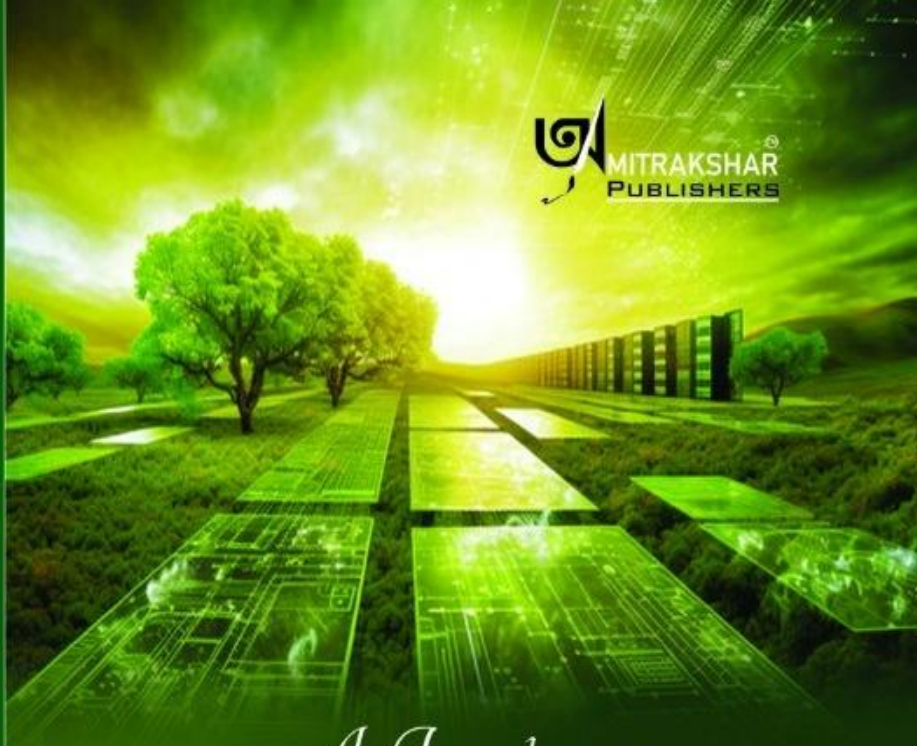
An Introduction to Green ICT and Green Computing



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Mr. Amit Adhikari | Dr. Amit Kumar Pandey | Prof. (Dr.) Santanu Biswas |
Prof. (Dr.) Asis Kumar Dandapat | Dr. Koomkoom Khawas

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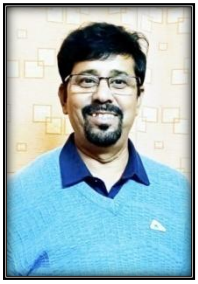

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PREFACE

Welcome to **"An Introduction to Green ICT and Green Computing"** In today's rapidly evolving technological landscape, the importance of sustainability and environmental consciousness cannot be overstated. As our reliance on information and communication technologies (ICT) grows, so too does the need for eco-friendly approaches to computing.

This book aims to provide a comprehensive overview of Green ICT and Green Computing, exploring their significance, principles, practices, and potential impact on both the environment and society. Through this introductory guide, readers will gain insights into how technology can be harnessed to mitigate its ecological footprint while still meeting the demands of a modern, interconnected world.

In the first part of this book, we delve into the fundamentals of Green ICT, elucidating key concepts such as energy efficiency, renewable energy sources, and sustainable design principles. Understanding these foundational elements is crucial for developing environmentally responsible ICT solutions.

Next, we turn our attention to Green Computing, examining strategies for reducing power consumption, minimizing electronic waste, and optimizing resource utilization in computing systems. From data centers to personal devices, there are numerous opportunities to implement greener computing practices, and we aim to equip readers with the knowledge to do so effectively.

Throughout this book, real-world case studies and examples will be used to illustrate the practical application of Green ICT and Green Computing principles across various industries and contexts. Additionally, emerging trends and innovations in the field will be explored, providing readers with a glimpse into the future of sustainable technology.

Whether you are a student, educator, IT professional, or simply someone interested in the intersection of technology and environmentalism, this book is designed to be accessible and informative. By fostering a deeper understanding of Green ICT and Green Computing, we hope to inspire positive change and contribute to a more sustainable digital future.

We would like to express our gratitude to all those who have contributed to the development of this book, including researchers, practitioners, and educators in the field of Green ICT and Green Computing. Their insights and expertise have been invaluable in shaping the content of this introductory guide.

Thank you for embarking on this journey with us. Together, let us explore the transformative potential of Green ICT and Green Computing in building a greener, more sustainable world.

AUTHORS

Mr. Amit Adhikari

Dr. Amit Kumar Pandey

Prof. (Dr.) Santanu Biswas

Prof. (Dr.) Asis Kumar Dandapat

Dr. Koomkoom Khawas

Place: Medinipur

Date: 25 March 2024

ACKNOWLEDGEMENT

It is with immense gratitude that I extend my heartfelt appreciation to all those who have contributed to the fruition of this book, **"An Introduction to Green ICT and Green Computing".**

Firstly, I would like to express my deepest gratitude to ***Dr. Amrita Dutta, the Principal of Netaji Nagar College, Kolkata, West Bengal, India,*** for her unwavering support and encouragement throughout the process of writing this book. Her valuable guidance and insightful suggestions have been instrumental in shaping the content and direction of this work.

I would also like to extend my sincere thanks to ***Prof. (Dr.) Jayanta Mete, Professor in Education at the Department of Education, University of Kalyani, Kalyani, West Bengal, India,*** for graciously providing the foreword for this book. His expertise and scholarly insights have added immense value to the overall discourse on green ICT and green computing.

I am indebted to all the researchers, educators, and practitioners in the field of green technology whose pioneering work has served as a constant source of inspiration and motivation for me. Their dedication to sustainability and environmental stewardship has profoundly influenced the content and vision of this book.

I extend my heartfelt thanks to my family and friends for their unwavering support and understanding throughout this journey. Their encouragement and belief in my abilities have been the driving force behind the completion of this endeavor.

I am deeply grateful to everyone who has contributed, directly or indirectly, to the realization of this book. It is my sincere hope that "An Introduction to Green ICT and Green Computing" will serve as a valuable resource for students, academics, and professionals interested in the intersection of technology and environmental conservation.

AUTHORS

Place: Medinipur
Date: 25 March 2024

FOREWORD

In our modern era, where technological advancements are omnipresent, it becomes imperative to pause and reflect on the environmental impact of our digital footprint. The book **"An Introduction to Green ICT and Green Computing" by *Mr. Amit Adhikari, Dr. Amit Kumar Pandey, Prof. (Dr.) Santanu Biswas, Prof. (Dr.) Asis Kumar Dandapat, and Dr. Koomkoom Khawas,*** serves as a beacon guiding us through the realms of Green ICT and Green Computing.

As we delve into the pages of this enlightening manuscript, we are greeted with a profound exploration of concepts, methodologies, and practices aimed at mitigating the ecological repercussions of information and communication technologies. The authors, with their collective expertise, unravel the intricate interplay between technology and sustainability, offering invaluable insights into the pivotal role played by Green ICT in fostering a harmonious coexistence between innovation and environmental stewardship.

Through meticulous research and scholarly discourse, the authors underscore the significance of adopting eco-friendly approaches in the design, deployment, and utilization of ICT infrastructure. From energy-efficient computing paradigms to eco-conscious data management strategies, each chapter unfolds a wealth of knowledge, empowering readers to embrace sustainable practices in their digital endeavors. This seminal work transcends disciplinary boundaries, catering to a diverse audience ranging from academics and researchers to industry professionals and policymakers. By elucidating the ethical imperatives and socio-economic imperatives associated with Green ICT, the book

catalyzes a paradigm shift towards a more sustainable technological landscape.

As we embark on this transformative journey guided by the wisdom encapsulated within these pages, let us heed the call for collective action in safeguarding our planet for future generations. I commend the authors for their scholarly contribution and fervently hope that this book serves as a catalyst for fostering a culture of sustainability in the realm of information and communication technologies.

Prof. (Dr.) Jayanta Mete
Professor in Education
Department of Education
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West Bengal, India

Place: Kalyani
Date: 25 March 2024

MESSAGE

In an era where technological advancements shape our daily lives, the imperative to prioritize sustainability has never been more urgent**. "An Introduction to Green ICT and Green Computing"** emerges as a beacon of knowledge, guiding us towards a harmonious fusion of technology and environmental consciousness.

Authored by a distinguished panel of scholar and professors including ***Mr. Amit Adhikari, Dr. Amit Kumar Pandey, Prof. (Dr.) Santanu Biswas, Prof. (Dr.) Asis Kumar Dandapat, and Dr. Koomkoom Khawas,*** this book embarks on a journey through the burgeoning landscape of Green ICT and Green Computing. It not only elucidates the theoretical underpinnings but also provides practical insights into fostering sustainability within the realm of information and communication technology.

As we stand at the precipice of a climate crisis, it is incumbent upon educational institutions to spearhead initiatives that foster environmental stewardship. Netaji Nagar College takes pride in endorsing this seminal work, recognizing its pivotal role in nurturing eco-consciousness among students, educators, and practitioners alike.

By delving into topics such as energy-efficient computing, e-waste management, and sustainable IT infrastructure, this book equips readers with the tools necessary to mitigate the ecological footprint of digital technologies. Furthermore, it underscores the symbiotic relationship between technological innovation and environmental preservation, dispelling the notion that progress must come at the expense of our planet.

Through comprehensive analysis and empirical evidence, the authors advocate for a paradigm shift towards eco-friendly practices in ICT, urging stakeholders to embrace sustainability as a cornerstone of their endeavors. In doing so, they offer a roadmap towards a more resilient and environmentally conscious digital future.

As we navigate the complexities of the 21st century**, "An Introduction to Green ICT and Green Computing"** serves as a testament to the transformative power of knowledge. May this book inspire readers to become agents of change, fostering a sustainable trajectory for generations to come.

Dr. Amrita Dutta
Principal, Netaji Nagar College
Kolkata, West Bengal, India

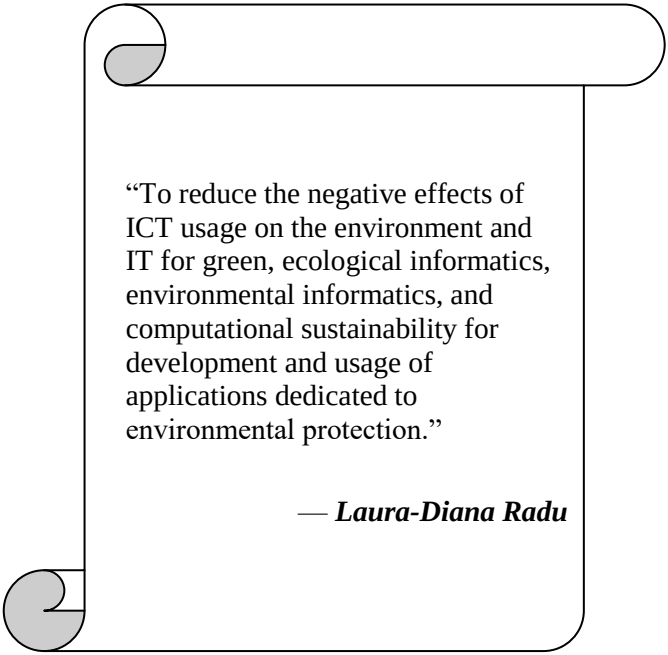
Place: Kolkata
Date: 25 March 2024

Dedicated to

My Grandma
Mokshada Adhikari

By

Mr. Amit Adhikari


"To reduce the negative effects of ICT usage on the environment and IT for green, ecological informatics, environmental informatics, and computational sustainability for development and usage of applications dedicated to environmental protection."
— Laura-Diana Radu

CONTENTS

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