelangelo**, and David Thue. "Automatic abstraction and refinement for simulations with adaptive level of detail." Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment. Vol. 15. No. 1. 2019.
- Vannucchi, Claudia, **Diamanti, Michelangelo**, et al. "virony: A tool for analysis and verification of ECA rules in intelligent environments." 2017 International Conference on Intelligent Environments (IE). IEEE, 2017.
- Vannucchi, Claudia, **Diamanti, Michelangelo**, et al. "Symbolic verification of event–condition–action rules in intelligent environments." Journal of Reliable Intelligent Environments 3 (2017): 117-130.

Grants & Awards

2021 — **Grant Recipient**, Icelandic Research Fund, Doctoral Grant, Agora: Unified Framework for Crowd Simulation Research, **primary investigator (PI)**, 13.000.000 ISK, 2 years (**18% acceptance rate**). *Reykjavík, Iceland* *[link]*

Projects

Battle for the Bay - Real Time Strategy (RTS) Videogame

C#, Javascript, Unity, Blender, Shaders (HLSL)

- Collaborated with a team of 4 to develop a pirate-era MOBA game. Features included player movement with special abilities, an upgrade system, **AI for minions**, an interactive HUD with a minimap, and an online scoring system. [code]

ARCADE - Behavioral Level of Detail Manager

C#, Unity, Simulation, PDDL, Unit Test (NUnit)

- Devised the **ARCADE** simulation framework, elevating simulation **speeds up to 37 times** via adaptive **behavioral level of detail adjustment** while ensuring **simulation consistency**. [code]

Light and Sounds - 2D Adventure Platformer Game

C#, Unity, Git

- Developed for the 2021 Global Game Jam, this narrative-driven game has players recover the memories of a deceased musician, melding memory puzzles with musical interactions to reconstruct his final composition. [demo]

Handwritten Characters Recognition

C++, CMake, Java, GTK, Fast Artificial Neural Network (FANN)

- Designed and implemented a multilayer perceptron for recognizing handwritten letters, achieving **80% accuracy** on the test set. [code]

AI Literature Review Assistant Tool

Python, Machine Learning, Binary Decision Tree

- Engineered a semi-automatic tool for literature reviews using machine learning. Facilitated keyword extraction, database search, and model optimization. Achieved up to **85% accuracy** and saved up to **15 hours** in manual review. [code]

IRONy - IDE for Intelligent Environments Development

Java, JavaCC, Microsoft Z3, GraphStream

- Developed a dedicated Integrated Development Environment and simulator for the domain-specific IRON language. Incorporated advanced features like syntax parsing, dynamic system simulation, and deep semantic analysis, showcasing a capacity to handle **>20M states**. [code]

References

Dr. Hannes Högni Vilhjálmsson — Professor of Computer Science, Reykjavík University, Iceland — *hannes@ru.is*