

Dr Nafrizuan Mat Yahya

Senior Lecturer



N. M. Yahya.

PhD (University of Sheffield) (2016)

MEng (Universiti Malaysia Pahang) (2009)

B.Eng (Universiti Sains Malaysia) (2004)

Address:

Faculty of Manufacturing Engineering

Universiti Malaysia Pahang

26600 Pekan

Pahang, Malaysia

Tel: (+609) 4245930 (Office)

Fax: (+609) 4245888

Email: nafrizuanmy@ump.edu.my

Room: CF13, First Floor, Block C, FKP Building

Dr Nafrizuan is head of the Control System Engineering Lab and former Head of Program (Mechatronics), Faculty of Manufacturing Engineering.

Research Interests

The research interests encompass three broad areas of research: intelligent manufacturing automation, bio-inspired computational intelligence and ergonomics for industrial application.

- Intelligent manufacturing automation
 - Automation in manufacturing has allowed to mass produce products with a reduced level of human participation at outstanding speeds and with great repeatability and quality. We explore in-depth the manufacturing automation field by incorporating the intelligent systems into motion controllers (motors, servos) and their corresponding interfaces, the Programmable Logic Controllers (PLCs), machine vision cameras, sensors and other measurement equipment, supervisory control and data acquisition (SCADA) systems, material handling systems as well as warehouse and storage systems.

- <http://electrical-engineering-portal.com/9-reasons-for-automation-of-manufacturing-processes>
- https://www3.nd.edu/~manufact/MPEM_pdf_files/Ch14.pdf
- Research relevant titles:
 1. Model, control and optimize the intelligent overhead crane system.
 2. Development of intelligent linear conveyor system for manufacturing shop floor.
 3. Implementation of intelligent machine vision control system to improve a high-speed sorting process at production floor.
- Bio-inspired computational intelligence
 - Biological systems and animal societies possess remarkable problem-solving capabilities. We take inspiration from nature by developing and improving the bio-inspired algorithms to solve and optimize a wide range of engineering problems such as motor control, control system optimization, mechanical design, manufacturing process, manufacturing cell formation, machine job scheduling, robotic team coordination and machine vision.
 - https://en.wikipedia.org/wiki/Bio-inspired_computing
 - <http://www.currentscience.ac.in/Volumes/103/04/0370.pdf>
 - Research relevant titles:
 1. Development of a multi-objective bats echolocation-inspired algorithm to optimize metal cutting process.
 2. Development of a many-objective bats echolocation-inspired algorithm to optimize car side impact design.
 3. A novel multi-objective adaptive bats sonar algorithm for finding Pareto optimum solutions with fast computation time.
- Ergonomics for industrial application
 - Ergonomics or human factors engineering are complementary disciplines concerned with the design of systems, environments and devices which people interact with in the course of their work. We focus on matching systems, tasks, products, and environments to the physical and cognitive abilities and limitations of people. These research efforts result in safety and error reduction, cost saved, cost avoided and higher man-machine system productivity.
 - <http://www.ergonomics-info.com/ergonomics-industrial.html>
 - <http://www.hse.gov.uk/pubns/indg90.pdf>
 - Research relevant titles:
 1. Intelligent lift assist devices to increase productivity and reduce ergonomics risk.
 2. Improving hand tools ergonomic value using intelligent decision support system.
 3. Adaptive regression model for synthesizing anthropometric population data of automotive manufacturing plant operators.

4. A study on the main risk factors of work-related musculoskeletal disorders in automotive manufacturing workers.
 5. Age-related operator deficits in a realistic instrument-control task of electronic component assembly line: Assessment of possible motor, cognitive and mental causes.
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Research Grants

UTeM Research Grant, Hyreil Anuar Kasdirin, Elia Erwani Hassan, Nafriuzan Mat Yahya, '*Stability studies of Automatic Generation Control of a Power System using Proportional-Integral Algorithm via Intelligent Control Technique*', - in application review, **RM 9,400**.

UMP Research Grant, Nafriuzan Mat Yahya, Mohd Fadzil Faisae Ab. Rashid, Azlyna Senawi, Mohd Fadzil Abdul Rahim, '*Investigation of Bats Echolocation-Inspired Algorithm to Solve Many Objective Optimisation Problem of Car Side Impact Design*', - in application review, **RM 28,800**.

UMP Research Grant, Azlyna Senawi, Chuan Zun Liang, Nafriuzan Mat Yahya, Rozieana Khairuddin, '*Feature Selection Method based on Adaptive Multi Correlation*', - in awarding process, **RM 20,000**.

PRGS KPT, Ahmad Razlan Yusoff, Wan Azhar Wan Yusoff, Zamzuri Hamedon, Muhammed Nafis Osman Zahid, Mohd Ali Hanafiah Shaharudin, Nafriuzan Mat Yahya, Mukhtar Malik, '*Prototype Development of Optimum Irregular Milling Tools for Chatter Supression in Machining Automotive Product*', 15/08/2017-14/08/2019, **RM 77,698**.

UMP Research Grant, Nafriuzan Mat Yahya, Ahmad Nor Kasruddin Nasir, Azlyna Senawi, Muhammed Nafis Osman Zahid, Hyreil Anuar Kasdirin (UTeM), '*Development of a Multi-Objective Bats Echolocation-Inspired Algorithm to Optimize Metal Cutting Process*', 05/05/2017-04/05/2019, - **RM 23,000**.

Lab2Market MOHE, Wan Azhar Wan Yusoff, Mahadzir Ishak @ Muhammad, Nafriuzan Mat Yahya, Fadhlur Rahman Mohd Romlay, '*Industrial Testing of a 3-Axis CNC Tailor Welded Blank Laser Welding Machine using Predefined Closest-Distance Volume Interpolator*', 15/12/2016-14/12/2017, **RM 150,000**.

UMP Research Grant, Muhammad Nafis Osman Zahid, Nafriuzan Mat Yahya, Zamri Mohamed, Ahmad Razlan Yusoff, Mebrahitom Asmelash Gebremariam, Munira Mohd Ali, '*Cutting Orientations in CNC Machining for Rapid Manufacturing Processes*', 25/06/2015-24/06/2017, **RM 26,000**.

Sciencefund MOSTI, Ahmad Faizal Mohd Zain, Nafriuzan Mat Yahya, Azmin Hashim, Ismayuzri Ishak, Aidil Shafiza, '*Development of Prototype Switchable Intelligent Tuneable Antenna Matching Unit for the HF Band*', 01/08/2012-31/07/2014, **RM 119,000**.

UMP Research Grant, Nafriuzan Mat Yahya, Khairul Fikri Muhammad, Munira Mohd Ali, Shahandzir Baharom, '*Development of Wireless-Controlled Industrial Robot*', 15/07/2012-14/06/2013, **RM 39,400**.

UMP Research Grant, Mahadzir Ishak, Nafrizuan Mat Yahya, Ramli Junid, Syarifah Nur Aqida Syed Ahmad, Khairul Fikri Muhammad, Mohd Fazli Ismail, Zahari Annuar Zakaria, Wan Azhar Wan Yusof, ‘*New Technique of Drilling/Cutting of Polymer Composite for Automotive Part by Low Power Laser*’, 01/08/2011-01/08/2012, **RM 38,000**.

UMP Research Grant, Ajisman, Nafrizuan Mat Yahya, Khairul Fikri Muhammad, Wan Azhar Wan Yusof, ‘*Design and Delevop a Soft Starting and High Efficiency Induction Motor Drive Using Mers Assisted PWM Controller for Robotic Application*’, 01/08/2011-01/08/2012, **RM 27,600**.

Sciencefund MOSTI, Nafrizuan Mat Yahya, Wan Ruslan Yusoff, Khairul Fikri Muhammad, Wan Azhar Wan Yusof, ‘*Development of Image Rotary Encoder for High Precision Motion Control*’, 01/02/2010-31/01/2012, **RM 131,500**.

Sciencefund MOSTI, Wan Azhar Wan Yusof, Nafrizuan Mat Yahya, Wan Ruslan Yusoff, Khairul Fikri Muhammad, Muhammed Nafis Osman Zahid, ‘*Development of Novel Piezoelectric Ultrasonic Motor for CNC Drive System*’, 01/10/2009-30/09/2011, **RM 119,000**.

UMP Research Grant, See Phen Chiak, Nafrizuan Mat Yahya, Khairul Fikri Muhammad, Wan Azhar Wan Yusof, ‘*Development of Image Rotary Encoder for High Precision Motion Control*’, 01/10/2009-30/09/2010, **RM 25,000**.

UMP Research Grant, Shamsuddin Baharin, Nafrizuan Mat Yahya, Nik Mohd Izual Nik Ibrahim, Wan Azhar Wan Yusof, See Phen Chiak, Fadhlur Rahman Mohd Romlay, ‘*Design and Development of a New Passive Shock Absorber System*’, 01/08/2009-31/07/2010, **RM 25,000**.

UMP Research Grant, Muhammed Nafis Osman Zahid, Nafrizuan Mat Yahya, Wan Azhar Wan Yusof, Zamzuri Hamedon, Nik Mohd Izual Nik Ibrahim, ‘*Development of Desktop Injection Molding Machine*’, 01/05/2009-31/10/2010, **RM 39,100**.

Selected Book/Journal/Conference Publications

2017

1. **Book**: *Bat echolocation-inspired algorithms for global optimisation problems*, **Nafrizuan Mat Yahya**, (2017), Penerbit Universiti Malaysia Pahang. ISBN No.: 978-967-2054-47-4.
2. **Article in Journal**: *A Modified Bats Echolocation-Based Algorithm for Solving Constrained Optimisation Problems*, **Yahya, N. M.** and Tokhi, M.O. (2017), International Journal of Bio-Inspired Computation, Vol. 10, No. 1, pp. 12-23.
3. **Conference Proceedings**: **Yahya, N.M.** and Zahid, M.N.O. (2017), *Work-related musculoskeletal disorders (WMDs) risk assessment at core assembly production of electronic components manufacturing company*, 3th International Manufacturing Engineering Conference 2017 (IMEC 2017), 7th – 8th December 2017, Yogyakarta, Indonesia.

2016

1. PhD Thesis: *Bats Echolocation-Inspired Algorithms for Global Optimisation Problems*, March 2016, University of Sheffield, Sheffield, United Kingdom.
2. Article in Journal: *A new bats echolocation-based algorithm for single objective optimisation*, **Yahya, N.M.**, Tokhi, M.O. and Kasdirin, H.A. (2016), *Evolutionary Intelligence*, Vol 9, No. 1, pp. 1-20.
3. Conference Proceedings: **Yahya, N.M.** and Zahid, M.N.O. (2016), *Application of Adaptive Bats Sonar Algorithm for Solving a Single Objective of Practical Business Optimization Problem*, 4th International Conference on Artificial Intelligence and Computer Science 2016 (AICS2016), 27th – 28th November 2016, Langkawi, Malaysia.

2015

1. Conference Proceedings: Kasdirin, H.A., **Yahya, N.M.** and Tokhi, M.O. (2015), *Hybridizing Firefly Algorithm with Invasive Weed Optimization for Engineering Design Problems*, IEEE International Conference on Evolving and Adaptive Intelligent Systems 2015 (IEEE EAIS 15), 1st-3rd December 2015, Douai, France.

2013

1. Article in Journal: *Taguchi Method Approach on Effect of Lubrication Condition on Surface Roughness in Milling Operation*, Shahrom, M.S., **Yahya, N.M.**, and Yusoff, A.R. (2013), *Procedia Engineering*, 53, 594-599.

2012

1. Conference Proceedings: Shahrom, M.S., **Yahya, N.M.**, and Yusoff, A.R. (2012), *Taguchi Method Approach on Effect of Lubrication Condition on Surface Roughness in Milling Operation*, Malaysian Technical Universities Conference on Engineering and Technology (MUCET 2012), 20th-21st November 2012, Perlis, Malaysia.
2. Conference Proceedings: Aziz, A.N.F, **Yahya, N.M.** and Yusoff, A.R. (2012), *Review on Elements of JIT Implementation*, International Conference on Automotive, Mechanical and Materials Engineering (ICAMME'2012), 19th-20th May 2012, Penang, Malaysia.

2011

1. Article in Book: *A Refined Differential Evolution for Improving Optimization Process*, Yusoff, A.R. and **Yahya, N.M.**, (2011). *Communications in Computer and Information Science*, Volume 252 CCIS, Issue Part 2 pp 184-194 ISSN: 18650929, ISBN:978-364225452-9.
2. Conference Proceedings: Zahid, M.N.O., **Yahya, N.M.**, Ali, M.M. and Johan, K. (2011), *Review on CNC-Rapid Prototyping*, 1st International Conference on Mechanical Engineering Research (ICMER2011), 5th-7th December 2011, Kuantan, Malaysia.

3. Conference Proceedings: Yusoff, A.R., **Yahya, N.M.**, and Suffian, M.R.Z.M. (2011), *Improvement of Milling Tool Geometry Optimization using a Refined Differential Evolution Algorithm for Chatter Avoidance*, 26th International Conference on CAD/CAM, Robotics and Factories of the Future 2011(CARs&FOF2011), 26th-28th July 2011, Kuala Lumpur, Malaysia.
4. Conference Proceedings: **Yahya, N.M.**, (2011), *Tuning of Optimum PID Controller of Servo Motion System using PSO Algorithm*, Department of Manufacturing Engineering's Engineering Letters, FKP Colloquium Vol. 1.

2010

1. Conference Proceedings: Mon, T.T., **Yahya, N.M.**, and Senawi, A. (2010), *Characterization of Laser Beam Intensity used for Machining*, Malaysian Technical Universities Conference and Exhibition on Engineering and Technology (MUCEET 2010), 28th-29th June 2010, Melaka, Malaysia.

2009

1. M.Eng Thesis: *Performance Improvement of Feedback Drive System by Optimizing PID Controller Parameter Using Particle Swarm Optimization Algorithm*, September 2009, Universiti Malaysia Pahang, Kuantan, Malaysia

2007

1. Conference Proceedings: Yusoff, W.A.W., **Yahya, N.M.** and Senawi, A. (2007), *Tuning of Optimum PID Controller Parameter using Particle Swarm Optimization Algorithm Approach*, Malaysian Technical Universities Conference and Exhibition on Engineering and Technology (MUCEET 2010), 28th-29th June 2010, Melaka, Malaysia.

2004

1. B.Eng Thesis: *Effects of Noise on Industrial Worker in Malaysia*, April 2004, Universiti Sains Malaysia, Penang, Malaysia.
 2. Article in Webpage: **Yahya, N.M.** and Muhammad, W.M.W. (2004), *An Overview of Assembly Lines Balancing*, KUKTEM K-Portal.
 3. Article in Webpage: **Yahya, N.M.** and Muhammad, W.M.W. (2004), *Flexible Assembly System*, KUKTEM K-Portal.
 4. Article in Webpage: **Yahya, N.M.** and Muhammad, W.M.W. (2004), *An Overview of Teaching Factory Concept*, KUKTEM K-Portal.
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Students Supervisory Assignments

- **PhD (on-going):** Nur Iffah Mohamed Azmi; PID parameter optimization for CNC adaptive servo control system utilizing particle swarm optimization-design of experiment (PSO-DOE) algorithm. - **Co-Supervisor.**
- **MSc (on-going):** Nur Atikah Nor'azlan; Development of a multi-objective bats echolocation-inspired algorithm to optimise metal cutting process. – **Main Supervisor.**
- **MSc (on-going):** Nurainaa Elias; Intelligent lift assist devices to increase productivity and reduce ergonomics risk. – **Main Supervisor.**
- **BEng Final Year Project (on-going):** Mohammad Izzuddin Jabaruddin; Development of a prototype overhead crane system. – **Main Supervisor.**
- **BEng Final Year Project (on-going):** Ho Jun Fu; Optimisation of the overhead crane control system using bats echolocation-inspired algorithm. – **Main Supervisor.**
- **BEng Final Year Project (on-going):** Izzat Khairi Muhammad Kamil; Effects of noise at production floor to the workers. – **Main Supervisor.**
- **BEng Final Year Project (on-going):** Muhammad Nazmi Osman; Effects of heat and humidity at production floor to the workers. – **Main Supervisor.**
- **BEng Final Year Project (on-going):** Nurhanisah Abdul Halim; Comparison study of adaptive bats sonar algorithm and particle swarm optimisation algorithm to solve engineering design problems. – **Main Supervisor.**
- **BEng Final Year Project (on-going):** Wong Yu Heng; Dimensionality reduction using nature-inspired algorithm. – **Main Supervisor.**
- **M. Industrial Eng. Dissertation (2017):** Muhammad Azhan Syahmi Nor Azlan; A case study of evaluating work posture in core assembly production at VAC (M) Sdn Bhd using RULA & REBA for WMSD's risk assessment. – **Main Supervisor.**
- **BEng Final Year Project (2017):** Er Hong Sing; MATLAB-based simulation for performance analysis of fuzzy logic temperature and humidity control system in pharmaceutical warehouse. – **Main Supervisor.**
- **BEng Final Year Project (2017):** Tan Hon Seng; Application of adaptive bats sonar algorithm to minimize car side impact design. – **Main Supervisor.**
- **BEng Final Year Project (2017):** Nurainaa Elias; An ergonomic prototype of adjustable chin stand aid for visual mechanical inspection at electronic manufacturing based company in Kuantan, Malaysia. – **Main Supervisor.**
- **BEng Final Year Project (2017):** Hanif Hajis; Investigation of foot control in electric wheelchair. – **Main Supervisor.**
- **BEng Final Year Project (2012):** Aina Azliyana Mohamad; Development of auto-tuning PID controller for DC motor using extremum seeking optimization method. – **Co-Supervisor.**
- **BEng Final Year Project (2012):** Siti Hazlina Mokhtar; Development of statistical process control (SPC) MATLAB-based software for automotive industries application. – **Main Supervisor.**
- **BEng Final Year Project (2012):** Mohamad Syahmi Shahrom; Performance analysis of cutting fluid on cutting surface during milling operation using design of experiment (DOE) technique. – **Main Supervisor.**

- **BEng Final Year Project (2012):** Nurul Fateha Abd Aziz; A case study on implementation of JIT production system for better production performance in Malaysian automotive industry. – **Main Supervisor.**
- **BEng Final Year Project (2012):** Koh Cek Seng; A case study on production improvement through optimization of line balancing technique in a small and medium-size industries (SMIs) manufacturing firms. – **Main Supervisor.**
- **BEng Final Year Project (2009):** Syed Mohd Safwan Bin Sayed Md Saifuddin; Development of control system for automated guided vehicle (AGV). – **Co-Supervisor.**
- **BEng Final Year Project (2009):** Mohd Aizat Mohd Azizan; Design and prototype of loading and unloading mechanism for automated guided vehicle (AGV). – **Co-Supervisor.**
- **BEng Final Year Project (2009):** Mohd Syimir Haziq Bin Noor Zainal; Characterization of laser beam intensity used for machining. – **Co-Supervisor.**
- **BEng Final Year Project (2008):** Ma'arof Mohammad Othman; Improvement and optimization of automatic dish washer machine. – **Co-Supervisor.**
- **BEng Final Year Project (2008):** Muhammad Safwan Zakaria; Development of incremental forming machine. – **Co-Supervisor.**
- **BEng Final Year Project (2008):** Shahrul Faiz Sabir Ahmad; Automated rostrum system. – **Co-Supervisor.**
- **BEng Final Year Project (2008):** Khairul Azmil Adzmi; Motor speed controller using fuzzy-logic. – **Co-Supervisor.**
- **BEng Final Year Project (2008):** Ismayuzri Ishak; Small cleaning robot. – **Co-Supervisor.**
- **BEng Final Year Project (2007):** Shahfiran Sarifuddin; Productivity improvement through line balancing technique in a small medium enterprise (SME) manufacturing plant. – **Co-Supervisor.**
- **BEng Final Year Project (2007):** Mohd Yusri Yusof; Development of the user friendly spreadsheet based SPC (Statistical Process Control) on SME company. – **Co-Supervisor.**
- **BEng Final Year Project (2007):** Nurhidayah Ismail; A plastic injection moulding process optimization using design of experiment. – **Co-Supervisor.**
- **BEng Final Year Project (2007):** Mohamad Sukri Moin; Improve and optimize of automatic dish washer machine. – **Co-Supervisor.**
- **BEng Final Year Project (2007):** Abdul Hafiz Mohamad; Design and development of autonomous guided vehicle. – **Co-Supervisor.**
- **BEng Final Year Project (2007):** Muhammad Altaf A. Jalil; Design and development PID digital control for cutting speed. – **Co-Supervisor.**
- **BEng Final Year Project (2006):** Naufeera Muaz; Development of an analog PID controller for mechanical control system application. – **Co-Supervisor.**
- **BEng Final Year Project (2006):** Raja Mohd Azlan Raja Ismail; Development of an automatic dish washer. – **Co-Supervisor.**

Teaching Assignment Experiences

- Industrial Ergonomics (M.Ind.Eng)
 - Control System Engineering (Undergraduate)
 - Artificial Intelligence System (Undergraduate)
 - Sensor and Instrumentation System (Undergraduate)
 - Computer Programming (Undergraduate)
 - Electrical Technology (Undergraduate)
 - Electronics Technology (Undergraduate)
 - CAD Modeling (Undergraduate)
 - Manufacturing Processes I (Undergraduate)
 - Occupational Safety and Health (Undergraduate)
 - Engineers in Society (Undergraduate)
 - Project Management (Undergraduate)
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Professional Activities and Recognition

- Graduate Member (No. 51430A), Board of Engineer Malaysia (BEM).
- Member (No. 118911), International Association of Engineers (IAENG).
- Fellow Researcher, Automotive Engineering Centre, Universiti Malaysia Pahang.
- Program Committee Member, 3rd International Manufacturing Engineering Conference (iMEC 2017), 7th – 8th Dec 2017, Yogyakarta, Indonesia.
- Technical reviewer for the book entitled: *‘Easy Step - Application In Matlab Software: Fuzzy Logic System With Engineering Applications’* to be publish under Penerbit UMP.
- Reviewer for many international conference papers.
- **Gold Medal**, for the project: “Fundamental Engineering Assessment: A Case Study in Higher Learning Institutions” by Muhammed Nafis Osman Zahid and **Nafrizuan Mat Yahya**, UMP TVET Exposition 2017, 19th-20th September 2017, Kuantan, Malaysia.
- **Silver Medal**, for the project: “A New Tool Geometry for Deep Drilling Process” by Ahmad Razlan Yusoff, **Nafrizuan Mat Yahya** and Mohd Hazwan Syafiq Harun, Creation, Innovation, Technology and Research Exposition (CITREx) 2017, 15th-16th March 2017, Kuantan, Malaysia.
- **Best Research Paper**, for the paper: T.T. Mon, **M.Y. Nafrizuan** and S. Azlyna, “Characterization of Laser Beam Intensity used for Machining”, Malaysian Technical Universities Conference and Exhibition on Engineering and Technology (MUCEET 2010), June 28-29, 2010, Melaka, Malaysia.
- **Silver Medal**, for the project: “Multi-Axial Fixing Elements (MAFE) an Innovative Product to Effectively Manage Most Clinically Unstable Situation of the Bone” by Zamzuri Hamedon, Badrul Akmal Hisham Md Yusoff, **Nafrizuan Mat Yahya** and Shahandzir Baharom, International Exposition of Research and Invention of Institutions of Higher Learning 2009. 8th-10th October 2009, Kuala Lumpur.
- **Gold Medal**, for the project: “Pc Based CNC Controller” by Wan Azhar Wan Yusoff, Fadhlur Rahman Mohammad Romlay and **Nafrizuan Mat Yahya**, 17th International Invention, Innovation and Technology Exhibition 2006. 19th-21st May 2006, Kuala Lumpur.