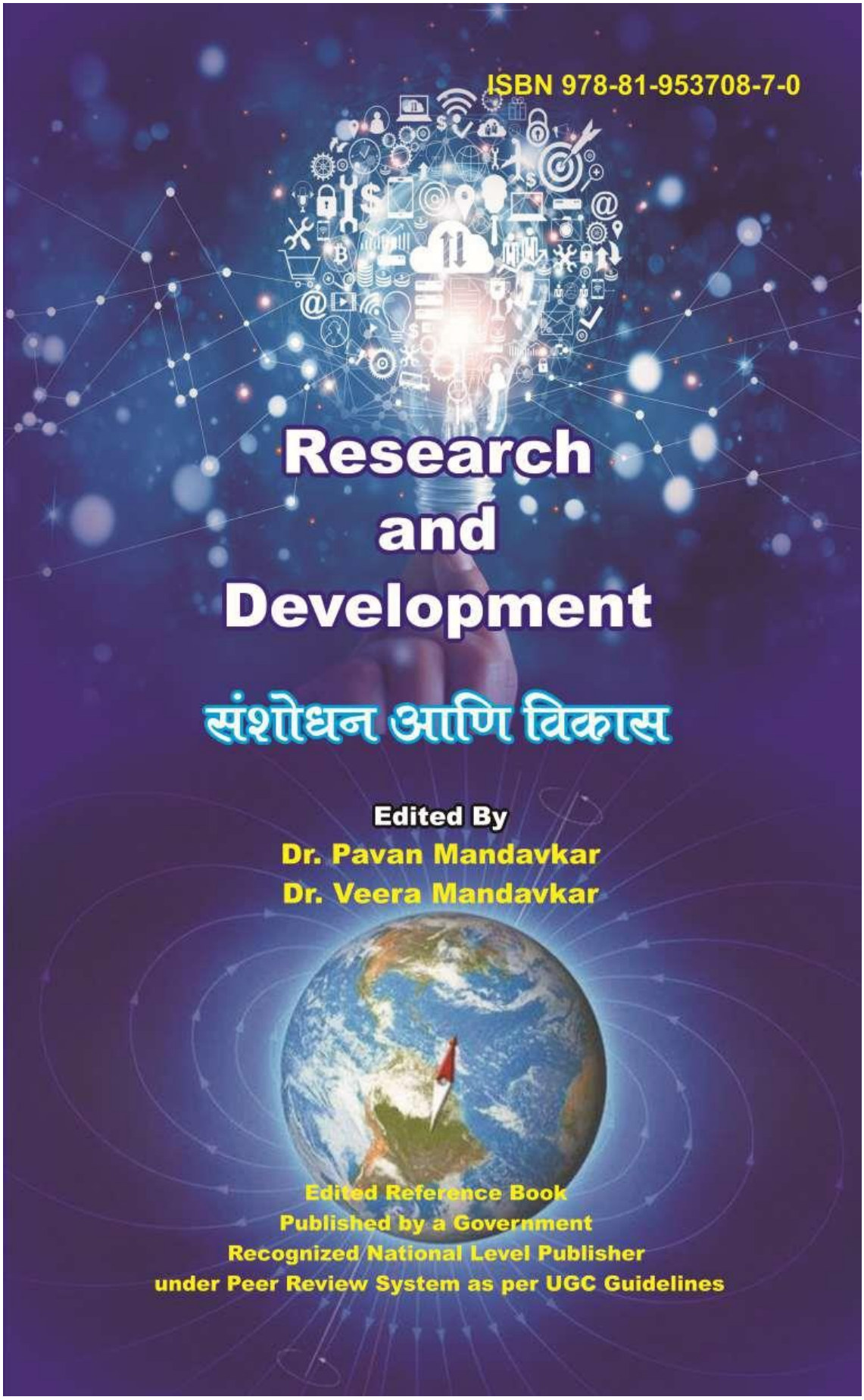
Dr. Vicky Watkar: Fuzzy Logic in Temperature Control Systems: Adaptive and Intelligent Solutions



ISBN 978-81-953708-7-0

Research and Development

(Edited Book as per UGC Norms by National Level Publisher)

संशोधन आणि विकास

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ISBN 978-81-953708-7-0
Edited Reference Book (in multilanguage)
Research and Development संशोधन आणि विकास

Indira Mahavidyalaya, Kalamb, Dist. Yavatmal,
Maharashtra 445 401 (India)
Edition I 8 March, 2023
(Mahashivratri, International Women's Day)
Publication Number 22 प्रकाशन क्र. २२
Copies 1000 प्रती १०००
Size Demi आकार डेमी
Pages 304 पृष्ठसंख्या ३०४
Cover Page 4 colour मुखपृष्ठ फोर कलर
Type setting & cover page Dr. Pavan Mandavkar
संगणक / मुखपृष्ठ रचना डॉ. पवन मांडवकर
Publisher
Dr. Veera Mandavkar
Director, Dr. Bhau Mandavkar Research Centre
Indira Mahavidyalaya, Kalamb, Dist. Yavatmal,
Maharashtra 445 401 (India)
9422867658, 9403014885
researchjournalofindia@gmail.com
marathipradhyapak@gmail.com
Printer and Distributor
Sewa Prakashan, Vijay Colony, Amravati

Rs. 400/- मूल्य ४०० रुपये

Fuzzy Logic in Temperature Control Systems: Adaptive and Intelligent Solutions

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Abstract

This book chapter explores the implementation of fuzzy logic in temperature control systems, presenting a detailed analysis of its adaptive and intelligent attributes. The chapter introduces the core principles of fuzzy logic, underscoring its significance in delivering versatile and effective control solutions for temperature dynamics. Through real-world applications and case studies, the chapter illustrates the prowess of fuzzy logic in enhancing adaptability, positioning it as an indispensable tool in temperature control systems.

Keywords: Fuzzy Logic, Temperature Regulation, Adaptive Control, Linguistic Variables, Fuzzy Inference System, Membership Functions, Rules, Intelligent Control.

Introduction

Traditional temperature control methods have evolved over the years and often rely on conventional engineering approaches to maintain a desired temperature within a system. Here's a brief overview of some traditional temperature control methods:

On/Off Control: Simple on/off switching based on the deviation of the current temperature (T) from the setpoint (SP).

Proportional Control: Adjusts heating or cooling intensity proportionally to the temperature error ($e = \mathrm{SP} - \mathrm{T}$), We Can Mathematically express $\mu(t) = K_p \, . \, e(t)$

Form IV

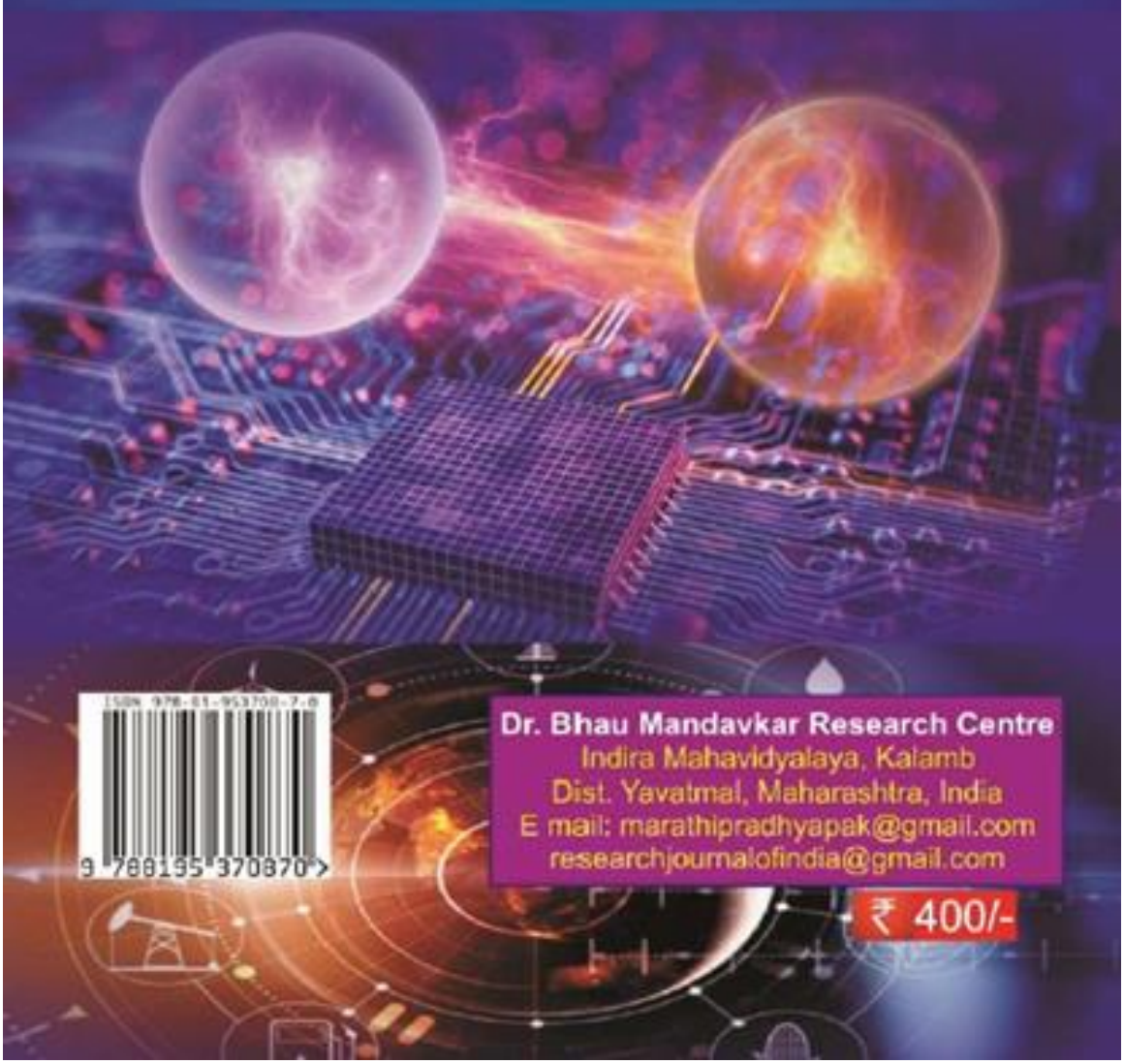
(See Rule 8)

Statement about ownership and other particulars about the edited book

Research and Development

1. Place of Publication	-	Indira Mahavidyalaya, Kalamb
2. Published on	-	8th March, 2024
3. Printer's Name	-	Seva Prakashan, Vijay Colony, Amravati 444606 (M.S.)
4. Publisher's Name	-	Dr. Mrs. Veera Mandavkar
Nationality	-	Indian
Address	-	Indira Mahavidyalaya, Kalamb, Dist. Yavatmal 445401
5. Chief Editor's Name	-	Dr. Pavan Mandavkar
Nationality	-	Indian
Address	-	Principal, Indira Mahavidyalaya, Kalamb, Dist. Yavatmal

We, Dr. Pavan Mandavkar & Dr. Mrs. Veera Mandavkar hereby declare that the particulars given above are true to the best of our knowledge and



ISBN 978-81-953700-7-0

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