Method for Estimating the Operating Regime of a System Based on Its Electrical Consumption Signature

Summary

Profile type
Technology offer

Company's country
Spain

POD reference
TOES20250318020

Profile status
PUBLISHED

Type of partnership
Commercial agreement with technical assistance

Targeted countries
• World

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Term of validity
18 Mar 2025
18 Mar 2026

Last update
18 Mar 2025

General Information

Short summary

A Spanish research group has developed a novel method for estimating the operating regime of an electrically powered system using its electrical consumption signature. AI models are used to analyse voltage, current, and phase shift data, improving system state identification without relying on power measurements. The technology enables more efficient monitoring and predictive maintenance in industrial and energy management applications. A licensee is sought to develop and market the invention.

Full description

The identification of operating states in electrically powered systems traditionally relies on power consumption analysis. However, conventional methods, such as Non-Intrusive Load Monitoring (NILM), often face challenges in distinguishing overlapping loads and require extensive labelled datasets. Existing solutions also struggle to provide real-time, high-accuracy state detection in complex industrial environments.
Researchers from two Spanish universities have solved these inconveniences by developing a method for estimating the operating regime of a system based on its electrical consumption signature. Unlike traditional approaches, this method leverages artificial intelligence models that analyse voltage, current, and phase shift data across multiple dimensions. This enables accurate state identification without relying on direct power measurements, leading to enhanced monitoring and predictive maintenance capabilities.
The present invention is applicable in those industries where accurate system state monitoring is crucial, such as

manufacturing, energy management, and predictive maintenance. It can be integrated into industrial plants, smart grids, and automated systems to optimize operational efficiency and reduce unexpected downtimes.
The IPR owners would like to reach license agreements with companies operating in such fields, so they can develop applications of the technology.

Advantages and innovations

- Eliminates the need for direct power measurements, enhancing flexibility and applicability.
- Utilizes artificial intelligence for precise system state identification in real-time.
- Enables predictive maintenance and anomaly detection, reducing operational costs.
- Applicable to various industrial settings, improving equipment efficiency and reliability.
- Offers a scalable solution that can be integrated into existing monitoring infrastructures.

Technical specification or expertise sought

Stage of development

Available for demonstration

Sustainable Development goals

- **Goal 9: Industry, Innovation and Infrastructure**
- **Goal 7: Affordable and Clean Energy**

IPR Status

IPR applied but not yet granted

IPR Notes

Spanish Patent applied.

Partner Sought

Expected role of the partner

Licensee of the technology to develop and market the invention.

Type of partnership

Type and size of the partner

Commercial agreement with technical assistance

- **Big company**
- **SME <=10**
- **SME 11-49**
- **SME 50 - 249**

Dissemination

Technology keywords

- **01003003 - Artificial Intelligence (AI)**
- **04007001 - Energy management**
- **02003001 - Process automation**
- **09001009 - Sensor Technology related to measurements**
- **01003010 - Databases, Database Management, Data Mining**

Market keywords

- **08002003 - Process control equipment and systems**
- **08002001 - Energy management**
- **09003001 - Engineering services**
- **06006002 - Metering and monitoring**
- **09008001 - Electric companies**

Targeted countries

- **World**

Sector groups involved

- **Renewable Energy**