Ibrahim Ouarrach

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Education

University of Southern California (USC)   **Aug 2024 - May 2026**
Master of Science in Computer Science (MSCS)   *Los Angeles, CA*
- Summa Cum Laude — **GPA: 3.82**
- Courses: Algorithm Analysis, Web Technologies, Game Engines, Machine learning, Autonomous Cyber-Physical Systems, Database Systems

California State University, Dominguez Hills (CSUDH)   **Aug 2020 - May 2024**
Bachelor of Science in Computer Science   *Carson, CA*
- Summa Cum Laude — **GPA: 3.97**

Projects

Bounding Volumes and Frustum Culling Optimization | *Video Demo/Source Code link* **C++ | 3D Math/Linear Algebra**
- Designed and implemented **Axis-Aligned Bounding Boxes (AABB)** and **camera frustum culling into a 20,000+ line C++ game engine**, reducing draw calls by up to **80% and boosting rendering efficiency**
- Optimized the **rendering pipeline to maintain stable framerates with 1,000+ objects**, minimizing **GPU workload** and frame drops
- **Debugged rendering logic** by tracing mesh visibility checks, testing with smaller **FOVs**, and verifying correct culling at frustum boundaries

Weather Search WebApp and iOS app | *Video*   **Ajax | JSON | Node.js | Responsive Design | Swift | SwiftUI**
- Developed a cross-platform **Weather Search Application Suite**, consisting of a **full-stack web app** (**Angular**, **Bootstrap**, **RWD**, **Node.js/Express.js**) and a native **iOS app** (**Swift**, **Xcode**, **MVC**), both sharing the same backend deployed on **Azure**
- Integrated multiple APIs including **Tomorrow.io**, **Google Maps/Geocoding/Places**, **IPinfo**, and **Twitter API** to deliver real-time weather data, location services, autocomplete, and social sharing features
- Enhanced UX with **HighCharts** for responsive data visualizations, **SwiftSpinner** for async loading states, and persistent favorites storage using **MongoDB Atlas** (cloud) and **UserDefaults** (iOS)

Physics Game Engine | *Video Demo and Source Code link*   **C++ | Game Engine Development | Multi-threading**
- Built a custom **physics engine subsystem** in C++ with a **PhysicsManager** and attachable components (spheres, boxes), enabling gravity, collision detection, and realistic object interactions within the game engine
- Improved performance through a flat physics graph and experimented with **multi-threaded execution**, synchronizing physics updates with game logic and rendering for smoother gameplay

Experience

Independent Software Developer   **Dec 2019 – Aug 2020**
Inventory Management System for Small Markets   *Casablanca, Morocco*
- **Developed and integrated bar-code scanning software** using **Java**, **JDBC**, and **MySQL** for efficient database management, enabling **real-time inventory updates** and accurate stock tracking
- **Built an easy-to-use web interface** with **JavaScript** and **React** (backend/frontend) along with **HTML5**, **CSS3**, **Bootstrap**, and **AJAX** to deliver a responsive, cross-browser, and user-friendly experience.
- **Utilized MySQL Workbench** with **SQL query optimization techniques, indexing strategies**, and **stored procedures** to improve database performance, scalability, and reliability.

Teaching Assistant – Data Structures and Algorithms   **Dec 2019 – April 2020**
Remote via Zoom   *Sidi Kacem, Morocco*
- Integrated **real-world coding examples** to strengthen students' practical understanding of core data structures and algorithms.
- Designed and delivered a comprehensive curriculum covering **linked lists, stacks, queues, trees, graphs, backtracking, One and two Dimensional Dynamic Programming.**
- Created tailored educational resources (slides, exercises, and code samples) to meet diverse student learning needs.

Technical Skills

Languages: Python, Java, SQL, HTML5, CSS, JavaScript, C++, C, JSON

Developer Tools: AWS, Postman, Google Cloud Platform (GCP), Git, Azure, Docker

Libraries/Frameworks: Spring Boot, ReactJS, PostgreSQL, NextJS, Angular, NodeJS, bootstrap