

MECHATRONICS BOOK SERIES SYSTEM DESIGN AND SIGNAL PROCESSING VOLUME 1

Editors

**Asan G. A. Muthalif
Amir Akramin Shafie
Siti Fauziah Toha
Iskandar Al-Thani Mahmood**



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

**MECHATRONICS BOOK SERIES:
SYSTEM DESIGN AND SIGNAL
PROCESSING - VOLUME 1**

Editors

Asan G. A. Muthalif
Amir Akramin Shafie
Siti Fauziah Toha
Iskandar Al-Thani Mahmood



IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
©IIUM Press, IIUM

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without any prior written permission of the publisher.

Perpustakaan Negara Malaysia

Cataloguing-in-Publication Data

ISBN: 978-967-418-173-4

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN.BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan
Tel: +603-6188 1542 / 44 / 45 Fax: +603-6188 1543
EMAIL: iiumprinting@yahoo.com

CONTENTS

| | |
|------------------------------------------------------------------------------------------|-----|
| Editorial Notes | v |
| About the Editors | vi |
| Contents | vii |
| | |
| 1 Energy Harvesting For Wide Area Sensor Networks..... | 1 |
| <i>Nahrul Khair Alang Md Rashid and Mohamad Ghazali Ameer Amsa</i> | |
| 2 Design And Development Of Automatic Paper Box Folding Machine..... | 8 |
| <i>Md Mozasser Rahman, Anwar Hussain bin Mohamed Rasied and Ahmad Zulkamal Ismail</i> | |
| 3 Intelligent Shoe Guard System..... | 20 |
| <i>M. J. E. Salami,, A. M. Aibinu, Siti Sarah binti Mohd Sufian</i> | |
| 4 Applications of Mechatronics Engineering In Modern Agriculture..... | 29 |
| <i>Nahrul Khair Alang Md Rashid</i> | |
| 5 Mathematical Modeling of Counter Flow Scrubber Using Eulerian-Lagrangian Approach..... | 34 |
| <i>Bashir Ahmed Danzomo and Momoh Jimoh E. Salami</i> | |
| 6 Auto Landmarks Generation For SLAM Algorithm..... | 42 |
| <i>Nahrul Khair Alang Md Rashid and Imama Karim Manba Usama</i> | |
| 7 Automatic Intelligent Ordering System Design and Tools Selection..... | 46 |
| <i>Siti Fauziah Toha and Rosdiazli Ibrahim</i> | |
| 8 Design And Development of a Sorting Machine Using Multiple Sensory System..... | 52 |
| <i>Md Mozasser Rahman1, Siti Fatimah binti Abdul Rahim</i> | |

| | | |
|----|-----------------------------------------------------------------------------------------------------------------------|-----|
| 9 | Design And Development Of Intelligent Wiper For Vehicle Windshield: Mechanical Design | 58 |
| | <i>Shahrul Na'im Sidek, Abd Rahman Ibrahim</i> | |
| 10 | Design and Development of Intelligent Wiper for Vehicle Windshield: Electrical Design | 63 |
| | <i>Shahrul Na'im Sidek, Mohammad Afhamuddin Ab Aziz</i> | |
| 11 | Design and Development of Intelligent Wiper for Vehicle Windshield: Final Assembly And Results..... | 68 |
| | <i>Shahrul Na'im Sidek, Mohammad Afhamuddin Ab Aziz</i> | |
| 12 | Design and Prototyping of Inertia Wheel..... | 73 |
| | <i>W. Astuti, A. R. Kasim, M. I. Solihin, A.M. Aibinu, Momoh Jimoh E.Salami and Wahyudi</i> | |
| 13 | Design and Implementation of Instant Noodles Vending Machine..... | 80 |
| | <i>M.M.Rashid</i> | |
| 14 | Mathematical Model for Three Tank System..... | 88 |
| | <i>W. Astuti, R. Alimuddin, A.M. Aibinu, Momoh Jimoh E.Salami and Wahyudi Martono</i> | |
| 15 | Design of Software Tool to Detect QRS Complex from ECG Signal..... | 98 |
| | <i>Wahju Sediono</i> | |
| 16 | Development of a Jet Powered Floating Platform (In Air)..... | 104 |
| | <i>M. Zharif, Raisuddin Khan and Masum Billah</i> | |
| 17 | Development of Experimental Station for Earthquake Prediction..... | 109 |
| | <i>A. M. Aibinu, M. J. E. Salami, Asan Gani Muthalif, Sumaiyah Mior Badri, Sarah Khalidah and Nuruleeman Saat</i> | |
| 18 | Development of Robotic Manipulator to Assist Human by Using Brain Signal..... | 117 |
| | <i>Rodhiah, Raisuddin Khan and Masum Billah</i> | |
| 19 | Development of Unmanned Aerial Vehicle – Part 1..... | 123 |
| | <i>Shahrul Na'im Sidek, M. Ismail Mohtar, A Mushawwir M Khalil</i> | |

| | | |
|----|--------------------------------------------------------------------------------------------|-----|
| 20 | Development of Unmanned Aerial Vehicle – Part 2..... | 129 |
| | <i>Shahrul Na'im Sidek, A Mushawwir M Khalil, M. Ismail Mohtar</i> | |
| 21 | Earthquake Prediction And Monitoring Using Unusual Animal Behavior..... | 134 |
| | <i>A. M. Aibinu, W. Astuti, M. J. E. Salami, R. Akmelawati and Asan Gani Muthalif</i> | |
| 22 | Development of Automatic Rocking Baby Cradle..... | 141 |
| | <i>W. Astuti, N. F. Azlan, A.M. Aibinu, Momoh Jimoh E.Salami and Wahyudi Martono</i> | |
| 23 | Electrooculography (EOG)-Controlled Wheelchair..... | 149 |
| | <i>Shahrul Na'im Sidek, M. Iqbal Zakaria and A. Ridwan A.Aziz</i> | |
| 24 | Conceptual Design of an Intelligent Coconut Dehusking..... | 155 |
| | <i>M. J. E. Salami, A. M. Aibinu</i> | |
| 25 | An Electrooculogram (EOG) Signal for Wheelchair Motion Control..... | 163 |
| | <i>Salmiah Ahmad, Nurul Muthmainnah Mohd Noor</i> | |
| 26 | A conceptual Paper on Intelligent Car Battery Monitoring System..... | 171 |
| | <i>Abdul Hafiz Bin Sahar, Khairul Azhar Bin Muhamat, M. J. E. Salami, and A. M. Aibinu</i> | |
| 27 | GIS-Based Vehicle Traffic Simulation..... | 177 |
| | <i>Wahju Sediono</i> | |
| 28 | Intelligent Postal Mails Sorter..... | 183 |
| | <i>Mohd Arif Faiz Bin Omar, Mohd Zain Bin Ismail, M. J. E. Salami, A. M. Aibinu</i> | |
| 29 | Intelligent Wet Scrubber System for Industrial Air Pollution Control..... | 188 |
| | <i>Bashir Ahmed Danzomo and Momoh Jimoh E. Salami</i> | |
| 30 | Leveraging on Nature for Systems Design..... | 194 |
| | <i>Nahrul Khair Alang Md Rashid and Safinaz Kader Mohideen</i> | |
| 31 | Natural Ventilation of Yam Storage System..... | 199 |
| | <i>Murtala Abdulazeez, M.J.E. Salami, Md. Raisuddin Khan</i> | |
| 32 | Self-Repair Capability in Engineering Systems..... | 208 |
| | <i>Nahrul Khair Alang Md Rashid and Aous Naji Rasheed</i> | |

| | | |
|----|---------------------------------------------------------------------------------------|-----|
| 33 | Simulation of Airflow and Temperature Distribution in Yam Storage System | 213 |
| | <i>Murtala Abdulazeez, M.J.E. Salami, Md. Raisuddin Khan, Nabeel Adeyemi</i> | |
| 34 | Sound Identification in Noisy Environment..... | 218 |
| | <i>Nahrul Khair Alang Md Rashid, Nor Hidayati Diana Nordin and Alim Sabur Ajibola</i> | |
| 35 | Intelligent CCTV-Based Monitoring System for Kulliyah of Engineering, IIUM..... | 225 |
| | <i>M. J. E. Saslami,, A. M. Aibinu and Nur Syahrain binti Mohd Jahini</i> | |
| 36 | Virtual Modeling of Two-Wheeled Wheelchair using Msc Visual Nastran 4D..... | 231 |
| | <i>Salmiah Ahmad, M. O. Tokhi</i> | |

CHAPTER 35

Intelligent CCTV-Based Monitoring System for Kulliyah of Engineering, IUM

M. J. E. Saslami, A. M. Aibinu and Nur Syahrain binti Mohd Jahini

Intelligent Mechatronics System Research Group

Department of Mechatronics Engineering, International Islamic University Malaysia.

P.O. Box 10. 50728, Kuala Lumpur, Malaysia.

maibinu@iium.edu.my

35.1 Introduction

Currently, the use of security system has become important in many areas in human endeavors. Traditionally, research on information security mainly focus on the different sub-disciplines such as network security, application security, grid security, etc., but not much emphasis is focused on integrated enterprise information security architecture. Thus, this allows us to look at the techniques and procedures for improving security system for targeted application. It is therefore expedient to design and develop an Intelligent Integrated Security System using Kulliyah of Engineering (KOE) a case study. This proposed Intelligent Integrated Security System involves some new functions such as alarm trigger for alert person, SMS text, and emailing the main security system. It also uses simple cabling system and also IP networking system for interconnection. The basic components of the system consist of laptop for controlling and monitoring, web camera, cables for power supply and video, analog sensors [1], modem and microcontroller for interfacing sensors and the system.

Intelligent here refers to the ability of the system to automatically work to secure the place as to be theft-free. This ability is implemented inside the new security system. Similarly, integration refers to the combination of sub-system in order to develop a much more complete and robust system. In the design of the new system, combination of sensors, wireless and alarm to the camera are used so that the system can be intelligent and much applicable to improve the security system in Kulliyah of Engineering (KOE). Security system is a system that protects the place from being attacked, harmed or damaged by any intruders.

Even though KOE already have security system to protect the places especially around the laboratories, however there are still cases where equipments are being stolen. Despite having cameras installed in KOE, theft cases could not be captured because the security could not identify them. Reasons responsible for this include, the numbers of cameras installed in KOE is limited and only covered few areas. Hence, there are many blind-spots that the camera could not cover. Moreover, the university's security system uses cameras only for monitoring and were controlled manually by the person in charge.

In a nutshell, the proposed project will lead to the model development of security system that will manage and monitor KOE efficiently, systematically, and intelligently incorporate the overall security system. Moreover, the system hopefully can effectively monitor peoples' activities in a targeted environment which when deploy to KOE will reduce the number of theft cases.

There are many benefits or advantages of installing the security system that is been designed. First, the camera that is intended to be installed has high definition and can be rotated or moved. Therefore, the views from the camera are much better and clearer and since it can be moved freely, the camera can cover more areas to be monitored and decrease the blind-spots.

The new security system will not only monitor the places but protect them by using sensors to detect intruders. Therefore, if the place is broken-into, the sensor will automatically trigger the