

IoT Sensing Platform for Remote Monitoring and Real-Time Data Analysis of Offshore Wind Turbines

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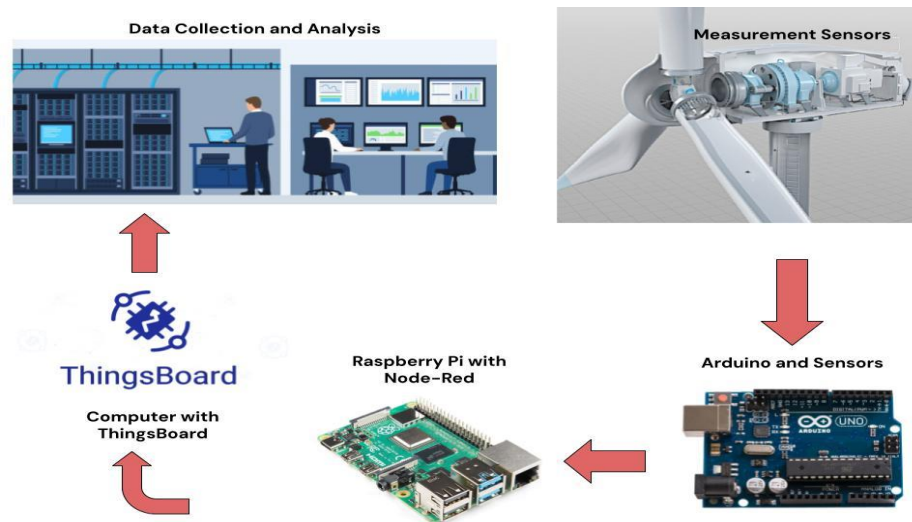
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Project Objective

The project aims to create an IoT platform for monitoring offshore wind turbines using wireless sensor networks to collect real-time data of the turbines, focusing on parameters such as current, voltage, and vibration. The objective is to create a system capable of real-time analysis, fault detection, and inspection techniques integration.

Prototype of Proposed IoT Platform



Expected Results



Methodology

- Sensing and Measurements:** Directly connect sensors to the Arduino board to gather data. Develop code within the Arduino IDE to collect and format the signals for transmission to the Raspberry Pi.
- Raspberry Pi Communication:** Enable serial communication between the Arduino and the Raspberry Pi. Utilize Node-Red in the Raspberry Pi to process the signals from the Arduino and transmit the data to remote nodes.
- Data Transmission:** Utilize MQTT protocol for sending data from Node-Red to the Desktop, which will be connected via the same Wi-Fi network. Thingsboard will handle data collection, storage, analysis, and visualization through dashboards.
- Sensor Testing:** Install and test various sensors in a real wind turbine testbed.

Conclusion

The project addresses the need for advanced monitoring systems in offshore wind farms, considering the challenges associated with traditional wired interconnections and the limitations of existing monitoring systems like SCADA. The integration of IoT technologies offers a promising solution to enhance monitoring capabilities and optimize maintenance strategies.

Next Steps:

- Deployment and Field Testing:** Deploy the IoT platform in operational offshore wind farms for further validation and performance evaluation in diverse environmental conditions.
- Refinement of Data Analysis Techniques:** Continuously refine machine learning algorithms and data analysis techniques to improve the accuracy of fault detection, predictive maintenance, and performance optimization.

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