

Chapter 3

Navigating Green Computing Challenges and Strategies for Sustainable Solutions

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ABSTRACT

The adoption of green computing is crucial due to cost reduction and environmental responsibility. However, challenges hinder progress. This research explores solutions for balancing industrial growth with sustainability and addresses green computing obstacles. Recognizing industry's importance while mitigating its environmental impact is vital. Strategies to reduce waste and energy use, like cloud computing and virtualization, can help. Implementing a circular economy approach makes products regenerative and less wasteful. This research provides real-world case studies and insights, aiding businesses in adopting greener, more sustainable computing practices for a cost-effective, environmentally responsible tech landscape.

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INTRODUCTION

Green computing and Green IT have become more well-known in recent years. They describe the environmentally responsible design and use of computer hardware, information technology, and communication technologies. This includes adopting energy-efficient servers, peripherals, and central processing units, as well as encouraging resource conservation and appropriate e-waste disposal. Modern technology and gadgets are all around us as if they were essential components of our daily existence, and their effects on the environment are something we cannot overlook. The scope of IoT is broad, ranging from everyday appliances to industrial machinery and environmental sensors.

On the other hand, green computing is a practice that focuses on environmentally conscious methods within the Information Technology realm. Its relevance has increased due to the rapid expansion of cloud computing and the associated energy costs. By utilizing energy-efficient hardware, optimizing data centers, and promoting efficient renewable energy adoption to power I.T. infrastructure, Green computing seeks to make I.T. systems and operations more energy-efficient and eco-friendly (Alsharif, 2023). Promoting an ecologically conscious and sustainable attitude towards technology is crucial. This can be achieved by reducing energy usage and minimizing technological waste. Cloud computing has significantly increased the cost of operating I.T. infrastructure. In response to this problem, green computing was created. Today, there is growing concern about the relationship between energy use and carbon emissions and the need to reduce both. The expansion of data centers has led to a significant increase in energy consumption, which has had detrimental effects on the environment. Enterprise data centers are responsible for more than 50% of a company's energy costs and roughly half its carbon footprint (Foley, 2007; Kumar, 2014).

Growing environmental concerns have brought considerable attention to green computing and sustainable design approaches in modern years (Jänick, 2012). This study explores the connection between these two concepts, highlighting the challenges and possibilities they provide for creating a more sustainable future. With the industry's rapid growth, energy consumption and electronic waste have become critical environmental concerns (Xu M. a., 2019). We need to find innovative strategies to mitigate the environmental impacts of information technology. This study examines ways to maximize energy efficiency, reduce electronic waste, and promote responsible technology usage. It also scrutinizes the tenets of sustainable design, emphasizing the need for environmentally friendly products that consider the entire life cycle. To help organizations, politicians, and consumers make well-informed decisions regarding technology usage and design, this study addresses these issues and promotes sustainable design practices. The journey towards a more sustainable and eco-friendly digital future begins with an understanding of these challenges and a commitment to responsible technology usage and design.

Using some of the most well-known academic research as a starting point, this article provides an extensive overview of the key ideas behind green computing. It is challenging to implement all of the suggested solutions at once since many of the ones made in the published literature to address the problems with IoT are similar. The publication urges researchers to reassess previous research and pinpoint problems and gaps that might be resolved in the next proposals. Further research is needed on Green implementation methods for corporations to manage Green Use effectively.

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