IUTA — Institut für Umwelt & Energie, Rechnik & Analytik e.V.

Bliersheimer Str. 58-60
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www.iuta.de

Internship, Bachelor & Master Thesis Opportunities

APPLY MACHINE LEARNING TO ANALYTICAL DATA — UNLOCK NEW INSIGHTS

Are you interested in using machine learning to solve real-world problems? At IUTA, we are offering motivated students the opportunity to work on innovative projects that apply machine learning techniques to the processing and interpretation of analytical data.

Our research projects focus on harnessing advanced data-driven methods to extract deeper insights from complex datasets in a variety of fields, including:

Environmental Studies — Analyse and predict patterns in environmental monitoring data (e.g., quality of surface water and wastewater) to support sustainability and regulatory efforts.

Pharmaceutical Quality Control — Improve the reliability and efficiency of quality assessments in pharmaceutical production by applying smart data analysis.

Predictive Maintenance of Analytical Devices — Develop models that anticipate device maintenance needs, minimizing downtime and optimizing performance.

A key feature of these projects is that the outcomes will be integrated into **StreamFind**[1] — an open-source software platform developed in-house at IUTA for advanced analytical data processing. As part of your work, you'll have the opportunity to actively contribute to the development of StreamFind and become part of the open-source community, where your contributions can support scientific progress beyond your project. In addition, you will have the chance to engage with a broad network of research institutions and industry partners connected to StreamFind — opening doors for professional exchange, collaboration, and future career opportunities in both academia and industry.

WE ARE LOOKING FOR STUDENTS WHO:

- Are studying data science, computer science, engineering, chemistry, environmental sciences, or a related field.
- Have a passion for machine learning, data analysis, and solving practical scientific problems.
- Are curious about open-source development and collaborative research.
- Want to work on projects with both scientific depth and industrial relevance.

[1] https://github.com/odea-project/StreamFind

For further questions and application, contact **Dr Ricardo Cunha** at cunha@iuta.de

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AVAILABLE PROJECTS

Analytical Device Maintenance Prediction
In this project, you will work on integrating open communication protocols (LADS OPC UA) to retrieve sensor and operational data from analytical instruments. Using this data, machine learning models will be developed to detect and classify anomalies — helping predict maintenance needs and prevent equipment failure.

Trend and Pattern Analysis in Environmental Monitoring of Micropollutants
This project focuses on applying machine learning to mass spectrometry datasets from environmental monitoring campaigns. The goal is to uncover trends and patterns in the occurrence of micropollutants, enabling better understanding and decision-making in environmental protection.

Development of a Framework for Sensor Data Collection and Diagnostics
Here you will design and implement a framework for collecting and pre-processing sensor data from for instance, laboratory environments. The project involves developing anomaly detection algorithms to identify deviations in room quality and operational conditions — supporting early detection of potential issues.

Further Development of StreamFind — Algorithms & User Interface
Contribute directly to the ongoing development of StreamFind, our in-house open-source software for analytical data processing. Your work can include implementing new data processing functionalities and algorithms, as well as refining and expanding the graphical user interface to improve user experience.

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