BAHADIR KUŞ

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» PORTFOLIO: VISUALS & TECHNICAL DEMOS (Click Here) «

Professional Summary

Results-oriented **Simulation Architect & Lead Developer** with a proven track record of engineering high-fidelity training systems that bridge the gap between physical hardware and virtual environments. Founder of a med-tech startup, successfully delivering clinically validated surgical simulators using **Unity 3D**, **embedded systems**, and **custom haptics**. Expert in **Digital Twins**, sensor fusion, and full-cycle product development from prototyping (CNC/PCB) to deployment. Seeking to leverage deep technical expertise in a challenging simulation or game development role.

Technical Skills

Core Development: C# (Expert), C++, OOP, Design Patterns (Singleton, Observer)

Game Engine & Physics: Real-time CSG (Mesh Cutting), Softbody Dynamics, Shader Graph, HLSL, Compute Shaders

Embedded Systems: Arduino/ESP32, EasyEDA (PCB Design), EM Tracking Integration, Encoders, I2C/SPI Protocols

CAD & Design: Fusion 360, SolidWorks, AutoCAD, Blender (3D Modeling), Adobe Photoshop

Manufacturing: CNC Milling, 3D Printing (FDM/SLA), Laser Cutting, Rapid Prototyping

Architecture & Tools: Finite State Machines (FSM), MVC/MVVM, Git/GitHub, Jira, Digital Twin Technology

Professional Experience

Prosthetic Worlds Toronto, ON & Turkey
Founder & Lead Simulation Architect *2022 – Present*

- Spearheading the R&D and development of hybrid surgical simulators, merging industrial hardware with advanced software architecture.

  - **Project 1: Hybrid Arthroscopy Simulator (2023 – Present)**

    - **Physics & Rendering:** Architected a high-performance simulation environment in Unity URP using **Real-time CSG** algorithms for soft-body cutting and tissue deformation to achieve medical-grade realism.
    - **Hardware-Software Bridge:** Developed a proprietary high-speed bi-directional communication protocol. Integrated industrial motors, **absolute encoders**, and **EMF sensors** to deliver precise haptic feedback and instrument tracking.
    - **Engineering Problem Solving:** Overcame critical electromagnetic (EM) interference issues by redesigning the chassis using non-ferrous materials and validating signal integrity, achieving stable sensor accuracy in the 97-100% range.
    - **Data Analytics:** Built a deterministic "Replay System" and automated debriefing module that tracks angular deviations and procedural errors, providing actionable feedback to trainees.

- **Project 2: Total Knee Arthroplasty (TKA) Simulation (2022 – 2023)**
  - **End-to-End Workflow:** Programmed a complete 30-minute surgical procedure including incision, bone resection, and implant placement, optimized for standalone VR headsets.
  - **System Logic:** Designed a robust Task Management System using Finite State Machines (FSM) to handle complex, non-linear user interactions and validation logic.
  - **Validation:** The software was successfully validated through clinical utility studies with orthopedic surgeons, proving its efficacy as a training tool (See Publications).

Mojo Import Export Uganda (Project Based)
Technical Consultant & System Analyst *2023 (6 Months)*

- Directed a digital transformation project for a manufacturing facility, optimizing workforce efficiency and tracking.
- **System Implementation:** Built and deployed a digital infrastructure for real-time monitoring of inventory, wastage rates, and production metrics.
- **AI Integration:** Leveraged AI-driven analysis to optimize drying processes, resulting in improved quality control standards.

Amazoi Software Ankara, Turkey (Hacettepe Technopolis)
VR/AR Developer *2022*

- **Mission Control System:** Developed a modular "Mission Control" framework for VR training, enabling instructors to manage scenarios and user permissions in real-time.
- **Mobile AR:** Created intuitive interaction mechanics and optimized UI/UX for mobile-based Augmented Reality applications using AR Foundation.

Indie Projects & Freelance Remote
Freelance Game Developer *2019 – 2022*

- **Fire Evacuation Digital Twin (2022):** Utilized **Lidar Scanning** to recreate a real-world facility 1:1 in Unity. Developed a safety training simulation featuring dynamic fire hazards and AR-style navigation routes.
- **Full-Cycle Development:** Managed the complete production pipeline of multiple mobile games from concept and design to coding (C#) and deployment on App Store/Google Play.
- **Technical Design:** Implemented scalable game mechanics, animation controllers, and level progression systems.

Selected Publications

Medicine Journal (2024): "A comparative study on real surgical performance in total knee arthroplasty: Virtual reality headset versus traditional training in orthopedic surgery" – Validating the efficacy of the TKA simulation software.

Education

Uşak University Uşak, Turkey
Undergraduate Studies *2018 – 2019*

- Voluntarily withdrew to prioritize a rapidly growing freelance career and hands-on professional projects over theoretical studies.

Gaziantep Chamber of Commerce High School Gaziantep, Turkey
Information Technologies *2014 – 2018*

- Acquired a strong technical foundation in software development, enabling an immediate transition into professional freelance projects upon graduation.