ECDA EROL

Lead System Engineer, M. Sc.

ecdaerol@gmail.com | Zurich, Switzerland | ecdaerol
Category B (CH) | C Permit

EXPERIENCE

Founder & Lead Engineer
X-Tech Studio (Early-stage Startup)
Jan 2026 – Present | Zurich, Switzerland

- Leading the end-to-end development of **AXIOM**, a novel 6-axis force–torque sensor series, coordinating mechanical, electronics, and software workstreams.
- Defining system-level requirements and interfaces to meet ambitious targets for torque density, stiffness, overload protection, and robustness in compact form factors.
- Driving rapid prototyping, bench testing, and iterative design updates; owning test planning, data evaluation, and coordination with industrialisation partners.
- Optimising mechanical design for manufacturability (DFM), cost efficiency, and scalability, preparing the product line for future high-volume robotic integration.

Lead System Engineer
Iino Biotech AG (ETH Spin-off), a Miltenyi Biotec Company
Sep 2023 – Present | Zurich, Switzerland

- Directing engineering for the **MACS Matchmaker** biosensor platform and **MACS Sampler** autosampler, integrating optics, mechanics, fluidics, electronics, and firmware into a cohesive ecosystem.
- Delivered two complex instruments from concept to market launch within 12 months, resolving critical challenges in precision motion, thermal management, and microfluidic integration.
- Steering the full mechanical release workflow: material and process selection, prototyping, verification testing, and generation of QA-compliant documentation packages.
- Managing a continuous R&D budget exceeding 1 M CHF, balancing performance, reliability, cost, and supply risk through structured design reviews and early supplier engagement.

Mechanical Design Engineer
Bota Systems AG (ETH Spin-off)
Nov 2021 – Aug 2023 | Zurich, Switzerland

- Led the mechanical design of **MiniONE** and **MiniONE Pro**—ultra-compact 6-axis force–torque sensors with integrated electronics—serving as the primary engineer for 10+ launched SKUs.
- Developed and implemented a simulation-to-real (sim2real) methodology linking FEA and test data, improving sensor accuracy by $\sim$400% and reducing calibration effort.
- Established an integrated PLM workflow (SolidWorks, PDM, ERP), ensuring data integrity, controlled change management (ECO/ECR), and clean transfer to manufacturing partners.
- Produced high-fidelity product renders and technical datasheets (SolidWorks Visualize, Illustrator, InDesign) to support marketing, customer onboarding, and documentation.

Research Assistant
Floating Robotics AG (ETH Spin-off)
Jun 2021 – Oct 2021 | Zurich, Switzerland

- Engineered a compliant gripper for agricultural robotics, using FEA to validate structural integrity, repeatability, and safe interaction under varying load conditions.
- Designed a novel two-DOF sequential cutter–gripper mechanism for the Kinova Jaco arm, enabling dual functionality with a single actuator via a custom mutilated-gear architecture.

Mechanical Engineering Intern
Antefil Composite Tech AG (ETH Spin-off)
Oct 2020 – Feb 2021 | Zurich, Switzerland

- Applied parametric skeletal modelling to design and scale up components of a fibre-spinning plant, enabling rapid design iterations and robust virtual prototypes.
- Optimised airflow in the fibre-drying channel using CFD/FEA, significantly improving thermal uniformity and overall process stability in bi-component fibre production.

Research Intern
Max Planck Institute for Intelligent Systems – Haptic Intelligence
Jun 2018 – Aug 2018 | Stuttgart, Germany

- Improved the effective actuation performance of the 'Digital VerroTouch' system by approximately 250%, enabling naturalistic haptic feedback of instrument vibrations to surgeons.
- Designed and optimized a customized bracket for voice-coil actuators, improving performance and reliability.
- Utilized additive manufacturing to prototype assemblies and sub-assemblies, enabling rapid iteration and cost-effective production.
- Developed an experimental setup and conducted experiments to quantify system dynamics, using high-speed data acquisition devices for accurate measurements.

Research Assistant
Bogazici University – Haptics & Robotics Laboratory
Sep 2017 – Jun 2019 | Istanbul, Turkey

- Modelled and simulated EndoWrist kinematics for the **da Vinci Surgical System** using MSC Adams, contributing to mechanism analysis for teleoperated robotic surgery.

EDUCATION

M. Sc. in Mechanical Engineering

ETH Zurich

Sep 2019 – Oct 2021 GPA: 5.74/6.00

- **Specialization:** Robotics, Design & Optimization.
- **Thesis:** "Design and Engineering of a Cable-driven Floating Robot with Actuator Coupling" – **Grade: 6.0/6.0**

B. Sc. in Mechanical Engineering

Bogazici University

Sep 2015 – Jun 2019 GPA: 3.75/4.00

- **Specialization:** Mechanical Structures & Systems.
- **Thesis:** "Design and Development of a **Force Sensor** for Colonoscopy Operations" – **Grade: 4.0/4.0**

Abitur & High School Diploma

Istanbul Lisesi (Deutsche Auslandsschule)

Sep 2009 – Jun 2014 GPA: 90.5/100

- **MINT-EC Certified:** Specialized education in STEM taught in **German**.
- Ranked top **0.06%** in national entrance exams.

AWARDS & ACHIEVEMENTS

Merit Scholarship
ETH Zurich — Awarded for outstanding academic performance during M.Sc. studies (2019–2021).

Salutatorian of Class (2019)
Bogazici University — Graduated with High Honors (2019).

National University Entrance Exam
Ranked in the **top 0.07%** among more than 2 million candidates (2014).

Outstanding Success Scholarship
Awarded by the Turkish Educational Foundation (TEV) for sustained academic excellence (2015–2019).

PUBLICATIONS

Articles

- Y. Gong, H. M. Husin, **E. Erol**, V. Ortenzi, and K. J. Kuchenbecker, "Airotouch: Enhancing telerobotic assembly through naturalistic haptic feedback of tool vibrations," *Frontiers in Robotics and AI, section Haptics*, 2024.
- F. Dinc, B. C. Akdeniz, **E. Erol**, *et al.*, "Analytical derivation of the impulse response for the bounded 2-d diffusion channel," *Physics Letters A*, vol. 383, no. 14, pp. 1589–1600, 2019.

Thesis

- **E. Erol**, "Design and engineering of a cable-driven floating robot with actuator coupling method," Master Thesis, ETH Zurich, Zurich, 2021-11-24. DOI: 10.3929/ethz-b-000670547.

SKILLS

Design & PLM
SolidWorks, SolidEdge, Inventor, SolidWorks PDM, PRO.FILE, ERP Integration, GD&T / Tolerance Analysis

Robotics & Mechatronics
Precision Rotary/Linear Actuators, Compliant Mechanisms, Electro-Mechanical Integration, 6-Axis Sensor Design

Simulation (FEA/CAE)
ANSYS, ABAQUS, COMSOL, Structural & Thermal Analysis, Sim-to-Real Validation

Product Realisation
Rapid Prototyping (SLA/SLS), CNC Machining / CAM, Hardware Bring-up, Supplier Engagement, Design Transfer

Tools & Visualisation
Python, MATLAB, Git, SolidWorks Visualize, Adobe Suite

LANGUAGES

Turkish (Native)
English (C1/C2)
German (B2/C1)

REFERENCES

Prof. Dr. Marco Hutter
ETH Zurich – Robotic Systems Lab
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Prof. Dr. Katherine J. Kuchenbecker
Max Planck Institute (Haptic Intelligence)
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Dr. Salman Faraji
Founder, Floating Robotics AG
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Additional references available upon request.