

Design Approach for an Environmental Impact Monitoring System of an Industrial Unit

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Abstract

Industrial companies can generate a high number of environmental impacts, often making it challenging to assess and monitor corresponding aspects. The ongoing development of the Industry 4.0 concept and its associated digital tools can be leveraged for the measurement and real-time monitoring of specific environmental impacts. Within the scope of this study, we focus on the design of a real-time environmental impact measurement and monitoring system for an industrial production unit, utilizing certain Industry 4.0 tools such as IoT devices. Additionally, we propose a comprehensive design approach based on a series of steps, including the identification of environmental aspects. In the literature, various approaches and methods are employed for identifying environmental aspects and impacts. These approaches often begin with the preliminary identification of processes and activities, followed by the identification of environmental aspects and impacts specific to those activities. However, the number of specific activities within an industrial production facility can be substantial, resulting in a high number of environmental aspects and impacts, and subsequently, a large number of sensors required for measurement and monitoring. To minimize the sensor count, we suggest adopting a holistic approach for identifying environmental aspects and impacts within our design process. The design approach we propose, founded on a set of steps, enables the management of complexity, cost, and project timeline for the development of an environmental impact measurement and monitoring system for an industrial unit. This work builds upon some of our prior research and publications in the fields of environmental impacts and Industry 4.0.

Keywords

Industrial Unit, Environmental Impacts, IoT Devices, Sensors, Real-Time

Biographies

Khalid Benhida Khalid is a professor at the EST of Safi and a member of the LAPSSII laboratory at Cadi Ayyad University, Morocco. K. BENHIDA holds doctorate degrees (Phds) and habilitation in the fields of electronics and industrial techniques. He serves as a supervisor and director for several doctoral theses (PhD) and is the author and co-author of numerous publications, patents, and scientific communications.

Nouredine Dahmani is a research scholar at the Department of Engineering Science, Faculty of Science and Technology, Cadi Ayyad University, Marrakech, Morocco. He is doing his PhD in the area of Green Lean design and industry 4.0 in product development. He has about 8 years of industry experience. His research interests include product design, Lean product development, sustainable product, lean design, design methodologies, Eco design and Industry 4.0.

Sana El Hidaoui got her Ph.D. degree in Industrial & Logistic Engineering at Cadi Ayyad University- Faculty of Technical Sciences, Marrakech, Morocco, in 2022. She received engineering diploma in "Industrial Engineer" from ENSA Safi, Cadi Ayyad University, Marrakech, Morocco, in 2015. She is currently in charge of teaching, with the

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