A Study on Systematic Review on Green IoT

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Abstract: *Green Internet of Things (Green IoT) represents the integration of energy-efficient technologies into IoT systems, aiming to minimize environmental impact and promote sustainability. This paper presents a systematic review of Green IoT by exploring its foundations, current methodologies, and advancements. Through an analysis of existing systems and proposals for innovative solutions, this study identifies opportunities for reducing energy consumption and environmental footprint while maintaining the functional integrity of IoT applications. The review also provides insights into future directions for research and development in Green IoT.*

Keywords: Green IoT, Energy Efficiency, Sustainability, Internet of Things, Environmental Impact, Green Computing

I. INTRODUCTION

The rapid proliferation of the Internet of Things (IoT) has revolutionized modern technology, enabling the seamless connection of devices, systems, and data. However, this advancement comes at a cost, particularly in terms of energy consumption and environmental impact. Green IoT has emerged as a critical paradigm that focuses on developing sustainable and energy-efficient IoT systems. By leveraging green technologies, Green IoT aims to address these challenges and contribute to the broader goals of environmental preservation and energy optimization.

This paper seeks to provide a comprehensive review of Green IoT, outlining its key principles, challenges, and advancements. It explores the interplay between IoT systems and sustainability, emphasizing the importance of energy-efficient solutions in reducing environmental footprints.

II. LITERATURE REVIEW

The literature on Green IoT encompasses a broad spectrum of topics, including energy-efficient communication protocols, hardware optimizations, and green data centers. Previous studies have highlighted the importance of renewable energy sources, energy-aware network design, and low-power devices in achieving the goals of Green IoT.

Key Research Themes
Energy Optimization: Strategies to minimize energy consumption in IoT devices and networks.
Sustainable Infrastructure: Development of IoT infrastructure using renewable and eco-friendly resources.
Green Data Centers: Design and management of data centers with reduced power consumption and carbon footprint.
Policy and Regulation: Role of government and international organizations in promoting Green IoT practices.

Research Gaps

While significant progress has been made in Green IoT, challenges remain in scaling energy-efficient solutions to diverse IoT applications. Limited research exists on integrating Green IoT principles with emerging technologies such as blockchain and AI.

III. METHODOLOGY

This systematic review adopts a mixed-methods approach, incorporating qualitative and quantitative analyses of Green IoT literature. The methodology involves:

Data Collection: Identification of peer-reviewed articles, conference proceedings, and industry reports related to Green IoT.

Selection Criteria: Inclusion of studies focused on energy efficiency, sustainability, and innovative IoT applications.

Analysis Framework: Classification of literature into themes such as energy optimization, sustainable infrastructure, and green data centers.

Evaluation Metrics: Assessment based on energy savings, environmental impact, and scalability of proposed solutions

IV. EXISTING AND PROPOSED SYSTEMS

Existing Systems

Energy-Efficient Communication Protocols: Protocols such as Zigbee and LoRaWAN designed to reduce energy consumption in IoT networks.

Low-Power IoT Devices: Development of sensors and actuators with minimal energy requirements.

Renewable-Powered IoT Systems: Integration of solar and wind energy to power IoT devices.

Proposed System

The proposed system emphasizes a holistic approach to Green IoT by combining:

AI-Driven Energy Management: Use of machine learning algorithms to optimize energy consumption.

Blockchain for Green IoT: Leveraging blockchain technology for transparent and efficient energy usage tracking.

Adaptive IoT Networks: Design of networks that dynamically adjust to varying energy demands and environmental conditions.

Hybrid Energy Solutions: Integration of renewable and traditional energy sources for enhanced reliability and sustainability.
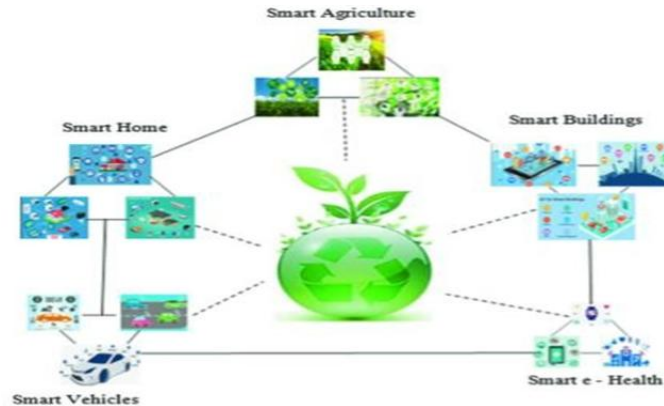
V. CONCLUSION

Green IoT represents a transformative shift towards sustainable technology solutions that balance functionality with environmental responsibility. This systematic review highlights the progress, challenges, and potential of Green IoT in achieving energy efficiency and reducing environmental impact. By addressing existing gaps and exploring innovative approaches, Green IoT can play a pivotal role in building a sustainable technological future.

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