

SYNERGY-2024

INNOVATIONS IN SCIENCE, ENGINEERING AND MANAGEMENT

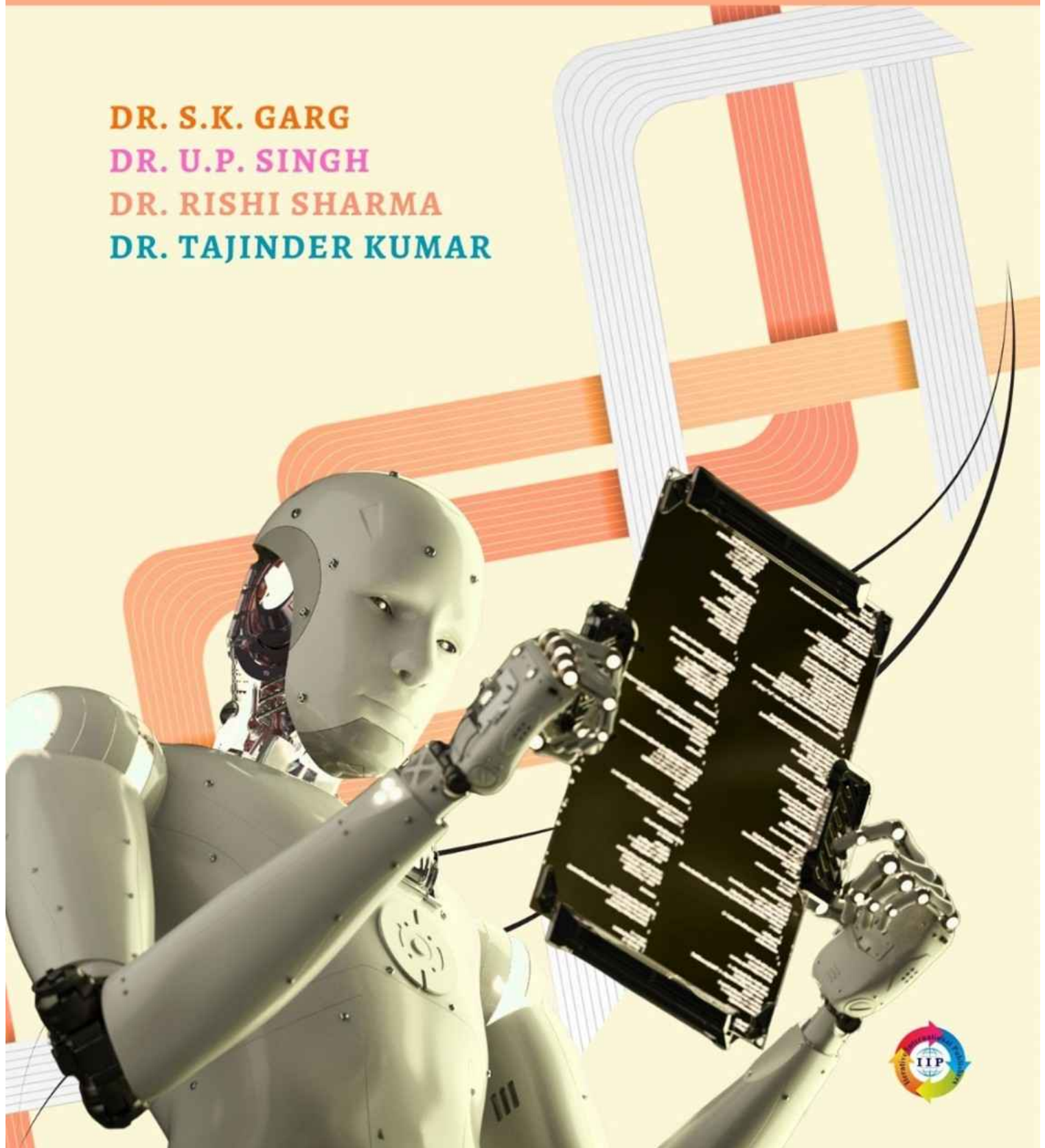
(EXPLORING GLOBAL ADVANCES AND COLLABORATIVE SOLUTIONS)

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SYNERGY~2024

Innovations in Science, Engineering and
Management

First Volume



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Foreword

It gives me immense pleasure to present the proceedings of SYNERGY-2024, a premier conference dedicated to fostering collaboration, innovation, and knowledge-sharing across diverse disciplines in Science, Engineering and Management. This event marks a significant milestone in our continuous efforts to create a dynamic platform where academia, industry, and research intersect to address contemporary challenges and explore emerging opportunities.

The theme of SYNERGY-2024 reflects the spirit of collective growth and interdisciplinary engagement. The conference brings together eminent scholars, researchers, professionals, and students who contribute valuable insights, novel ideas, and ground breaking research. It is heartening to witness such enthusiasm and intellectual energy from participants across the country and beyond.

We are proud to host a wide array of sessions, workshops, and paper presentations that delve into current trends, technological advancements, and future pathways. Each contribution is a testament to the commitment and hard work of our participants, reviewers, and organizing team.

I extend my heartfelt gratitude to all contributors, keynote speakers, session chairs, and volunteers for making SYNERGY-2024 a vibrant and meaningful academic event. May the knowledge exchanged here spark new collaborations and pave the way for impactful innovations.

Wishing all participants a fruitful and enriching experience.

Dr. Ramesh Kumar
General Secretary,
Board of Governors

Preface

We are delighted to present the proceedings of SYNERGY-2024, held on the 20th and 21st of December, 2024. The purpose of this conference was to showcase new ideas and engineering tools that inspire curiosity and engagement among researchers and readers alike. It aimed to provide a vibrant platform for young professionals, scientists, budding engineers, and aspiring researchers to share their expertise, experiences, and research insights. These contributions address a wide spectrum of scientific and societal challenges.

We are especially grateful to the distinguished speakers from four countries—Canada, Denmark, Britain, and the United States—who have significantly enriched the conference with their deep knowledge and impactful presentations. Their participation greatly elevated the experience for our contributors. Researchers, faculty members, and students also took the stage to present their work, which spanned a wide array of technical topics and provoked thoughtful scientific discussions.

The on-going wave of globalization has introduced a host of new technical challenges. Research plays a crucial role in addressing these issues by deepening our understanding of scientific principles and engineering methodologies. In the field of engineering, this translates to sustainable development and the creation of innovative products aimed at improving human life. Research also seeks to develop effective solutions to contemporary problems and challenges.

We are witnessing a paradigm shift in the integration of computers into daily life. From fuzzy-logic-based washing machines to algorithms capable of extracting meaningful insights from massive datasets, the influence of computer science is pervasive. Today's era is defined by the power of software tools and intelligent systems—technologies that replicate aspects of human or natural intelligence in machines. These intelligent systems often surpass human capabilities in terms of speed, computational power, and pattern recognition.

This conference brings together a wide range of such computer-assisted tools and methods, offering tactical and innovative solutions to today's real-world problems.

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