



# ENGINEERING CAPSTONE EXPO 2024

PAKISTAN ENGINEERING COUNCIL



## Development of a Power Monitoring and Control System for Smart Grid

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### OBJECTIVES

- To monitor and analyze the power quality parameters of an electrical grid, including voltage, frequency, and harmonics.
- To identify issues related to power quality such as harmonic distortion, low power factor, and voltage fluctuations.
- To improve the reliability and efficiency of the electrical grid, leading to cost savings, reduced downtime, and increased customer satisfaction.

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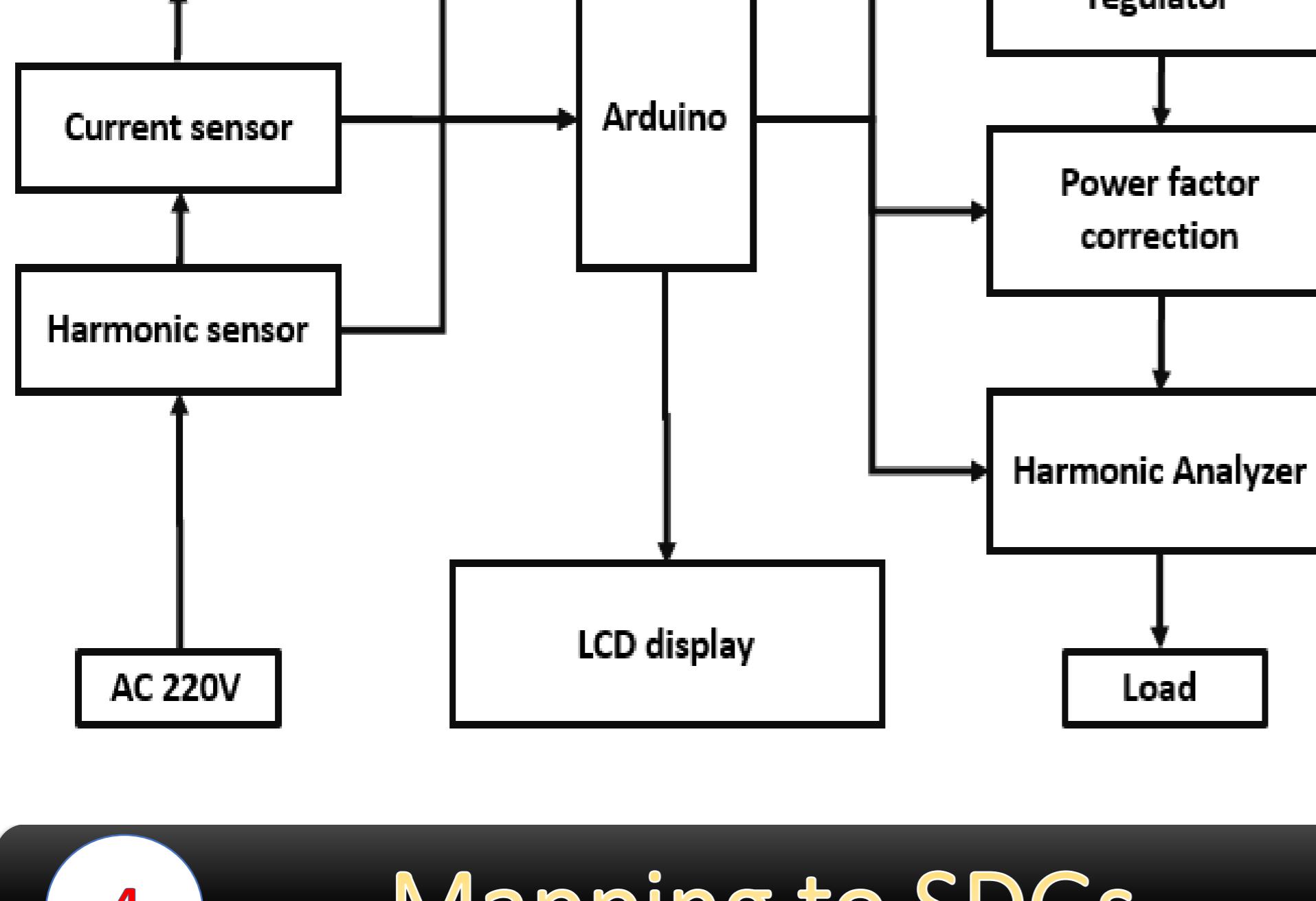
### ABSTRACT

Electric power systems are critical to modern society, providing the energy required for everything from lighting and heating to manufacturing and transportation. However, poor power quality can result in equipment damage, increased energy consumption, and reduced system efficiency. Therefore, the need for monitoring and analyzing the power quality of electrical smart grids has become increasingly important. A smart grid is an electricity network that uses digital and other advanced technologies to monitor and manage the transport of electricity from all generation sources to meet the varying electricity demands of end users.

The purpose of this project is to develop a system for monitoring and analyzing the power quality of an electrical grid. The objectives of the project are to identify issues related to power quality such as harmonic distortion, power factor imbalances, and voltage fluctuations, and to implement corrective actions such as power factor correction or voltage regulation to improve power quality and reduce energy waste. The project will improve the reliability and efficiency of the electrical grid, leading to cost savings, reduced downtime, and increased customer satisfaction.

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### Functional Block Diagram



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### Mapping to SDGs

Goal No.	Statement	Description	Justification
7	Affordable and Clean Energy	Ensure access to affordable, reliable, sustainable, and modern energy for all.	System can help identify areas where energy efficiency can be improved, reduce energy losses, and optimize the use of renewable energy sources, ultimately leading to more affordable and clean energy for all.
9	Industry, Innovation and Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.	It can help identify areas where infrastructure improvements are needed, optimize the use of existing infrastructure, and support the development of innovative solutions that improve the resilience and sustainability of infrastructure.
11	Sustainable Cities and Communities	Make cities and human settlements inclusive, safe, resilient and sustainable.	The system can help improve the efficiency and reliability of electricity supply to urban areas.
13	Climate Action	Take urgent action to combat climate change and its impacts.	System can help optimize the use of renewable energy sources, reduce greenhouse gas emissions, and support the development of more sustainable energy systems, ultimately contributing to climate change mitigation and adaptation efforts.
17	Partnerships for the Goals -	Strengthen the means of implementation and revitalize the global partnership for sustainable development.	By promoting collaboration and partnership between different stakeholders, such as energy providers, regulators, and consumers, the system can help identify and address common challenges related to energy access, sustainability, and resilience, ultimately contributing to the achievement of the SDGs through collective action.

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