POWER MANAGER

TELEMETRY

PREPARED FOR

**INTEL UNNATI INDUSTRIAL TRAINING PROGRAM**

**2024 - 2025**

SUBMITTED BY

**ARPITA B KALASHETTY**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SHARNBASAVA UNIVERSITY, KALABURGI

Under the guidance of

**Dr. Shivkumar Kagi**

SHARNBASVA UNIVERSITY,KALABURGI

ABSTRACT

Power manager telemetry systems are integral components of modern industrial and residential environments, facilitating real-time monitoring, control, and optimization of power consumption. This abstract provides an overview of the fundamental aspects and benefits of such systems, highlighting their importance in enhancing operational efficiency, reducing costs, and supporting sustainable energy practices. Power manager telemetry is the communication between your system processing and the power supply devices. This communication can be used to control and / or monitor details about your power system.

**INTRODUCTION**

Power manager telemetry systems play a crucial role in modern industrial and residential settings by enabling real-time monitoring and management of power consumption. These systems are designed to track and analyze energy usage patterns, providing insights that facilitate efficient resource allocate on and cost management. Power manager telemetry is an innovative technology that transforms the way energy systems are monitored and managed. By collecting and analyzing real-time data from various points in the energy network, it provides a comprehensive view of energy consumption, distribution, and performance.

**CONCEPT : POWER MANAGER TELEMETRY**

**1.Components and Functionality of power manager**

* Power Manager: Central component responsible for controlling the power supply to devices or systems.
* Telemetry Data Collection: Regular measurement and recording of power consumption metrics.
* Real-Time Monitoring: Continuous updates on power status and consumption levels.
* Data Transmission: Transfer of telemetry data to monitoring systems for analysis and decision-making.

The above components plays an important role in performing the sophisticated roles of each component used in this power manager telemetry. Hence they perform the functionality which holds both the hardware and software processing. The Telemetry data is collected automatically and continuously to increase dataaccuracy. Manual data collection is prone to human error and intermittent data collection may miss important events or changes. Continuous, automated data collection through telemetry can reduce these errors to provide more reliable data.

The Real-time monitoring is the delivery of continuously updated data about systems, processes or events. Such monitoring provides information streaming at zero or low latency, so there is minimal delay between data collection and analysis. It enables quick detection of anomalies, performance issues and critical events. Real-time monitoring relays the active and ongoing status of an IT environment. It can be tuned to focus on particular IT assets and set to look at a desired level of granularity.

The Data transmission in Power Manager Telemetry functions in sending and receiving data via cable (e.g., telephone lines or fiber optics) or wireless systems. Digital computers use a modem to transform outgoing digital electronic data, and a similar system at the receiving end translates the incoming signal back to the original electronic data. Data transmission can either be analogue or digital, but is mostly earmarked for sending and receiving digital data.  As such, data transmission is also referred to as digital transmission or digital communications.

**SOME FEATURES OF POWER MANAGER TELEMETRY**

* Power On/Off Control: Enables operators to remotely or automatically manage device power states.
* Energy Consumption Measurement: Accurate tracking of energy usage, often in kilowatt-hours (kWh).
* Fault Detection: Immediate identification of power anomalies or failures.
* Historical Analysis: Storage and retrieval of past energy consumption data for trend analysis and optimization**.**

**APPLICATIONS**

* Industrial Automation: Enhancing operational efficiency and reducing downtime through proactive energy management. Power manager telemetry systems play a crucial role in industrial automation by providing real-time monitoring, control, and optimization of power consumption.
* Smart Grids: Integration into smart grid infrastructure for demand response and load balancing. Power manager telemetry plays a crucial role in enhancing the functionality and efficiency of smart grids, which are modern electrical grids that leverage digital technology to monitor, control, and optimize the generation, transmission, and distribution of electricity.
* Residential Energy Management: Enabling homeowners to monitor and optimize household energy usage. Power manager telemetry systems are increasingly utilized in residential management systems to empower homeowners with tools for monitoring, controlling, and optimizing their energy consumption.

**Challenges and Considerations of Power Manager Telemetry**

While power manager telemetry systems offer substantial benefits, they also present challenges such as ensuring data accuracy across varying operational conditions, addressing real-time data transmission requirements, and maintaining robust cybersecurity measures to safeguard sensitive telemetry data.

A power manager telemetry system monitors the energy consumption of critical machinery. It detects a sudden increase in power usage in a milling machine due to a malfunctioning motor. The system immediately alerts the maintenance team, who intervene promptly to replace the motor before it fails completely, thereby preventing costly downtime and ensuring uninterrupted production.

Power manager telemetry systems are indispensable , providing the necessary tools for efficient energy management, predictive maintenance, and compliance with environmental standards. By leveraging real-time data insights, industries can enhance operational efficiency, reduce costs, and promote sustainable practices, thereby driving overall productivity and competitiveness.

**Scope of the Power Manager Telemetry**

Future advancements in power manager telemetry systems are anticipated to leverage advanced analytics, machine learning algorithms, and IoT integration to further optimize energy usage and predict maintenance needs. These innovations promise enhanced efficiency, resilience, and sustainability in energy management practices.

Identifying and documenting the available knobs in a system to measure power. Collect **power** telemetry data from CPU, memory, NIC, and TDP etc. Measure and record system power utilization for CPU, NIC, and TDP based on the input parameter of system utilization percentage.

Power manager telemetry has a promising future, particularly as the demand for energy efficiency and sustainable practices continues to grow. Advancements in sensor technology, data analytics, and artificial intelligence will enhance the capabilities of power manager telemetry systems, enabling more precise monitoring and control of energy consumption. This will facilitate smarter grid management, predictive maintenance, and optimized energy distribution, reducing waste and costs. The integration of Internet of Things (IoT) devices will further expand the reach of telemetry, providing real-time data from various sources to improve decision-making processes. As renewable energy sources become more prevalent, power manager telemetry will play a crucial role in balancing loads and integrating these sources into the grid. Furthermore, the increasing focus on reducing carbon footprints will drive the adoption of advanced telemetry systems, contributing to a more sustainable future. Overall, power manager telemetry is set to become an indispensable tool in achieving energy efficiency and sustainability goals globally.

Power manager telemetry is expansive and multifaceted, driven by technological advancements and the global push towards energy sustainability. This power manager telemetry systems can monitor and adjust the output from renewable sources to ensure a stable and reliable power supply, even as conditions fluctuate. The proliferation of Internet of Things (IoT) devices will enable more granular data collection across various points in the energy network. This will allow for more precise control and optimization of energy use, as well as better demand forecasting and load balancing.

Therefore considering the whole scenario its future scope can also be found in IoT, Data Analytics and Artificial Intelligence, Consumer Engagement and Behavioral Change, Policy and Regulatory Compilance, Grid Decentralization and Microgrids.



**CONCLUTION OF THE CONCEPT**

The power manager telemetry systems represent a pivotal technological solution for modern energy management challenges. By enabling precise monitoring, efficient control, and strategic decision-making, these systems contribute significantly to operational excellence, cost savings, and environmental stewardship in today's dynamic energy landscape. Continued advancements in technology and adoption are poised to further elevate the role of these systems in shaping a sustainable future.

Power manager telemetry systems are instrumental in advancing smart grid capabilities, enabling utilities to operate more efficiently, improve reliability, integrate renewable energy sources effectively, and meet evolving energy demands. By leveraging real-time data analytics and control capabilities, these systems contribute to a more sustainable and resilient energy infrastructure that supports economic growth and environmental stewardship.

Power manager telemetry systems are transforming residential energy management by providing homeowners with actionable insights and control over their energy usage. By leveraging real-time data analytics, these systems empower individuals to make informed decisions, enhance energy efficiency, and contribute to a sustainable future. As technology continues to evolve, the integration of smart devices and renewable energy solutions will further optimize residential energy management practices, driving towards greater efficiency and resilience in home energy systems.

Power manager telemetry stands at the forefront of revolutionizing energy management and sustainability. With its ability to provide real-time, actionable insights, enhance grid reliability, and integrate renewable energy sources, it promises a future where energy systems are smarter, more efficient, and environmentally friendly. As technological advancements continue to propel the capabilities of telemetry, its role in predictive maintenance, consumer engagement, and regulatory compliance will only grow more significant. The integration of AI and IoT will further amplify its impact, ensuring optimal energy usage and fostering a culture of energy consciousness. Ultimately, power manager telemetry is not just a tool but a critical enabler in the global journey towards a sustainable and resilient energy future.