

WAHYU CAESARENDRA

Lecturer

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SUMMARY

Wahyu Caesarendra was born in Jakarta, Indonesia on January 31st, 1982. He received Bachelor of Engineering degree from Diponegoro University, Indonesia in 2005. He worked in automotive and electrical company prior to join Diponegoro University as a Lecturer in 2007. He received New University for Regional Innovation (NURI) and Brain Korea 21 (BK21) scholarships for Master study in 2008 and obtained his Master of Engineering (M.Eng) degree from Pukyong National University, South Korea in 2010. In 2011, Wahyu Caesarendra was awarded of University Postgraduate Award (UPA) and International Postgraduate Tuition Award (IPTA) from University of Wollongong. He received Doctor of Philosophy (Ph.D) degree from University of Wollongong in 2015. He published more than 25 research articles in Journals and Conference proceedings. One of them was being the top 25 most cited paper in Mechanical Systems and Signal Processing Journal. He has developed skills and experience in scholarly research, teaching and learning activities. He is currently Postdoctoral Fellow in Rolls-Royce@NTU Corp Lab, School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore.

EDUCATION

- Ph.D** University of Wollongong, Australia (Feb 2011 - Dec 2015)
School of Mechanical, Materials and Mechatronics Engineering,
Faculty of Engineering and Information Sciences
PhD Thesis:
"Vibration and acoustic emission-based condition monitoring and prognosis methods for very low speed slew bearing"
- M.Eng** Pukyong National University, South Korea (Feb 2008 - Feb 2010)
(Hons.) School of Mechanical Engineering, Mechanical Design Engineering Department
Master of Engineering Thesis:
"Model-based and data-driven approach for machine prognostics"
Credits: 24; GPA: 4.44 (scale 4.5); Predicate: Cum Laude
- B.Eng** Diponegoro University, Indonesia (Aug 2000 - Aug 2005)
(Hons.) Faculty of Engineering, Mechanical Engineering Department
Final Year Project Title:
"Development of vibration educational apparatus based on virtual instrument for dynamic analysis"
Credits: 150; GPA: 3.09 (scale 4); Predicate: Very satisfactorily

RESEARCH INTERESTS

- ✓ Vibration, acoustic emission and bio-medical signal processing.
- ✓ Vibration condition monitoring, feature extraction, intelligent fault diagnosis and prognosis.
- ✓ Pattern recognition, artificial intelligence and machine learning.
- ✓ Mechatronics and bio-mechatronics, instrumentation and control system.

AWARDS

- ✓ Nanyang Technological University (NTU) Postdoctoral Research Fellow (2017 - 2018).
- ✓ UPA and IPTA scholarships from University of Wollongong (2011 - 2014).
- ✓ NURI and BK21 scholarships from Pukyong National University (2008 - 2010).

PUBLICATIONS

Book Chapter

Caesarendra, W., Kosasih, B., Choi, B.K., Tieu, K., Moodie, C.A.S., Chapter 12: Condition Monitoring of Naturally Damaged Slewing Bearing Based on EMD and EEMD. In: Lee, W.B., Choi, B.K., Ma, L., Mathew, J., eds. *Towards Integration and Interoperability in Engineering Asset Management*, Springer.

Journals

Pappachan, B.K., Caesarendra, W., Tjahjowidodo, T., Wijaya, T., "Frequency domain analysis of sensor data for event classification in real-time robot assisted deburring," *Sensors* 17(6) (2017) 1-18.

Caesarendra, W., Tjahjowidodo, T., Tieu, K., Kosasih, B., "Integrated condition monitoring and prognosis method for incipient defect detection and remaining life prediction of low speed slew bearings," *Machines* 5(2) (2017) 1-20.

Pandiyan, V., Caesarendra, W., Tjahjowidodo, T., Praveen, G., "Predictive modelling and analysis of process parameters on material removal characteristics in abrasive belt grinding process," *Applied Sciences* 7(4) (2017) 1-17.

Caesarendra, W., Ariyanto, M., Pambudi, K.A., Lekson, S.U., "Classification of EEG signals for eye focuses using artificial neural network," *Internetworking Indonesia Journal* 9(1) (2017) 15-20.

Putri, F., Caesarendra, W., Pasmanasari, E.D., Ariyanto, M., Setiawan, J.D., "Parkinson disease detection based on voice and EMG pattern classification method for Indonesian case study," *International Journal of Intelligent Engineering and Systems*. (Accepted for publication in 2017).

Lekson, S.U., Caesarendra, W., Tjahjowidodo, T., Agung, M., "Mental tasks EEG signal classification using support vector machine," *International Journal of Intelligent Engineering and Systems*. (Accepted for publication in 2017).

Caesarendra, W., Irfan, M., "Classification method of hand gestures based on support vector machine," *International Journal of Intelligent Engineering and Systems*. (Accepted for publication in 2017).

Haryanto, I., Ariyanto, M., Caesarendra, W., Dewoto, H.K., "Development of speech control for robotic hand using neural network and stream processing method," *Internetworking Indonesia Journal* 9(1) (2017) 59-64.

Caesarendra, W., Kosasih, B., Tieu, A.K., Zhu, H., Zhu, Q., Moodie, C.A.S., "Acoustic emission based condition monitoring method: review and application for low speed slew bearing," *Mechanical Systems and Signal Processing* 72-73 (2016) 134-159.

Caesarendra, W., Kosasih, B., Tieu, A.K., Moodie, C.A.S., "Application of the largest Lyapunov exponent algorithm for feature extraction in slow speed slew bearing condition monitoring," *Mechanical Systems and Signal Processing* 50-51(2015) 116-138.

Caesarendra, W., Wibowo, D.B., Ariyanto, M., Setiawan, J.D., "An application of mathematical morphology operators as features extraction method for low speed slew bearing condition monitoring," *Journal of Robotics and Mechanical Engineering Research* 1(3) (2015) 1-13.

Caesarendra, W., Kosasih, B., Tieu, A.K., Moodie, C.A.S., "Circular domain feature based condition monitoring for low speed slewing bearing," *Mechanical Systems and Signal Processing* 45 (2014) 114-138.

Caesarendra, W., Kosasih, B., Tieu, A.K., Moodie, C.A.S., Choi, B.K., "Condition Monitoring of naturally damaged slow speed slewing bearing based on ensemble empirical mode decomposition," *Journal of Mechanical Science and Technology* 27 (8) (2013) 2253-2262.

Caesarendra, W., Widodo, A., Yang, B.S., "Combination of probability approach and support vector machine towards machine health prognostics," *Probabilistic Engineering Mechanics* 26(2) (2011) 165-173.

Caesarendra, W., Thom, P.H., Widodo, A., Yang, B.S., Setiawan, J.D., "Combined probability approach and indirect data-driven method for bearing degradation prognostics," *IEEE Transactions on Reliability* 60(1) (2011) 14-20.

Widodo, A., Shim, M.C., Caesarendra, W., Yang, B.S., "Intelligent prognostics for battery health monitoring based on sample entropy," *Expert Systems with Applications* 38(9) (2011) 11763-11769.

Caesarendra, W., Niu, G., Yang, B.S., "Machine condition prognosis based on sequential Monte Carlo method," *Expert Systems with Applications* 37(3) (2010) 2412-2420.

Caesarendra, W., Widodo, A., Yang, B.S., "Application of relevance vector machine and logistic regression for machine degradation assessment," *Mechanical Systems and Signal Processing* 24(4) (2010) 1161-1171.

Oh, J.S., Yang, S.W., Shim, M.C., Caesarendra, W., Yang, B.S., Lee, W.H., "Condition monitoring for coil break using features of stationary rolling region," *Transactions of the Korean Society for Noise and Vibration Engineering* 19(12) (2009) 1252-1259.

Conference Papers

Pappachan, B.K., Caesarendra, W., Tjahjowidodo, T., Wijaya, T., "Remote wireless monitoring in robot assisted manufacturing processes," 3rd International Conference on Industrial Internet of Things (ICIIOT), 23-25 August 2017, Bali, Indonesia.

Caesarendra, W., Tjahjowidodo, T., Sutopo, D., "EMG based classification of hand gestures using PCA and ANFIS," 2nd International Conference on Informatics, Robotics, Network, Control and Systems (IRONCONS), 23-25 August 2017, Bali, Indonesia.

Diana, A.E., Caesarendra, W., Tjahjowidodo, T., Nuraldi, F.G., "A classification of human emotion EEG signal using bandpass filter and independent component analysis," 2nd International Conference on Informatics, Robotics, Network, Control and Systems (IRONCONS), 23-25 August 2017, Bali, Indonesia.

Pappachan, B.K., Caesarendra, W., Tjahjowidodo, T., Wijaya, T., "Remote wireless monitoring in robot assisted manufacturing processes," 3rd International Conference on Industrial Internet of Things (ICIIOT), 23-25 August 2017, Bali, Indonesia.

Caesarendra, W., Ismail, R., Kurniawan, D., Karwiy, G., Ahmad, C., "Sudden cardiac death predictor based on spatial QRS-T angle feature and support vector machine," In: *Proceeding of 2016 IEEE Conference on Biomedical Engineering and Sciences (IECBES)*, 4-8 December 2016, Kuala Lumpur, Malaysia.

Ariyanto, M., Ismail, R., Nurmiranto, A., Caesarendra, W., Paryanto, Franke, J., "Development of a low cost anthropomorphic robotic hand driven by modified glove sensor and integrated with 3D animation," In: *Proceeding of 2016 IEEE Conference on Biomedical Engineering and Sciences (IECBES)*, 4-8 December 2016, Kuala Lumpur, Malaysia.

Ismail, R., Ariyanto, M., Caesarendra, W., Haryanto, I., Dewoto, H.K., Paryanto, "Speech control of robotic hand augmented with 3D animation using neural network," In: *Proceeding of 2016 IEEE Conference on Biomedical Engineering and Sciences (IECBES)*, 4-8 December 2016, Kuala Lumpur, Malaysia.

Caesarendra, W., Ariyanto, M., Pambudi, K.A., Lekson, S.U., "Classification of EEG signals for eye focuses using artificial neural network," In: *Proceeding of 2016 International Conference on Informatics, Robotics, Network, Control and Systems (IRONCONS)*, 23-25 November 2016, Bandung, Indonesia.

Putri, F., Caesarendra, W., Pasmansari, E.D., Ariyanto, M., Setiawan, J.D., "Parkinson disease detection based on voice and EMG pattern classification method for Indonesian case study," In: *Proceeding of 2016 International Conference on Informatics, Robotics, Network, Control and Systems (IRONCONS)*, 23-25 November 2016, Bandung, Indonesia.

- Lekson, S.U., [Caesarendra, W.](#), Tjahjowidodo, T., Agung, M., "Mental tasks EEG signal classification using support vector machine," In: Proceeding of 2016 International Conference on Informatics, Robotics, Network, Control and Systems (IRONCONS), 23-25 November 2016, Bandung, Indonesia.
- [Caesarendra, W.](#), Irfan, M., "Classification method of hand gestures based on support vector machine," In: Proceeding of 2016 International Conference on Informatics, Robotics, Network, Control and Systems (IRONCONS), 23-25 November 2016, Bandung, Indonesia.
- Putri, F.T., Ariyanto, M., Haryanto, I., Arozi, M., [Caesarendra, W.](#), Hanan, M.R.I., "Development of unmanned aerial vehicle (UAV) ornithopter with wireless radio control," In: Proceeding of 2016 3rd International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE), 19-20 October 2016, Semarang, Indonesia.
- Arozi, M., Putri, F.T., Ariyanto, M., [Caesarendra, W.](#), Widyotriatmo, A., Munadi, Setiawan, J.D., "Electromyography (EMG) signal recognition using combined discrete wavelet transform based on artificial neural network (ANN)," In: Proceeding of 2nd International Conference of Industrial, Mechanical, Electrical, and Chemical Engineering (ICIMECE), 6-7 October 2016, Yogyakarta, Indonesia.
- [Caesarendra, W.](#), Widyotriatmo, A., Lekson, S.U., Mustaqim, K.A., "A pattern classification method of hand EMG signals based on principal component analysis and artificial neural network," In: Proceeding of 4th International Conference on Instrumentation, Control and Automation (ICA), 29-31 August 2016, Bandung, Indonesia.
- Ismail, R., Ariyanto, M., [Caesarendra, W.](#), Nurmianto, A., "Development of robotic hand integrated with SimMechanics 3D animation," In: Proceeding of International Seminar on Intelligent Technology and Its Applications (ISITIA), 28-30 July 2016, Indonesia.
- [Caesarendra, W.](#), Putri, F.T., Ariyanto, M., Setiawan, J.D., "Pattern recognition methods for multi stage classification of Parkinson's disease utilizing voice features," In: Proceeding of 2015 IEEE International Conference on Advanced Intelligent Mechatronics (AIM), 7-11 July 2015, Busan, South Korea.
- Ariyanto, M., [Caesarendra, W.](#), Mustaqim, K.A., Irfan, M., Pakpahan, J.A., Setiawan, J.D., "Finger movement pattern recognition method using artificial neural network based on electromyography (EMG) sensor," In: Proceeding of 2015 International Conference on Automation, Cognitive Science, Optics, Micro Electro-Mechanical System, and Information Technology (ICACOMIT), 7-11 July 2015, Bandung, Indonesia.
- [Caesarendra, W.](#), Ariyanto, M., Lekson, S.U., Pasmansari, E.D., Chang, C.R., Setiawan, J.D., "EEG based pattern recognition method for classification of different mental tasking: Preliminary study for stroke survivors in Indonesia," In: Proceeding of 2015 International Conference on Automation, Cognitive Science, Optics, Micro Electro-Mechanical System, and Information Technology (ICACOMIT), 7-11 July 2015, Bandung, Indonesia.
- [Caesarendra, W.](#), Ariyanto, M., Setiawan, J.D., Arozi, M., Chang, C.R., "A pattern recognition method for stage classification of Parkinson's disease utilizing voice feature," In: Proceeding of 2014 IEEE Conference on Biomedical Engineering and Science, 8-10 December 2014, Miri, Sarawak, Malaysia.
- [Caesarendra, W.](#), Kosasih, B., Tieu, A.K., Moodie, C.A.S., "Degradation trend estimation and prognosis of large low speed slewing bearing lifetime," In: Proceeding of 1st International Conference on Mechanical Engineering (ICOME), September 12-14, 2013, Lombok, Indonesia.
- [Caesarendra, W.](#), Kosasih, B., Tieu, A.K., Moodie, C.A.S., "An application of nonlinear feature extraction - A case study for low speed slewing bearing condition monitoring and prognosis," In: Proceeding of 2013 IEEE/ASME International Intelligent Mechatronics (AIM), July 9-12, 2013, Wollongong, Australia.
- [Caesarendra, W.](#), Kosasih, B., Tieu, A.K., Moodie, C.A.S., "Condition monitoring of low speed slewing bearing based on largest Lyapunov exponent algorithm and circular-domain feature extractions," In: Proceeding of the 26th International Congress of Condition Monitoring and Diagnostic Engineering Management (COMADEM), June 11-13, 2013, pp. 312-319, Helsinki, Finland.
- [Caesarendra, W.](#), Kosasih, P.B., Tieu, A.K., Ariyanto, M., "Vibration online condition monitoring system for slow speed slewing bearing based on file transfer protocol and web," In: Proceeding of International Joint Conference on Advanced Engineering 2012, Semarang, Indonesia.

Caesarendra, W., Ariyanto, M., and Suyanto, D.B., "Attitude and altitude control design of quadrotor unmanned aerial vehicle in hover flight condition," In: Proceeding of the International Conference on Informatics for Development, November 2011, Yogyakarta, Indonesia.

Caesarendra, W., Widodo, A., Thom, P.H., and Yang, B.S., "Machine degradation prognostic based on RVM and ARMA/GARCH model for bearing fault simulated data," IEEE – Prognostics and System Health Management (PHM) Conference, January 2010, Macao, P.R. China.

Yang, S.W., Widodo, A., Caesarendra, W., Oh, J.S., Shim, M.C., Kim, S.J., Yang, B.S., and Lee, W.H., "Support vector machine and discrete wavelet transform method for strip rupture detection based on transient current signal," In: Proceeding of the 4th World Congress on Engineering Asset Management (WCEAM), September 2009, Athens, Greece.

Caesarendra, W., Yang, B.S., Kim, S.J., "Performance comparison of particle filter and Kalman filter methods for fatigue crack propagation prediction," In: Proceeding of 3rd International Symposium on Advanced Engineering (ISAE), February 2009, Busan, South Korea, pp.165-167.

Caesarendra, W., and Yang, B.S., "Sequential Monte Carlo method for machine prognosis applied in real dynamic system," In: Proceeding of 8th International Symposium of the Advanced Mechanical and Power Engineering (ISAMPE), October 2008, South Korea, pp. 250-255.

Journals (under review)

Caesarendra, W., Kosasih, B., Tieu, K., Tjahjowidodo, T., "A review study of feature extraction for low speed slew bearing condition monitoring utilizing vibration signal," *Machines*.

Pandiyani, V., Tjahjowidodo, T., Caesarendra, W., Hao, T.H., "In-Process tool condition monitoring in compliant abrasive belt grinding process using support vector machines and genetic algorithm," *Journal of Manufacturing Processes*.

Other Achievements

- Invited speaker in International Conference on Informatics, Robotics, Network, Control and Systems (IRONCONS 2016) 23-25 November 2016, Bandung Indonesia.
- Best paper award in The IEEE Conference on Biomedical Engineering and Sciences 2016 (IECBES 2016), , 4-8 December 2016, Kuala Lumpur Malaysia.
- Best Paper Award, International Conference on Industrial Internet of Things (ICIOT), 23-25 November 2016, Bandung Indonesia.

Patents

- Indonesia Patent with title "Robotic hand driven by flex and EMG sensors." Patent Number 2016/S/00046.
- Indonesia Patent with title (in Bahasa) "Suatu Metode Pendeteksian Penyakit Parkinson dengan Menggunakan Pengenalan Pola Sinyal Suara dan Sinyal Electromyography (EMG)." Patent Number S00201606698.

EXTERNAL ACTIVITIES

- ✓ Guest editor for special issue in *Shock and Vibration* journal. The special issue title: "Fault Diagnosis and Prognosis of Critical Components".
- ✓ Reviewing journal manuscripts for international journals: *Mechanical Systems and Signal Processing*, *Measurement*, *Applied Acoustics*, *Biomedical Signal Processing and Control*, *Shock and Vibration* journal, *Mathematical Problems in Engineering*, *Journal of Process Mechanical Engineering*, *International Journal of Precision Engineering and Manufacturing*, *Sensors and Experimental Techniques*.

TEACHING AND SUPERVISING

Contribute, develop and deliver the following courses:

- ✓ Undergraduate courses in Mechanical Engineering Department, Diponegoro University:
 1. Mechanical Drawing
 2. Engineering Measurement
 3. Control Systems
 4. Numerical Methods
 5. Mechatronics
 6. Mechanical Vibrations
- ✓ Undergraduate and postgraduate courses in University of Wollongong (as a Tutor during PhD study):
 1. Engineering Computing (ENGG 952)
 2. Engineering Analysis (MECH 201)
 3. Engineering Fluid Mechanics (ENGG 252)
 4. Finite Element Methods in Engineering (MECH 419)

Please note that the course codes above were actual course codes from University of Wollongong's Mechanical Engineering program for undergraduate and postgraduate students.
- ✓ Postgraduate courses in Mechanical Engineering Department, Diponegoro University:
 1. Sensor and Instrumentation
 2. Engineering Analysis 1
 3. Design Methodology and Product Development

Supervise Final Year Project (FYP) and Thesis:

In Mechanical Engineering Department, Diponegoro University

- ✓ 9 Bachelor of Engineering students; 1 Master of Engineering students; and 2 PhD students.

As a co-supervisor In School of Mechanical and Aerospace Engineering, Nanyang Technological University

- ✓ 2 Bachelor of Engineering students and 1 PhD student.

ADMINISTRATION, MANAGEMENT AND LEADERSHIP

- Head of quality assurance development program of Mechanical Engineering Department. Role: preparing documents to achieve the certification ISO9001:2015. (Granted in 2016).
- Curriculum development of Mechanical Engineering Department, Diponegoro University (2016). Role: assessing the Bachelor of Engineering course syllabus.
- National reviewer for research proposals and grants in Indonesia (2015 - now). Role: assessing and selecting potential proposals submitted by lecturers from all Universities in Indonesia. The successful proposal will be funded by Ministry of Research and Higher Education, Indonesia. The national reviewers are selected based on the level of *h*-index from Scopus website.
- Academic advisor for undergraduate student (2015-2017). I have responsibility to monitor, support, and supervise all external student activities e.g. national robotics competition, shell-eco marathon asia, student research activities, sports, and industrial internships.
- ✓ Accreditation for Bachelor of Mechanical Engineering program (in 2007) and for doctoral program of Mechanical Engineering (in 2016). Role: Preparing the accreditation documents to obtain the accreditation grade from Ministry of Research and Higher Education.

RESEARCH GRANTS

- ✓ Title: Parkinson Disease detection and classification based on voice and EMG signal processing methods. Funded by Ministry of Research and Higher Education (2014-2015).
- ✓ Title: Design and development of prosthetic hand based EMG sensor for below elbow amputee in Indonesia. Funded by Indonesian Navy and dr. Ramelan Naval Hospital (2015-2016).
- ✓ Title: Development of wireless ECG signal measurement. Funded by Faculty of Engineering, Diponegoro University (2016).
- ✓ Design and development of hand robotic exoskeleton for stroke patient in Indonesia. Funded by Diponegoro University and dr. Kariadi General Hospital (2016-2017).

REFERENCES

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