

Bilal BOUALEM

Expert / Lead Real-Time 3D Engineer — Web & Desktop | Configurators & Parametric Geometry

Senior software engineer with close to 10 years of experience, specialised in real-time 3D on the web (WebGL, Three.js, Babylon.js, GLSL shaders) and on desktop (Unreal Engine 5, Blueprint & C++). Expert in parametric product configurators: rule and constraint engines, dynamic geometry generation, CPU/GPU optimisation. Trained in control engineering and process control, with hands-on experience using CAD tools and a strong understanding of the end-to-end product development process, from design and 3D modelling through to software development. Technical lead on architecture, proofs of concept, code review and levelling up teams.

✉ bilal.developments@gmail.com

☎ +33 7 81 73 96 86

📍 Metz, France

🌐 bilal3d.dev

🔗 github.com/boualemb

🌐 linkedin.com/in/bilal-boualem



PROFESSIONAL EXPERIENCE

Senior 3D Developer / Solutions Architect

Independent

09/2016 - Present

France

Selected engagements

- **IKEA (IPEX / Bathroom Planner)** — 3D lead for the architecture of the space and object generation module. An engine converting 2D floor plans into interactive 3D scenes: procedural geometry generation (walls, doors, windows), constraint-driven placement logic, and a module reused from project to project. WebGL instancing strategies, load times under 50 ms. Worked alongside the interior design and product teams.
- **Maria Tash** — Led the Three.js implementation of a React e-commerce application. Custom GLSL shaders for realistic gem rendering and real-time ear deformation, collision detection via three-mesh-bvh, a sustained 60 FPS on mobile.
- **CMR Surgical (Versius simulator)** — An interactive virtual environment reproducing the behaviour of a surgical robotic arm: inverse kinematics, collision detection, real-time manipulation and motion simulation.
- **OMAK Virtual Island** — A 2 GB Blender scene brought to the web under 30 MB (GPU instancing, Draco compression), smooth on desktop and mobile.
- **Real-time architectural visualisation (Unreal Engine 5)** — Interactive architectural visualisation experiences: staging, real-time lighting and materials, scene optimisation and packaging of deliverables. C++ classes exposed to Blueprint (UCLASS / UFUNCTION / UPROPERTY) giving artists reusable interaction blocks without writing code.

Lecturer & Trainer

Université de Tlemcen — InfoTech

01/2011 - 06/2019

Tlemcen, Algeria

- **Teaching post** from 01/2011 to 06/2018, then **trainer** from 09/2017 to 06/2019 — both run in parallel, at partial load.
- Taught programming (C++, Java, C#), numerical analysis and optimisation (MATLAB), and 3D (3ds Max). Designed the course material, supervised students, and brought both beginners and experienced practitioners up to speed.



CONFIGURATORS & PARAMETRIC PRODUCTS

Warehouse Configurator

- 2D to 3D conversion, a catalogue of glTF modules, PBR materials, colour and texture customisation, geometry placed under footprint constraints.

Spatial feasibility engine (personal R&D)

- A deterministic engine for spatial rules and constraints: validating clearances, accessibility and usage scenarios, with multi-criteria scoring. Decoupled architecture, exposable as an API.

Home configurators & immersive experiences

- 3D house configurators, a virtual showroom, apartment walkthroughs, and a 3ds Max plugin for tooling and asset preparation, reused from project to project.

AI APPLIED TO 3D

LLM-driven 3D scene configurator

- Translating user intent into structured commands executable in a real-time 3D engine; a compact DSL generating execution graphs targeting React and Babylon.js.

Computer vision

- Automatic detection of actions in a video stream, raising notifications (Python, OpenCV, deep learning, object detection).

CORE TECHNICAL EXPERTISE

Real-time WebGL / WebGPU rendering

Unreal Engine 5 — C++ exposed to Blueprint

GLSL shaders

Parametric geometry

Rule & constraint engines

CPU / GPU optimisation

Software architecture

CAD → 3D digital continuity

PBR rendering

Code review

Generative AI applied to 3D

TECHNICAL LEADERSHIP & COLLABORATION

3D technical lead

Mentoring & support

POCs & architecture decision support

Working with business and UX/UI

Knowledge sharing

Autonomy

Product steering

TOOLS & TECHNOLOGIES

Languages

TypeScript, JavaScript, C++, Python, GLSL, C#

Web 3D

Three.js, Babylon.js, WebGL, WebGPU (watching brief & POCs), React

Geometry & algorithms

Parametric geometry, inverse kinematics (IK), BVH & collision detection, simulation, linear algebra

Real-time 3D on desktop

Unreal Engine 5: C++ exposed to Blueprint, architectural visualisation, real-time lighting and materials, scene optimisation — Unity / C# (porting UE5 projects)

Pipeline & CAD

Blender, 3ds Max, AutoCAD, Fusion 360, glTF, FBX, Draco

Backend

Node.js, PostgreSQL, SQLite, REST APIs

Cloud & DevOps

Docker, Azure, GCP, CI/CD, Linux / VPS

Artificial intelligence

LLMs, agents, prompt engineering, computer vision, OpenCV

Practices

Agile, Scrum, Git, code review

EDUCATION

Master's in control engineering — process control

Université de Tlemcen

09/2008 - 07/2010

Tlemcen, Algeria

Bachelor's in electrical engineering — control systems

Université de Tlemcen

09/2005 - 07/2008

Tlemcen, Algeria

LANGUAGES

French

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Arabic

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English

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