MEDRIA KUSUMA DEWI HARDHIENATA

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KEY SKILLS AND ATTRIBUTES

- Research experience in computer science over more than ten years
- Knowledge background in Artificial Intelligence, Multi-agent System, Optimization, Agent-based Simulation, and Machine Learning

EDUCATION

August 2010-August 2015

PhD in Computer Science, University of New South Wales (UNSW) Canberra

Supervisors : Dr Kathryn Merrick, Prof *Valeri Ougrinovski*

Thesis title : *Models of motivation for Particle Swarm Optimization with application to task allocation in multi-agent systems*

Research Summary

My PhD thesis investigates the role of motivation in solving optimization problems, with application to task allocation. To achieve this aim, a novel approach that incorporates computational models of motivation into Particle Swarm Optimization (PSO) was proposed. The use of models of motivation enables PSO agents to select the optima that they will pursue autonomously. This has led to the introduction of a new class of PSO algorithms, the Motivated Particle Swarm Optimization (MPSO) algorithms. The proposed approach has shown to improve the performance of existing PSO approaches without motivation, particularly when there is only a small number of agents and when the agents are initialized from a single point, which is the case in many realistic situations.

August 2005- **August 2009**	Bachelor in Computer Science, *Bogor Agricultural Institute (IPB University), Indonesia*

Program:

       Major : Computer Science

       Minor : Operation Research

Supervisors : Dr. Ir. Sri Nurdiati, M.Sc, Dr. Sugi Guritman

Thesis Title : *The Development of Voting Result Data Transfer to the Central Tabulating Facilities*

Research Summary:

Advances in election voting process nowadays have triggered the application of virtualization technique in several countries. Most studies raised concern about Online Voting which provides cost saving and convenience. The voting system using virtual network technology aims to reduce considerable calculation time as well as necessary human resources. Despite this, Indonesia still performs voting during election manually. To address this issue, this research aims to study the application of small scale Online Voting at the Department of Computer Science, Bogor Agricultural University as well as studying its further possibility for applying this technique on a larger scale. Considering the complexity in building a complete secure online election voting process, this research is focused only in developing a system to send vote from voter to Central Tabulating Facilities (CTF) by implementing a modified secure election protocol with Two Central Facilities. It is also conducted to implement earlier research recommendations to make the system more secure as well as how to integrate an election voting system from a single host into multiple hosts by using Java Web Start Technology.

EMPLOYMENT HISTORY

November 2016-current	**Lecturer (equivalent as Post-Doctoral Researcher) at the** **Department of Computer Science, Bogor Agricultural University** **(IPB University), Indonesia**

| July 2015-
January 2016 | **Research Associate, UNSW Canberra** |
| | Working with Dr. Kathryn Merrick, Prof. Jiankun Hu, Dr. Kamran Shafi |

This research position was responsible for developing, implementing and testing an agent-based simulation of motivated agents engaged in strategic decision-making and information warfare games.

Duties were to conduct:

- Literature review(s)
- Agent model development
- Model implementation using Matlab
- Experimental design and results analysis
- Writing papers for publication

| September
2014-
November
2014 | **Research Assistant, UNSW Canberra** |
| | Working with Dr. Kathryn Merrick and Prof. Hussein Abbass |

Topic: Investigating the role of user profiles for adaptive automation

Duties were:

- Writing Literature Review
- Drafting paper for publication

| February 2013-
December
2013 | **Data Checking the schools Research Publication database, UNSW Canberra** |
| | Under the direction of A/Prof Ruhul Sarker and Dr Mahmud Ashraf |

Duties were:

- Check the accuracy of research publication database
- Editing fields where data is missing

| October 2009 | **Assistant Lecturer, Bogor Agricultural University, Indonesia** |
| | Assistant Lecturer in Mathematics Computation |

| September
2008 – January
2009 | **Assistant Lecturer, Bogor Agricultural University, Indonesia** |
| | Assistant Lecturer in Software Engineering and Quantitative method |

| September –
October 2008 | **Assistant Lecturer, Bogor Agricultural University, Indonesia** |
| | Assistant Lecturer in Computer Organization |

April 2008 – September 2008	**Assistant Lecturer Bogor Agricultural University, Indonesia** Assistant Lecturer in Database, Computer Organization
September 2008 – January 2009	**Assistant Lecturer, Bogor Agricultural University, Indonesia** Assistant Lecturer in Software Engineering and Quantitative method

As Assistant Lecturer my duties were:

- Delivering lectures
- Performing Lab demonstrations
- Marking students' assessments

July 2008 – August 2008	***National* Institute of Aeronautics and Space, Indonesia** Volunteer worker as Customer Technology Staff

Duties were:

- Assisted to create LAPAN POLAR Satellite website

- Assisted to create video gallery and animation on LAPAN POLAR Satellite website using Flash and PHP.

SELECTED PUBLICATIONS

CONFERENCE PAPERS

- **M. K. Hardhienata**, K. E. Merrick, and V. Ugrinovskii. Task allocation in multi-agent systems using models of motivation and leadership. In Institute of Electrical and Electronics Engineers (IEEE) Congress on Evolutionary Computation (CEC-2012), Jun. 2012, pp. 1-8.

- **M. K. Hardhienata**, V. Ugrinovskii, and K. E. Merrick. Task allocation under communication constraints using motivated particle swarm optimization. In IEEE Congress on Evolutionary Computation (CEC-2014), Jul. 2014, pp. 3135-3142.

- **M. K. Hardhienata,** K. E. Merrick, and V. Ugrinovskii. Effective motive profiles and swarm compositions for motivated particle swarm optimisation applied to task allocation. In IEEE Symposium on Computational Intelligence for Human-like Intelligence (CIHLI-2014), Dec. 2014, pp. 1-8.

- K. Merrick, **M. Hardhienata**, K. Shafi and J. Hu. Using Game Theory with Intrinsic Motivation to Examine Anti-Hacking Policies for Autonomous Systems. IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2016).

- K. Priandana, **M. Hardhienata**, M. Iqbal Choironi, Rakean G.D. Prawitra, Sri Wahjuni, Agus Buiono, "Design of A Task-Oriented Autonomous Wheeled- Robot for Search and Rescue," *2018 International Conference on Advanced Computer Science and Information Systems (IEEE ICACSIS)*, Yogyakarta, 2018, pp. 259-263, doi: 10.1109/ICACSIS.2018.8618160.

- K. Priandana, I. Abiyoga, A. N. Wakhid Daini and **M. K. D. Hardhienata**, "Improvement of Data Accuracy on Backpropagation Neural Network-based Automatic Control System for Wheeled Robot," *2020 International Conference on Smart Technology and Applications (IEEE ICoSTA)*, Surabaya, Indonesia, 2020, pp. 1-5, doi: 10.1109/ICoSTA48221.2020.1570614105.

- T. T. Harmanda, K. Priandana and **M. K. D. Hardhienata**, "Development of Localization Technique using Trilateration Algorithm for E-Puck2 Robot," *2020 International Conference on Smart Technology and Applications (IEEE ICoSTA)*, Surabaya, Indonesia, 2020, pp. 1-6, doi: 10.1109/ICoSTA48221.2020.1570615346.

- H. F. Ahmad, **M. K. D. Hardhienata** and K. Priandana, "Integration of N-GCPSO Algorithm with Spatial Particle Extension Algorithm for Multi-Robot Search," *2020 International Conference on Smart Technology and Applications (IEEE ICoSTA)*, Surabaya, Indonesia, 2020, pp. 1-4, doi: 10.1109/ICoSTA48221.2020.1570614082.

JOURNAL ARTICLES

- Djatna, T., **Hardhienata, M.K.D.** & Masruriyah, A.F.N. An intuitionistic fuzzy diagnosis analytics for stroke disease. *Journal of Big Data Springer* **5,** 35 (2018). https://doi.org/10.1186/s40537-018-0142-7

- K. Merrick, **M. Hardhienata**, J. Hu, and K. Shafi, "A survey of game theoretic approaches to modelling decision making in information warfare scenarios," *Future Internet* vol. (in press), 2016.

- S. Hardhienata, **M. K. Hardhienata**, "Design and Implementation of Video Gallery and Animation on Lapan Polar Satellite Site ", in *Journal of Information Technology (JUTI)*. ISSN 1412 – 6389. Accredited SK. Dirjen DIKTI No. 45/DIKTI/Kep/2006, vol. 7, no. 3, Jan 2009.

BOOK CHAPTER

- K. Merrick, A. Klyne, M. Hardhienata, "Computational Motivation, Autonomy and Trustworthiness: Can We Have It All?", in *Foundations of Trusted Autonomy*, 2016.

CONFERENCE PRESENTATIONS

- Presenting Paper "Task allocation in multi-agent systems using models of motivation and leadership" in IEEE Congress on Evolutionary Computation (CEC-2012), June. 2012.

- Presenting Paper "Effective motive profiles and swarm compositions for motivated particle swarm optimisation applied to task allocation" in IEEE Symposium on Computational Intelligence for Human-like Intelligence (CIHLI-2014), Dec. 2014.

- Presenting Paper "Evolution of Intrinsic Motives in a Multi-Player Common Pool Research Game" on behalf of Dr. Kathryn Merick in IEEE Symposium on Computational Intelligence for Human-like Intelligence (CIHLI-2014), Dec. 2014.

- Presenting Paper "Self-Motivated Learning of Achievement and Maintenance Tasks for Non-Player Characters in Computer Games" on behalf of Hafsa, Dr. Kathryn Merrick, and Dr. Michael Barlow in IEEE Symposium on Computational Intelligence for Human-like Intelligence (CIHLI-2014), Dec. 2014.

AWARDS AND HONOURS

2012   Nominated for the best paper award, *IEEE Conference on Evolutionary Computation* 2012, Brisbane, Australia. Paper title: "*Task Allocation in Multi-Agent Systems using Models of Motivation and Leadership*".

2010   **University College Postgraduate Research Scholarship (UCPRS)**
This scholarship is awarded and administered by the University College to support students (both international and local) to undertake a postgraduate research degree at UNSW Canberra.

| 2009 | *Achieved the Best Graduate Award* in Department of Computer Science *Bogor Agricultural Institute, Indonesia,* in 2009 |
| 2008 | *Achieved the Student Achievement* Award in the Department of Computer Science *Bogor Agricultural Institute, Indonesia,* in 2008 |

OTHER ATTRIBUTES

- Active member of Machine Learning and developmental group at UNSW Canberra under the direction of Dr. Kathryn Merrick and Dr. Michael Barlow (2011-2015).
- Participated in ADFA Open Day 2011 (Demonstration of Motivated Agent to solve Task Allocation Problem) and ADFA Open Day 2012 (Poster Presentation of Motivated Particle Swarm Optimization).
- IEEE member since 2012.

COMPUTER SKILLS

Programming Languages	Matlab, Java, C
Type Setting	Latex, Microsoft Office
Applications	Microsoft Office, MiTex, Adobe Photoshop
Operating System	Windows 7, Windows 8, Windows XP

LANGUAGES

Indonesia	Mother Tongue
English	Fluent
German	Elementary