

# 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 2019–Sept 2019	<b>Trainer/Teacher</b> , <i>FROMAC Academy</i> , Tlemcen, Algeria
	<ul style="list-style-type: none"> <li>• Subject: Automatics and Industrial Data Processing</li> <li>• Delivered professional training programs to industry professionals</li> </ul>
Sept 2020–Jun 2021	<b>Teaching Assistant</b> , <i>University of Tlemcen</i> , Tlemcen, Algeria
	<ul style="list-style-type: none"> <li>• Courses: Linear Multivariable Systems, Nonlinear Systems, Optimal Control</li> <li>• Supervised undergraduate and graduate students in advanced control theory</li> </ul>
Sept 2019–Jun 2020	<b>Teaching Assistant</b> , <i>University of Tlemcen</i> , Tlemcen, Algeria
	<ul style="list-style-type: none"> <li>• Courses: Multivariable Systems, Nonlinear Systems</li> <li>• Developed practical laboratory exercises and assessment materials</li> </ul>
Sept 2016–Oct 2016	<b>Trainee as Automation Engineer</b> , <i>LATAFNA Mill</i> , Tlemcen, Algeria
	<ul style="list-style-type: none"> <li>• Gained hands-on experience in industrial automation systems</li> <li>• Worked on process control and optimization projects</li> </ul>

## Education

2018–2024	<b>Ph.D. in Automatics</b> , <i>University of Tlemcen</i> , Tlemcen, Algeria
	<p><b>Thesis:</b> “Data-Driven Modeling, Order Reduction and Control of Anaerobic Digestion Processes”</p> <p><b>Supervisors:</b> Prof. Boumediene Benyahia &amp; Prof. Brahim Cherki</p> <p><b>Co-direction:</b> LBE-INRAE Narbonne, France</p> <p><b>International Mobility:</b></p> <ul style="list-style-type: none"> <li>○ Bilateral Student at University of Trento (Aug 2022–Jul 2023)</li> <li>○ International Credit Mobility Student at University of Trento (Aug 2021–Jul 2022)</li> </ul>
2013–2015	<b>M.Sc. in Automatics and Industrial Data Processing</b> , <i>University of Tlemcen</i> , Tlemcen, Algeria
	<p><b>Thesis:</b> “Commande d'un Quadrirotor Parrot Bebop Drone”</p> <p><b>Supervisors:</b> Dr. Mokhtari Mohammed Rida &amp; Prof. Brahim Cherki</p>
2009–2013	<b>B.Sc. in Automatics</b> , <i>University of Tlemcen</i> , Tlemcen, Algeria

## Research Projects

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

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

## Technical Skills

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

## 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