

# JOURNAL OF COMPUTATIONAL INNOVATIONS AND ENGINEERING APPLICATIONS

Volume 4 Number 1  
JULY 2019

The **Journal of Computational Innovations and Engineering Applications (JCIEA)** is a peer-reviewed, open access journal of De La Salle University, Manila. The JCIEA aims to promote the development of new and creative ideas on the use of technology in solving different problems in different fields of our daily lives. The JCIEA solicits high quality papers containing original contributions in all areas of theory and applications of Engineering and Computing including but not limited to: Computational Applications, Computational Intelligence, Electronics and Information and Communications Technology (ICT), Manufacturing Engineering, Energy and Environment, Robotics, Control and Automation, and all their related fields. The JCIEA editorial board is comprised of experts from around the world who are proactively pushing for the development of research in these fields.

**Annual Subscription Rates:** Foreign libraries and institutions: US\$60 (airmail). Individuals: US\$50 (airmail). Philippine domestic subscription rates for libraries and institutions: Php1,800, individuals: Php1,300. Please contact Ms. Joanne Castañares for subscription details: telefax: (632) 523-4281, e-mail: [dlsupublishinghouse@dlsu.edu.ph](mailto:dlsupublishinghouse@dlsu.edu.ph)

Copyright © 2020 by De La Salle University

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 written permission from the copyright owner.

ISSN 2507-9174

Published by De La Salle University Publishing House  
2401 Taft Avenue, Manila 0922 Philippines  
Telephone: (63 2) 523-4281 / 524-2611 loc 271  
Fax: (63 2) 523-4281  
Email: [dlsupublishinghouse@dlsu.edu.ph](mailto:dlsupublishinghouse@dlsu.edu.ph)  
Website: <http://www.dlsu.edu.ph/offices/publishing-house/journals.asp>

*The De La Salle University Publishing House is the publications office of De La Salle University, Manila, Philippines.*

## Editorial Board

---

**Elmer P. Dadios**

*Editor-in-Chief*

De La Salle University, Philippines

elmer.dadios@dlsu.edu.ph

**Ira C. Valenzuela**

*Managing Editor*

De La Salle University, Philippines

ira.valenzuela@dlsu.edu.ph

## International Advisory Board

---

Abdoullah A. Afjeh

*Oregon Institute of Technology*

Oussama Khatib -

*Stanford University, USA*

Marcelo Ang

*National University of Singapore, Singapore*

Nguyen Thi Quynh Lam

*European International School, Vietnam*

Kathleen Aviso

*De La Salle University, Philippines*

Laurence Gan Lim

*De La Salle University, Philippines*

Argel Bandala

*De La Salle University, Philippines*

Ioan Marinescu

*University of Toledo, USA*

John-John Cabibihan

*Qatar University, Qatar*

Janina Mazierska

*James Cook University, Australia*

Anthony SF Chiu

*De La Salle University, Philippines*

Raouf Naguib

*BIOCORE, International U.K.  
Liverpool Hope University, U.K.*

Kukjin Chun

*Seoul National University, South Korea*

Yong-Jin Park

*Universiti Malaysia Sabah, Malaysia*

Joel Cuello

*University of Arizona, USA*

Raymond Girard Tan

*De La Salle University, Philippines*

Alvin Culaba

*De La Salle University, Philippines*

Raymund Sison

*De La Salle University, Philippines*

Eryk Dutkiewicz

*University of Technology Sydney, Australia*

Edwin Sybingco

*De La Salle University, Philippines*

Alexis Fillone

*De La Salle University, Philippines*

Ryan Vicerra

*De La Salle University, Philippines*

Kaoru Hirota

*Tokyo Institute of Technology, Japan, Japan Society for  
Promotions of Science, BIT, China*

David Williams

*Loughborough University, UK*

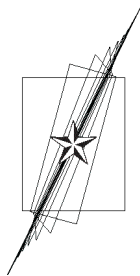
Rodrigo Jamisola, Jr.

*Botswana International University of Science and  
Technology*

Lawrence Wong

*National University of Singapore, Singapore*





# JOURNAL OF COMPUTATIONAL INNOVATIONS AND ENGINEERING APPLICATIONS

---

## Table of Contents

### From the Editor

Elmer P. Dadios  
*Editor-in-Chief*

### Research Articles

- Artificial Intelligence: Policy Paper 1  
*Reagan L. Galvez, Alvin B. Culaba, Elmer P. Dadios, and Argel A. Bandala*
- Design of a Load Detection Circuit Using Magnetic Field–Based Transistor Switch 6  
for Charge Controllers Neural Network  
*Ryann Alimuin, Elmer Dadios, Samuel Mabanta, Karen Salva, Jun Andal,  
Jesus Niño Pua, and Reynaldo Almoradie*
- Development of an Algorithm Using Zernike Polynomials and Fourier Transform 16  
for Measuring Refractive Errors in the Human Eyes  
*Marie Cattleah D. Atas, Larish Mariam T. Landicho, Abigail D. Lobo,  
Carla Joy L. Orubia, Adolph Christian O. Silverio, and John Carlo V. Puno*
- Policy Paper on Robotics in the Philippines 22  
*Anton Louise de Ocampo, Alvin Culaba, and Elmer P. Dadios*
- Classification of Philippine Herbal Plants via Leaf Using Different Machine 29  
Learning Algorithms  
*Robert G. De Luna, Marife A. Rosales, and Elmer P. Dadios*
- Shrimp Growth Monitoring System Using Image Processing Techniques 35  
*Rex Paolo C. Gamara, Camille Tabalanza, Tim V. Cruz, Jennie Lou C. Tindugan,  
and Pocholo James M. Loresco*

### Guidelines for Contributors 41



# From the Editor

---

The *Journal of Computational Innovations and Engineering Applications* (JCIEA) is a peer-reviewed and abstracted journal published twice a year by De La Salle University, Manila, Philippines. JCIEA aims to promote and facilitate the dissemination of quality research outputs that can push for the growth of the nation's research productivity. In its second volume, second issue, seven articles were selected to provide valuable references for researchers and practitioners in the field of environmental engineering, air quality monitoring, agricultural crop health assessment, healthcare engineering, assistive systems, machine learning, computer vision, video processing, wireless systems, motor controller for electric vehicles, and robotic systems.

The first article is *Artificial Intelligence: Policy Paper*. In this paper, the current trends of AI are discussed in a global and local context. Furthermore, the common facilitating factors that make AI adoption easy are also elaborated as well as the barriers of technology adoption. Then finally, policy recommendations that will improve and maximize the applications of AI in the economy, industry, society, and government has been proposed.

The second article is *Design of a Load Detection Circuit Using Magnetic Field-Based Transistor Switch for Charge Controllers*. This is a design of a load detection circuit using magnetic field – based transistor switch for charge controllers. This charge controller has two innovative main features. The first one is for the battery charging. Multiple batteries are employed so that more energy will be stored. The second one is focused in the battery discharging. The load detection circuit aims to guarantee that the energy stored in the battery is being used efficiently. Typical charge controllers let the battery supply the whole system even if no load is connected. This load detection circuit will detect if a load is connected to the system before letting the battery discharge.

The third article is *Development of an Algorithm Using Zernike Polynomials and Fourier Transform for Measuring Refractive Errors in the Human Eyes*. This paper aims to develop an algorithm using Zernike polynomials and Fourier transform to provide a reliable measurement of refractive errors that will aid ophthalmologists and optometrists. The FFT of the image and magnitude and the phase of spectrum values are correlated and computations using formula for Zernike polynomials are performed. The outputs are spherical (SPH), cylindrical (CYL), and axial (AX) values which represent the refractive errors of the eyes. The results are displayed in the device and uploaded to a database which can be viewed at the website online. The device was able to provide a reliable measurement which can aid in conducting eye checkups.

The fourth article is *Policy Paper on Robotics in the Philippines*. The paper aims to recommend a policy paper on the use and adoption of robotics in the Philippines. Applications of robotics extend from domestic to manufacturing and automation industry. Military and healthcare services also use robots in day to day programs. Economies that had adopted robotics have already flourished and prospered. This paper discusses the trends in robotics, stimuli, and hindrances for adoption, impacts of robotics, and some recommendations for the utilization of robotics to fire up our economy.

The fifth article is *Classification of Philippine Herbal Plants via Leaf using Different Machine Learning Algorithms*. In this paper, a machine vision-based herbal plant identification was implemented. An improvised image capturing system with 16 megapixels resolution camera was used with the aid of MATLAB installed in

laptop to gather real images of twelve herbal plants. An intelligent system was developed by utilizing image processing, feature extraction, and machine learning (ML) algorithms using Python. The classification accuracy was used to select the best model. Moreover, F1 score metric was used to compare the performances of the default and optimized models in identifying all the herbal classes. Based on the results, SVM model showed the best performance in classifying the herbal plants with accuracy score of 94.50% and 93.30% for the optimized training and testing performances.

The sixth article is *Shrimp Growth Monitoring System Using Image Processing Techniques*. An approach in developing a shrimp growth monitoring system capable of measuring the growth parameters and calculating the optimal feed amount based on the real-time images of live shrimp samples has been discussed. The system utilizes a specialized conveyor belt and camera controlled by an Arduino microcontroller for image acquisition. The acquired images are sent to the computer for image processing-based measurements using Artificial Neural Network (ANN). The system was tested and reached an average accuracy of above 96% for length and above 94% for weight measurement.

Original research outputs are most welcome to JCIEA. There is no publication fee in this journal, and the research papers are assured of fair and fast peer review process. For further information, please visit [www.dlsu.edu.ph/offices/publishinghouse/journals.asp](http://www.dlsu.edu.ph/offices/publishinghouse/journals.asp).

**Elmer P. Dadios, PhD**  
*Editor-in-Chief, JCIEA*