

# Benaissa Dekhici

Researcher in Bioenergy  
& Data-Driven  
Innovations

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## About Me

*Research Engineer specializing in the intersection of **Machine Learning**, **Control Engineering**, and **Bioenergy Systems**. Ph.D. in Automatics with a focus on data-driven modeling and model order reduction for biological processes. Experienced in building robust, reproducible simulation frameworks and collaborating with interdisciplinary teams (chemists/biologists) to optimize anaerobic digestion systems. Seeking to leverage expertise in Python, PyTorch, and optimization algorithms to solve sustainability challenges in a Research Engineer (ML) role.*

## Work Experience

- 2024–Present **Research Engineer & Senior Data Scientist, BioFuelAI (University Spin-out), Guildford, UK**
- Developing and deploying ML models and LLM-based AI agents for real-time AD process decision support
  - Building physics-based simulation software integrated with ML optimization algorithms
  - Designing and implementing cloud-deployed applications (Azure, AWS) with database and user management systems
  - Creating web-based user interfaces for scientists to interact with ML models and run experiments
  - Implementing end-to-end ML pipelines from research prototype to production-ready tools
  - Collaborating with interdisciplinary teams to validate models against real experimental data
- Feb 2024–Present **PDRA in Bioenergy Process Optimisation and Control, University of Surrey, England, UK**
- Developing and evaluating machine learning models (Gaussian Processes, LSTM, neural networks) for biogas production prediction
  - Implementing physics-informed ML approaches combining mechanistic models with data-driven techniques
  - Building robust, reproducible simulation frameworks in Python for bioenergy process optimization
  - Collaborating closely with chemists and biologists to translate scientific questions into ML solutions
  - Designing experiments, analyzing results, and validating findings with scientific rigour
- May 2017–Jun 2019 **Research Support State Engineer, Research Center in Industrial Technologies, CRTI, Algiers, Algeria**
- Responsible for drone systems development (hardware and software)
  - Led interdisciplinary teams in UAV technology advancement
  - Contributed to multiple research publications and technical reports
- Since 2018–Present **Researcher, Tlemcen Automatics Laboratory LAT, Tlemcen, Algeria**
- Active member contributing to laboratory research initiatives
  - Collaborating on national and international research projects

- Jun **Trainer/Teacher**, *FROMAC Academy*, Tlemcen, Algeria  
 2019–Sept • Subject: Automatics and Industrial Data Processing  
 2019 • Delivered professional training programs to industry professionals
- Sept **Teaching Assistant**, *University of Tlemcen*, Tlemcen, Algeria  
 2020–Jun • Courses: Linear Multivariable Systems, Nonlinear Systems, Optimal Control  
 2021 • Supervised undergraduate and graduate students in advanced control theory
- Sept **Teaching Assistant**, *University of Tlemcen*, Tlemcen, Algeria  
 2019–Jun • Courses: Multivariable Systems, Nonlinear Systems  
 2020 • Developed practical laboratory exercises and assessment materials
- Sept **Trainee as Automation Engineer**, *LATAFNA Mill*, Tlemcen, Algeria  
 2016–Oct • Gained hands-on experience in industrial automation systems  
 2016 • Worked on process control and optimization projects

## Education

- 2018–2024 **Ph.D. in Automatics**, *University of Tlemcen*, Tlemcen, Algeria  
**Thesis:** “Data-Driven Modeling, Order Reduction and Control of Anaerobic Digestion Processes”  
**Supervisors:** Prof. Boumediene Benyahia & Prof. Brahim Cherki  
**Co-direction:** LBE-INRAE Narbonne, France  
**International Mobility:**  
 ○ Bilateral Student at University of Trento (Aug 2022–Jul 2023)  
 ○ International Credit Mobility Student at University of Trento (Aug 2021–Jul 2022)
- 2013–2015 **M.Sc. in Automatics and Industrial Data Processing**, *University of Tlemcen*, Tlemcen, Algeria  
**Thesis:** “Commande d’un Quadrirotor Parrot Bebop Drone”  
**Supervisors:** Dr. Mokhtari Mohammed Rida & Prof. Brahim Cherki
- 2009–2013 **B.Sc. in Automatics**, *University of Tlemcen*, Tlemcen, Algeria

## Research Projects

- Feb **Rapid Digitalisation of Bioenergy for Higher Efficiency and Profit**, *UKRI*  
 2024–Present *Supergen Bioenergy Impact Hub*  
 Developing advanced optimization frameworks to transform the bioenergy industry into a data-driven, digitalized Industry.
- Nov **D-Xpert: AI-Based Recommender System for Smart Energy Saving**, *Innovate*  
 2024–Feb *UK Project*  
 2025 Dynamic Heat Flow Model Development, HVAC Profiling, AI Occupancy Model, and Model Predictive Control Algorithm development.
- Jan **Biomethane Islands – Feasibility Study**, *Future Energy Networks: Network*  
 2025–Aug *Innovation Allowance*  
 2025 Developed base simulation for mass and energy balance, cost estimation, designed small-scale pilot system, and delivered profitability assessment.
- Jul 2024–Dec **Integrating CFD Modeling and Kinetics for Enhanced Anaerobic Digestion**,  
 2024 *The Carbon Recycling Network Business Interaction Voucher*  
 Developed automated methodology integrating CFD with kinetic models and Bayesian Optimisation for optimizing anaerobic digester mixing systems.

Oct **Techno-economic Analysis of Novel Water Treatment System, Consultancy**  
2024–Oct *with Intelligent Tomorrow Ltd*  
2024 Developed base simulation for mass and energy balance, cost estimation, designed pilot system, and delivered profitability assessment.

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## Technical Skills

Process Bioenergy Systems, Process Systems Engineering, Anaerobic Digestion Processes,  
Engineering **Physics-based Modelling**  
Data Science **Machine Learning (LSTM, Gaussian Processes, Neural Networks), Deep  
Learning & PyTorch**, Bayesian Optimization, Dynamic System Identification, **Data-  
Driven Modelling**, Model Order Reduction, **LLM Integration & AI Agents**,  
**Experiment Tracking (MLflow, W&B)**  
Programming **Python (Advanced: PyTorch, scikit-learn, pandas, numpy)**, MAT-  
LAB/Simulink (Advanced), Git/GitHub/GitLab, SQL Databases, Cloud Deployment  
(Azure, AWS)  
Languages English (Fluent), French (Fluent), Arabic (Native)

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## Hobbies & Interests

Research: Reading research articles, ML tools exploration, science books, chess  
Gaming: Playing and watching football, video games across all consoles, triple-A games, Nintendo  
Switch gaming  
Technology: Tech enthusiast (IT, electronics), DIY projects and electronics, 3D printing, Electronic  
chips and boards, Operating systems exploration