PERSONAL INFORMATION

Alessio Masola

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SEX Male | Birth 04/08/1994 | Nationality Italian

MASTER DEGREE

Master Degree in Computer Science

PROFESSIONAL EXPERIENCE

01/11/2020 – 01/01/2024

Math Ph.D

Dip. Of Computer Science – University of Modena and Reggio Emilia (UNIMORE)

Ph.D. in Math *(Supervisor: Prof. Nicola Capodieci).*
Projects:

- **Developing prototypes for innovative 360° visualization systems**, incorporating 3D software for managing these prototypes. Additionally, creating 3D components for printing these prototypes.
- **City Visualizer & HMI con Godot Engine**. 3D graphical visualizer for self-driving vehicles and smart city that implements a map of part of the city of Modena and allows visualization of self-driving cars, pedestrians, bicycles, and vehicles that are communicated by both self-driving cars and the smart city zone. This project was a widespread porting and optimization of the previous project developed during the time as a university researcher with the Raylib library.
  (European projects MASA and PRYSTINE)
- **Immersive Simulation with Unity**. This real-time project, developed in Unity, carried out in collaboration with Hipert s.r.l will implement a projection on an experimental surface, of a simulative racing environment that will create an illusion of a reality without any viewer. In this project, feasibility studies, patent state of the art research were also done and the entire project was designed keeping in mind the real-time latencies of the components involved.
  - *Audio integration with Wwise Audio Engine*
- **Novara City Visualizer with Unity [Android Version and PC].** 3D graphical viewer to check in real time, both on mobile and workstation, the situation of Martyrs' Square in Novara. Meshes of the surrounding environment in Martyrs' Square were reconstructed with 3D photogrammetry. That model was subsequently optimized (simplification) while maintaining graphical fidelity and taking into account the optimization the execution time to render that mesh on mobile devices. Communication dynamics between viewer and Smart City, visualization filtering of Pedestrians, Cars and Bicycles with a 2D graphical interface (HUD) were implemented.
  "Zones of Interest" were also implemented where counters of the number of Pedestrians, Cars and Bicycles accessing them can be displayed. Finally, a small input interface was generated to be able to use such a viewer on mobile.
- Ph.D. courses and studies:
  - Computer Graphics (UC San DiegoX - CSE167x)
  - Ray Tracing Course (E186- TU Wien - Institute of Computer Graphics and Algorithms)
  - Scientific English course for PHD
  - Symbolic Learning
  - Machine Learning

3D City - HMI – Papers – Graphical Engine – Research – Autonomous driving – ADAS – Real Time – Godot Engine – Unity Engine – Simulations – Projections

PUBLICATION AND INVITED TALKS

- **Masola, A., Gabbi, C., Castellano, A., Capodieci, N., & Burgio, P. (2020, September). Graphic Interfaces in ADAS: From requirements to implementation. In Proceedings**

of the 6th EAI International Conference on Smart Objects and Technologies for Social Good (pp. 193-198).(on scopus)
In this paper, our work was developed following a requirement-driven approach, in which regulations, usability, and visual attractiveness requirements must be considered while balancing their impact in terms of computational resources of the embedded platform on which such graphical interfaces are implemented. The graphical interfaces created consist of a set of 2D frames for the instrument cluster (displaying the tachometer and speedometer) and a screen area where a 3D representation of the vehicle's surroundings, along with driving directions and the point cloud obtained through LIDAR, are rendered. All these components are capable of alerting the driver to imminent and/or nearby driving hazards.

- **•Masola, A., & Capodieci, N. (2023). Optimization strategies for GPUs: an overview of architectural approaches. International Journal of Parallel, Emergent and Distributed Systems, 38(2), 140-154. (on scopus).**
  In this survey, we collected the current state of the art of methodologies and architectures used to be able to improve the real-time performance and latencies of GPUs for IoT devices (embedded and non-embedded).
- **Masola, A., Capodieci, N., Cavicchioli, R., Olmedo, I. S., & Rouxel, B. (2023, May). Memory-Aware Latency Prediction Model for Concurrent Kernels in Partitionable GPUs: Simulations and Experiments. In Workshop on Job Scheduling Strategies for Parallel Processing (pp. 46-73). Cham: Springer Nature Switzerland**. (will be on scopus)
  This paper presents analyses of concurrent kernels on a well-known GPU simulator (GPGPU-Sim) to derive functions capable of predicting memory interferences occurring in the L2 cache due to concurrent memory access requests.
- **Parking Lots Management and Visualization in the Smart City - Digital Twin Context**
  Chinmay Satish Shrivastav, Alessio Masola, Nicola Capodieci and Roberto Cavicchioli (will be indexed, IEEE MetaCom 2023) June 26-28, 2023 · Kyoto, Japan
- "**Machine Learning Techniques for Understanding and Predicting Memory Interference in CPU-GPU Embedded Systems**" published at IEEE RTCSA 2023 (will be indexed and on scopus).
  The research investigates the impact of CPU memory-intensive workloads on GPU kernel latency in heterogeneous embedded platforms, such as Nvidia Jetson Xavier, commonly used in low-latency applications. It analyzes kernel behavior under various board conditions and employs machine learning techniques to predict latency degradation based on kernel metrics. The research identifies key metrics for predicting kernel completion latency degradation in scenarios where shared memory resources between CPU and GPU are influenced by concurrent workloads.

Invited Talks:

- Workshop CAPITAL 2022: sCalable And PrecIse Timing AnaLysis for multicore platforms Friday, June 3th, 2022. Grenoble, bâtiment IMAG; and possible remote attendance "Understanding memory interference in CPU-GPU embedded systems"

PROFESSIONAL EXPERIENCE

16/03/20 – 01/11/2020

Hipert Lab – University Researcher

Dip. Of Computer Science – Università di Modena e Reggio Emilia (UNIMORE)

Research fellow in "Study and implementation of RT (Real Time) scheduling algorithms for fog computing applications in urban - smart city, on heterogeneous embedded multi/many-cores platforms" *(Supervisors: Prof. Marko Bergogna and Prof. Nicola Capodieci).*
Projects:

- **3D Human Machine Interface (HMI)** with Raylib library: 3D graphical visualizer for self-driving vehicles and smart city that implements a map of part of the city of Modena and allows visualization of self-driving cars, pedestrians, bicycles, and vehicles that are communicated by both self-driving cars and the smart city zone. (European projects MASA and PRYSTINE)

- **Prototype creation of video calling APP and AI with Real Time requirements**: This application was created and subsequently optimized for an embedded android system by developing/optimizing ad-hoc solutions that took into account Real Time requirements. Such optimizations and tests were performed on Huawei smartphones.

- **3D Object Viewer with real-time gestures in Godot.** Viewer that through an external gesture recognition application goes to control, rotate and move objects within the

application through the use of the hands.

- **Gesture recognition application.** Such an application would allow, through a live feed from a camera, to recognize hand features and understand the movements and gestures that this hand is making.

Current projects:

- Study and analysis of caching algorithms for optimization on embedded devices.
- Study and analysis of techniques to improve 3D rendering timelines.

3D HMI – Papers – Graphics Engines – Research – Autonomous Driving – ADAS – Real Time – Android Application – Gesture – Interactive 3D Visualizer – Raylib – Godot Engine

PROFESSIONAL EXPERIENCE

20/03/19 -15/09/19

University researcher with collaboration

Zuru Tech Italy

- Profiling and analysis of the Unreal Engine 4 graphics engine
- Creating an algorithm capable of implementing choices to avoid overloading the graphics engine, thereby improving the responsiveness of applications developed using that graphics engine.

Computer Graphics 3D – 3D Engine – Research – Real Time – Unreal Engine

PROFESSIONAL EXPERIENCE

University Tutor for Laboratory of "General Computer Science"

Dip. of Physical, Computer and Mathematical Sciences - University of Modena and Reggio Emilia (UNIMORE)

Commission Paritetica Teachers-Students Year 2018/2019

Dept. of Physical, Computer and Mathematical Sciences- University of Modena and Reggio Emilia (UNIMORE)

I took part as a student in the peer committee inherent in the Master of Science in Computer Science course in the 2018/2019 academic year.

Commission

- Maintenance of infrastructure at System/Retail level.
- HelpDesk Assistant.
- Use of Active directory and mailboxes.
- Development of new software components at Firebird 3.0(SQL) Database level.
- Use of Delphi for graphics (object-oriented programming).
- Migration from Firebird 2.0 to Firebird 3.0 and migration of Language SQL 1.0 to SQL 3.0 .
- Management/Physical networks in foreign showroom (Relocation to France).

Computer Scientist - IT CED Assistant - Systems Engineer - Programmer

PROFESSIONAL EXPERIENCE

25/04/16 – 15/07/16

PROGRAMMER (BACHELOR'S DEGREE INTERNSHIP)

Hars SRL

- Design and development of an AMP module for tax document management through the the use of Alfresco and Java.
- Implementation of an Automated document importer through the use of the CMIS service.

Computer Scientist - Programmer

EDUCATION AND TRAINING

1/10/2017– 11/12/2019

Master Degree in Computer Science (110/110)

University of Modena and Reggio Emilia

- Thesis: **Dynamic Light Cutting for Hybrid Rendering in Unreal Engine.** (Rendering, Unreal Engine 4, Ray Tracing, Rasterizzation, Lights Cutting, Optimization)

Thesis Abstract: <See Attachments>

EDUCATION AND TRAINING

25/09/2013 - 19/04/2017

Bachelor Degree (101/110)

University of Modena and Reggio Emilia

- Thesis**: Design and Development of an AMP Module and Document Importer using Alfresco Document Software.**

EDUCATION AND TRAINING

29/06/2013

Technical Expert (81/100)

Institute ITIS FERMO CORNI (Abacus Project)

PERSONAL SKILLS

Native language: Italian

Other languages

	UNDERSTANDING		SPEAKING		WRITTEN PRODUCTION
	listening	Reading	Interaction	Oral Production	
English	B1	B1	B1	B1	B1

Levels: A1/A2: Basic User - B1/B2: Intermediate User - C1/C2: Advanced User
Common European Framework of Reference for Languages

Communication skills

- I possess excellent communication skills as I have worked as an IT assistant, in addition, these skills were refined during the research carried out in collaboration with Zuru Tech Italy and continue the refinement during the research projects held throughout the university period

Organizational and management skills

- Autonomous: I complete goals as best I can and try to improve results as much as possible.
- Decision-making skills: I can fully understand the choices I need to make on particular issues and what those choices will lead to.

Professional skills

- Analyst
- Programmer
- SW designer
- Social Media Manager for Catering, Internal Catering Management, Marketing Communication.
- 3D Programmer
- 3D Artist (medium)
- Social media manager for restaurant + Internal management.

Digital skills

SELF-EVALUATION				
Information processing	Communication	Content Creation	Security	Troubleshooting
Advanced	Advanced	Advanced	Advanced	Advanced

Levels: Basic User - Intermediate User - Advanced User
Digital skills - Self-assessment form

Additional computer skills:

- Good command of Microsoft Office 365 suite tools.
- Good knowledge of the most commonly used programming languages (C++, C, C#, Python, Java)

Driver's license: B

ADDITIONAL INFORMATION

Projects

- **Arcade Video Game Project (C++ / Qt Library).**

  Development of an Arcade video game known as SpaceInvaders.
  Design of the central core of the video game and the basics of the game with associated win/lose rules. The game was developed with incremental difficulty and with a graphical interface totally reminiscent of the original retro SpaceInvaders one (presence of Real-Time multithreading requirements).

- **E-Book Project (Java).**

  Development of an electronic E-Book library developed with Java. This library allows you to insert your own e-book formats and have the ease of management like a real library. It also allows you to load different types of E-books and have different viewers with external libraries.

- **Web App Project (Python).**

  Web application development. I designed and developed a landscape image voting application called "TheBestPalce." This application allows users to register, upload their images and make votes of images chosen through clash algorithms based on the information entered for that image. An interface is also implemented to be able to analyze the performance of images and other information of interest to the user in order to improve their photos.

- **Operations Research Analysis and Profiling.**
- The Project consisted of analyzing a company's private software from the outside and trying to figure out what the core of the algorithm used internally to perform routing and routing of logistics vehicles. (Classified)

- **Project for Advanced Information Management.**

  The Project consisted of recreating the algorithm present within a paper for a recommandation system and performing analysis on a new data sample present at the university.

- **Project for Real Time Embedded System.**

  The Exam Project consisted of creating a system with the presence of concurrency between Threads. I personally chose to develop for that exam a famous game called "Asteroids" with presence of audio and graphics part in 2.5D.

- **Kernel profiling with Commit.**

  The Project consisted of profiling part of the scheduling algorithm present within the Linux kernel called BFQ and making improvements within it in terms of performance.

- **Unreal Engine 4 Analysis and Improvements Project.**

  The project consisted of profiling and analyzing the Unreal Engine 4 graphics engine and creating an algorithm capable of implementing choices to avoid overloading the graphics engine, thus improving the responsiveness of applications developed using that graphics engine.

ATTACHMENTS

Abstract Master Thesis: **Dynamic Light Cutting for Hybrid Rendering in Unreal Engine**.

Personal Data

I authorize the processing of my personal data in accordance with Legislative Decree No. 196 of June 30, 2003, "Code for the Protection of Personal Data."

What is stated in this curriculum vitae is true in accordance with Articles 46 and 47 of Presidential Decree 445/2000