

Sankar K. Pal  
Sabu M. Thampi  
Ajith Abraham *Editors*



# Intelligent Informatics

Proceedings of Eighth International Symposium on Intelligent Informatics (ISI 2023)

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Sankar K. Pal · Sabu M. Thampi · Ajith Abraham  
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# Intelligent Informatics

Proceedings of Eighth International  
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2023)

 Springer

*Editors*

Sankar K. Pal  
Center for Soft Computing Research  
Indian Statistical Institute  
Kolkata, West Bengal, India

Ajith Abraham  
Bennett University  
Greater Noida, India

Sabu M. Thampi  
School of Computer Science  
and Engineering  
Kerala University of Digital Sciences  
Innovation and Technology (Digital  
University Kerala)  
Thiruvananthapuram, Kerala, India

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# Preface

The 8th International Symposium on Intelligent Informatics (ISI'23) was held in Bengaluru (Bangalore), India, from December 18 to 20, 2023. ISI'23 provided a platform to share and discuss theoretical and practical developments in intelligent informatics. It was co-located with the International Conference on Applied Soft Computing and Communication Networks (ACN'23). The conference included keynote addresses, contributed papers, workshops, and tutorials. The event was organized by PES University, Bengaluru, and received technical support from the IEEE Signal Processing Society Bangalore Chapter and the IEEE Communications Society Bangalore Chapter.

This volume comprises 30 papers presented at the symposium and is organized into different sections, such as Computer Vision, Image Processing, Signal Processing, Machine Learning and Deep Learning Applications, Healthcare and Medical Diagnostics, Biotechnology and Environmental Applications, IoT Security and Data Encryption, and Quantum Computing and Intelligent Systems.

All submissions underwent evaluation based on their significance, novelty, and technical quality. A double-blind review process was conducted to ensure that the author names and affiliations were unknown to the Technical Program Committee (TPC).

We extend our gratitude to all the authors who contributed their papers to the success of ISI'23. We acknowledge the pivotal role played by PES University, Bengaluru, as the organizing institution, and express our thanks to the IEEE Signal Processing Society Bangalore Chapter and IEEE Communications Society Bangalore Chapter for their technical support. The dedication of the Local Organizing Committee members is commendable, as is the selfless contribution of time by the faculty, staff, and student volunteers who played vital roles in ensuring the success of ACN'23.

Lastly, we express our appreciation for the collaboration with our publisher, Springer, and extend our sincere thanks to Senior Editor Aninda Bose for their invaluable support.

Kolkata, India  
Thiruvananthapuram, India  
Greater Noida, India  
December 2023

Sankar K. Pal  
Sabu M. Thampi  
Ajith Abraham

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# About the Editors

**Sankar K. Pal** (Life Fellow, IEEE) received the first Ph.D. degree in radio physics and electronics from the University of Calcutta, Kolkata, India, in 1979, and the second Ph.D. degree in electrical engineering along with DIC from Imperial College, University of London, London, UK, in 1982. He is currently National Science Chair, Government of India, and President of the Indian Statistical Institute (ISI). He is also Distinguished Scientist and Former Director of ISI, Former Distinguished Professor of the Indian National Science Academy, and Former Chair Professor of the Indian National Academy of Engineering. He founded the Machine Intelligence Unit and the Center for Soft Computing Research: a national facility in the institute in Calcutta. In 1975, he joined ISI as CSIR Senior Research Fellow where he became Full Professor in 1987, Distinguished Scientist in 1998, Director in 2005–2010, and President in 2022–2024.

**Sabu M. Thampi** is a Professor at the School of Computer Science and Engineering, Digital University Kerala, Trivandrum, India. His current research interests include the Internet of Things (IoT), cognitive security, social networks, endpoint security, and smart cyber-physical systems. Sabu is also coordinating the Connected Systems and Intelligence (CSI) Lab at the University. He holds a Ph.D. in Computer Engineering from the National Institute of Technology Karnataka. Dr. Sabu has been actively involved in funded research projects and published papers in book chapters, journals, and conference proceedings. He has authored and edited a few books, as well as edited 45+ conference proceedings published by Springer in various series, as well as a few others published by IEEE, ACM, and Elsevier.

**Ajith Abraham** received his Ph.D. in Computer Science from Monash University, Melbourne, Australia. He has a Master of Science in Control and Automation from Nanyang Technological University, Singapore. He holds a bachelor's degree in electrical and electronic engineering from the University of Calicut, Kerala, India. He has over 32 years of industry and academic experience. His primary research is on developing advanced machine intelligence using hybridization of function approximation methods, approximate reasoning and global optimization methods focused on big

data analytics, understanding networks, information security, Web intelligence, decision support systems, the Internet of things, etc. He is Founding Director of Machine Intelligence Research Labs, a not-for-profit Scientific Network for Innovation and Research Excellence connecting industry and academia.

# Enhancing Bamboo Dryer Using IOT Control

Farrah Wong<sup>1[0000-0002-8685-7165]</sup>, Mohd Syaqr Bin Japarudin<sup>1</sup>, Sariah Abang<sup>2</sup>, Hoe Tung Yew<sup>1</sup>, Mazlina Mamat<sup>1</sup>, Ing Ming Chew<sup>1</sup>, Aroland Kiring<sup>1</sup> and Jamal Ahmad Dargham<sup>1</sup>

<sup>1</sup> Faculty of Engineering, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia

<sup>2</sup> Faculty of Engineering, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak

<sup>1</sup> farrah@ums.edu.my

**Abstract.** The ideal temperature and humidity levels for the drying process of bamboo vary depending on the species of bamboo and desired product. This system has been designed to create an optimal and controlled drying environment within the temperature range of 50°C to 52°C encompassing three integral subsystems. At the core of this innovation lies the Control Subsystem, a pivotal entity responsible for maintaining the precise drying conditions required for optimal results. This subsystem integrates a range of components, including the NodeMCU-ESP32 microcontroller, DHT22 temperature and humidity sensors, 2 Channel 5V relays, AC Heater, and AC Fan. These elements collaboratively function to dynamically regulate the temperature and humidity parameters essential for efficient bamboo drying. The Communication Subsystem, seamlessly interfaced with the Blynk cloud platform, bridging the gap between the IoT components and user interaction. Through this innovative feature, the drying process becomes accessible from remote locations, enabling real-time monitoring and control via the Blynk mobile application. The Monitoring Subsystem through the I2C LCD Display provides users with a localized display of critical drying such as average temperature and humidity. On the experimental results, a comparative analysis between the traditional sun-drying approach and the IoT-Based Dryer method elucidates significant differentials in weight loss and moisture reduction trends. The latter consistently showcases heightened efficiency by achieving higher average moisture loss percentages, signifying its ability to rapidly reduce moisture content within bamboo samples by 5%. Furthermore, the IoT-Based Dryer method demonstrates enhanced time efficiency, predictability, and consistency due to its controlled and optimized drying conditions.

**Keywords:** Bamboo dryer, IOT-based Controller, Temperature Control.

## 1 Introduction

### 1.1 Overview

The suitable temperature and humidity for different bamboo species can vary as different species may have different requirements for optimal growth and preservation. High temperatures and relative humidity above 70% facilitate mold growth in Tropical climate [1]. The challenge of effectively controlling the temperature in bamboo