

MECHATRONICS

BOOK SERIES

SYSTEM DESIGN AND SIGNAL PROCESSING

VOLUME 2

Editors

Md. Raisuddin Khan

Md. Mozasser Rahman

Muhammad Mahbubur Rashid

Shahrul Na'im Sidek



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CONTENTS

Editorial Notes	v
About the Editors	vi
Contents	vii
1. A Brief Overview of Biomechatronics and Its Applications.....	1
<i>Nur Izatulnisha A.Rashid, Jamaliah Kassim and Asan G. A. Muthalif</i>	
2. Self-Powered Solar Tracking System Part 1: System Modeling and Hardware Selections.....	7
<i>Asan G. A. Muthalif, Dzairul Hafiz and Haris Shafiq</i>	
3. Self-Powered Solar Tracking System Part 2: System Design.....	14
<i>Asan G.A. Muthalif, Dzairul Hafiz and Haris Shafiq</i>	
4. Self-Powered Solar Tracking System Part 3: System Integration and Testing.....	19
<i>Asan G.A. Muthalif, Dzairul Hafiz and Haris Shafiq</i>	
5. Smart System For Monitoring Electrical Power Usage at Homes.....	25
<i>Kawthar A. Rahman, Asan G. A. Muthalif and Nurul F. Shua'ib</i>	
6. Vibration Based Predictive Maintenance: Common Rotating Machinery Faults and Their Signatures.....	30
<i>Siti F. Mansor, Asan G. A. Muthalif and Nurul 'I. Zaman</i>	
7. Modeling of Disc Rotor Induction Motor	38

M. M. Rashid, S. Abubakar and R.Tamjis

8. Computer Communication for a Smart Card Based Ordering System Via Visual Basic..... 52
Siti Fauziah Toha and Rosdiazli Ibrahim
9. Electronic Smart Ordering System: Graphical User Interface 59
Siti Fauziah Toha and Rosdiazli Ibrahim
10. Intruder Avoidance System Via Short Message Service (SMS)..... 65
Siti Fauziah Toha and Mohammad Zafran Haja Mohideen
11. Anti Skid Control System, A Tutorial..... 71
M. J. E. Salami, R. Khan, A.M. Aibinu, Syahrul Syazanizam Bin Md Said and Mohd Sofian Bin Basrah
12. Intelligent Anti Skid Control System..... 75
M. J. E. Salami, R. Khan, A.M. Aibinu, Syahrul Syazanizam Bin Md Said and Mohd Sofian Bin Basrah
13. Principles of FMCW Radar Signal Processing..... 91
Wahju Sediono and Andrian Andaya Lestari
14. Design and Implementation of a Simple Queueing System for Vehicle Traffic Simulator..... 99
Wahju Sediono
15. Determination of Target Speed from the FMCW Radar Data..... 107
Wahju Sediono and Andrian Andaya Lestari
16. Intelligent Egg Incubator: Introduction..... 116
Shahrul Na'im Sidek, Yasir Mohd Mustafah, Urwah Ismail, Nur Hasnaa Che Awang
17. Intelligent Egg Incubator: Mechanical Design..... 125

	<i>Shahrul Na'im Sidek, Yasir Mohd Mustafah, Urwah Ismail, Nur Hasnaa Che Awang</i>	
18.	Intelligent Egg Incubator: System Integration And Results	137
	<i>Shahrul Na'im Sidek, Yasir Mohd Mustafah, Urwah Ismail, Nur Hasnaa Che Awang</i>	
19.	Human Posture Recognition Classification And Recognition.....	157
	<i>Kyaw Kyaw Htike, Othman O. Khalifa and and Lai Weng Kin</i>	
20.	Human Posture Recognition Preprocessing Techniques.....	162
	<i>Othman O. Khalifa, Kyaw Kyaw Htike, Lai Weng Kin and A. Albagoul</i>	
21.	Path Detection Implementation Using Fuzzy Classifier	171
	<i>Imran Moez Khan, Yusof Zaw Zaw, Othman O. Khalifa and Lai Weng Kin</i>	
22.	Mechanical Design Of Unmanned Underwater Vehicle	180
	<i>Md. Raisuddin Khan, M. Zuhdi and Masum Billah</i>	
23.	Design And Development Of An Automated Café System.....	187
	<i>Md. Raisuddin Khan, MAS Kamal and Masum Billah</i>	
24.	Speech Coding Using Compressive Sensing On A Multicore System	194
	<i>T.S. Gunawan, Othman O. Khalifa, A. A. Shafie and E. Ambikairajah</i>	
25.	A Case For Cooperative Vision System.....	202
	<i>A. A. Shafie and N. Samudin</i>	
26.	Path Following Autonomous Vehicle Based On Vision System.....	208
	<i>A. A. Shafie, E. A. Syukur and N. I. Sidek</i>	
27.	Trajectory Planning Using Gps For Unmanned Aerial Vehicle With Microcontroller Based System	215
	<i>A. A. Shafie, Md. Raisuddin Khan and M Shehzad Islam</i>	

28. Digital Hearing Aids Analysis And Implementation.....	224
<i>Othman O. Khalifa, Aisha H. Abdalla and Sheroz Khan</i>	
29. Automatic Intelligent Ordering System: Design And Tools Selection	233
<i>Siti Fauziah Toha and Rosdiazli Ibrahim</i>	
30. Automatic Smart Card Purchasing System for Express Kiosk.....	240
<i>Siti Fauziah Toha and Rosdiazli Ibrahim</i>	
31. Finite Element Formulation of Piezoelectric Laminated Composite Plate	247
<i>Iskandar Al-Thani Mahmood and Md. Raisuddin Khan</i>	
32. A Review on Modeling And Shape Control Of Piezoelectric Laminated Composite Plate Using Finite Element Method.....	257
<i>Iskandar Al-Thani Mahmood and Md. Raisuddin Khan</i>	
33. Development of Auto Parking System & Auto Billing System Using Image Processing Technique (Part 1).....	267
<i>M. M. Rashid</i>	
34. Development of Auto Parking System and Auto Billing System Using Image Processing Technique (Part 2)	274
<i>M. M. Rashid</i>	
35. Development of Auto Parking System& Auto Billing System Using Image Processing Technique (Part 3).....	281
<i>M. M. Rashid</i>	
36. Automatic Car Parking Management System for Large Parking Lot.....	289
<i>M. M. Rashid</i>	
37. Development of Wireless Home Power Monitoring System	296
<i>M. M. Rashid</i>	

CHAPTER 18

INTELLIGENT EGG INCUBATOR: SYSTEM INTEGRATION AND RESULTS

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18.1 Introduction

In the previous chapter, we have described the mechanical design of the proposed incubator. The design has to meet the objective of the incubator design that is to maximize the number of eggs that to be hatched. In this chapter we will describe about the integration of the hardware and the software of the incubator system.

18.2 Integration and Control Design

The critical task in building the incubator is to design and integrate the systems in the incubator. This is done by completing the electrical and control part where we have to control the process of the incubator including the heating element, humidifier circuit, sensors (temperature and humidity) circuit control, ventilation system, display circuit, timing device, interfacing the control with the microcontroller as well as the microcontroller programming.

Fig. 18.1 shows the complete functional block diagram for this incubator. From that figure, we can see that there are several inputs and output of microcontroller need to be considered. The inputs to the microcontroller will be coming from both temperature and humidity sensors. Since we used two temperature sensors and two humidity sensors, the total number of inputs to the microcontroller will be four.

While there is several numbers of outputs coming out from the microcontroller resulting from the sensor inputs. The microcontroller will control the heating element (lamp) for temperature control and humidifier for humidity control. Both temperature and humidity control are the output from the microcontroller after the signal from the sensors goes to the microcontroller.

For this incubator, we also display the output of the temperature and humidity sensor so that the measurement can be observed at any time. Besides, we also shows the number of days left for hatching process as it is counting down from day 21.

For the ventilation system, we used constant rotating fan as the input from the fan will be coming from the microcontroller. For constant rotation, the voltage supplied to the fan must be constant from the start to the end of the incubating period.

18.3 Heating Element

For the heating element, we had chosen a 12V, 2.5A, 32Watt lamp with two filaments inside the bulb as in the Fig. 18.2. Since the incubator is a small system, the lamp is