Muhammed Hasan

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Education

Siirt University **Sep 2021 – May 2025**
Bachelor of Engineering in Mechanical Engineering *Siirt, Turkey*

Research Experience

TUBITAK 2209A Research Program **Mar 2024 – Mar 2025**
Undergraduate Researcher | Supervisor: Dr. M. Rasit Atelge *Siirt, Turkey*

- Designed and executed experimental pipeline optimizing **supercapacitor electrode** production from agricultural waste, achieving **7.98 F/g specific capacitance** through two-stage thermal processing (pyrolysis at 600°C, KOH at 800°C).
- Reduced experimental trials by **67%** using **Taguchi orthogonal array** methodology while maintaining validity.
- Developed **artificial neural network** with 27 model configurations to establish predictive relationships between synthesis parameters and electrochemical properties, achieving $R^2 = 0.94$ with optimized **Bayesian architecture**.
- Conducted systematic characterization via **CV, GCD, and EIS** across 0–1.0 V potential window.

Clean Energy Laboratory **Jun 2024 – Aug 2024**
Research Intern | Supervisor: Dr. Fatih Bayrak *Siirt, Turkey*

- Executed full-factorial experimental campaign for **PV spray cooling systems**, contributing to peer-reviewed publication in **Applied Thermal Engineering (2025)** demonstrating **47% surface temperature reduction**.
- Designed instrumentation setup including **thermocouple arrays** and **pyranometers**, collecting thermal imaging data across **18 experimental configurations**.
- Collected thermal imaging and electrical performance data supporting research demonstrating **∼15°C temperature reduction** and **≈26% power output increase** using six-nozzle 0.6 mm configuration positioned 250 mm above panel.

Publications

- **Conference Proceedings: Hasan, M.**, & Bayrak, F. (2025, May). Comparative assessment of photovoltaic cell temperature models and power output performance. *Proceedings of the 7th International Bogazici Scientific Research Congress*, 145–155. Istanbul, Turkey.
- **Conference Proceedings: Hasan, M.**, & Bayrak, F. (2025, May). Impact of ambient temperatures and discharge rates on lithium-ion battery thermal performance. *Proceedings of the Sivas International Conference on Scientific and Innovation Research*, 510–525. Sivas, Turkey.
- **Poster: Hasan, M.** & Atelge, M. R. (2024, Feb). Synthesis and electrochemical characterization of food waste-derived active carbon for high-performance supercapacitor electrodes. Poster presented at *Batman University Research Seminar*, Batman, Turkey.

Honors & Awards

- **Semifinalist,** 3T in Oncology AI Competition (2025) – Developed ML pipeline for lung cancer biomarkers identification.
- **Semifinalist,** Tech Applications in Psychology Competition (2025) – Wearable sensor assessment app.
- **Finalist (Top 10),** Eksim Pulse Ideathon (2025) – Selected from 50+ teams for AI-driven vertical farming proposal.
- **Finalist**, Teknofest Nuclear Energy Competition (2024) – Ranked 6th among 100+ teams for Thorium MSR design
- **Finalist,** Teknofest Environment Competition (2024) – Advanced to finals from 171+ teams for battery cooling.
- **Project Support,** TUBITAK 2209-A (2024) – University students research projects support program.
- **3rd Place,** International YES Challenge (2023) – Selected from 50+ international teams for waste-to-energy innovation.

Leadership & Competitions

Jet Engine Design Competition: Team Lead | *CFD (ANSYS), Additive Manufacturing* **Dec 2024 – Apr 2025**

- Led 9-member team designing annular combustion chamber for turbojet targeting **1200°C** thermal conditions.
- Coordinated integration of combustion physics, **CFD optimization**, materials science, and additive manufacturing.

Nuclear Energy Technologies Design Competition: Design Engineer | *Reactor Modeling* **Jul 2024 – Oct 2024**

- Modeled **135 MWe subcritical Thorium Molten Salt Reactor** coupled with supercritical CO_2 Brayton cycle.
- Optimized Brayton cycle configuration for heat rejection and integrated proton-beam subcritical assistance.

Environment and Energy Technologies Competition: Team Lead | *Battery Cooling* **Nov 2023 – Sep 2024**

- Designed hybrid thermal system with copper microchannels and **metal oxide nanofluids (0.5% CuO)**.
- Achieved **31% temperature reduction** (55°C to 38°C) at 3C discharge, maintaining uniformity within **±3°C**.

Professional Experience

Deneyap Technology Workshops, T3 Foundation **Mar 2024 – Present**
Instructor-Mentor *Siirt, Turkey*

- Mentor **50+ students** in robotics, **C++**, and **Fusion 360** spanning concept to prototype.
- Coach students for national robotics competitions, achieving success in regional qualifiers.

Projects

Senior Design Project: Green Hydrogen Feasibility Study | *HOMER Pro, Modeling* **Feb 2025 – Jun 2025**

- Designed a grid-connected **PV-BESS system** with green hydrogen production for the Siirt University campus.
- Conducted technical-economic feasibility analysis using **HOMER Pro** to optimize LCOE and **LCOH**.

EcoRay.ai: QML Energy Forecasting | *Pennylane, Quantum ML* **GitHub**

- Implemented a **Quantum Neural Network using PennyLane** to forecast renewable energy power output (solar).
- Optimized a hybrid quantum-classical architecture to achieve a Mean Absolute Percentage Error **(MAPE) below 5%**.

Cognition X: NLP System | *PyTorch, BERT, SpaCy* **GitHub**

- Developed a **BERT-based** text classification system (**PyTorch**, **SpaCy**) achieving **89% accuracy** on datasets.
- Optimized model efficiency via quantization and pruning, **reducing inference latency by 35%** for edge devices.

Volunteer App (Backend) | *Node.js, MongoDB, Passport.js, Swagger* **GitHub**

- Led a small team through two sprints to build a web application connecting volunteers with social causes.
- Designed the backend architecture, database schema (**Mongoose**), and implemented a **REST API** with Swagger.
- Implemented **Passport.js** for robust authentication, supporting **JWT**, OAuth, and local strategies.

Technical Skills

Simulation & Modeling: ANSYS, SolidWorks, Fusion 360, MATLAB/Simulink, HOMER Pro, OriginPro
AI & Data Science: Python, PyTorch, Keras, Pennylane , scikit-learn, NLTK, SpaCy, Pandas, NumPy, Matplotlib
Development & Tools: Git, Docker, Linux, Node.js, Next.js, MySQL, MongoDB, Arduino, LaTeX, MS Office Suite
Laboratory Techniques: Electrochemical characterization, thermal imaging, experimental design and statistical analysis

Professional Development

Faradai Clean Technology Entrepreneurship Program | *Clean Tech, Business Models* **Mar 2025 – Jun 2025**

- Completed 12-week accelerator program in **clean technology innovation**, business model and commercialization.

Nuclear Physics and Fusion Technology Program | *TUBİTAK — Reactor Physics* **Sep 2024**

- Received advanced training in **reactor physics**, plasma confinement systems, and magnetic fusion engineering.

Industry 4.0 – PLM Event Program | *Ege University — Digital Manufacturing* **Sep 2024**

- Professional development in **digital manufacturing**, smart factory systems, and sustainable engineering practices.

Global Student Experience | *Schneider Electric — Power Systems, AI* **Jul 2023 – Aug 2023**

- Completed service track on power systems and presented analysis on the intersection of **green energy and AI**.

Backend Development BootCamp | *Re:Coded — Backend Architecture* **Mar 2023 – Sep 2023**

- Comprehensive training in **backend architecture**, database management, and **RESTful API** development.

Languages

Kurdish (Native) | **Arabic** (Native) | **Turkish** (Fluent) | **English** (Fluent)