



# HO Hann Woei

My research focuses on bio-inspired vision and control, machine learning, advanced flight control, Micro Air Vehicle (MAV) design, and swarm. It involves creating autonomous MAVs by integrating theory and practice, which are extremely challenging, yielding numerous publications as the first/corresponding author, including IEEE Transactions on Robotics (**T-RO**), Aerospace Science and Technology (**AESCTE**), Robotics and Autonomous Systems (**RAS**), Journal of Aerospace Information Systems published by American Institute of Aeronautics and Astronautics (**AIAA**), Robotics: Science and Systems (**RSS**), IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), and other prestigious journals. I have successfully secured several highly competitive national grants and been awarded various prizes in both national and international conferences/competitions, including two best paper awards and four technology challenge awards.

## Personal Data

Nationality Malaysian  
Date of Birth September 1984  
Fluency Malay, English, Chinese

## Education/ Research

2013–2017 **Ph.D. Degree**, *Delft University of Technology (TU Delft)*, Delft, The Netherlands  
Aerospace Engineering  
2010–2012 **MSc. Degree**, *Delft University of Technology (TU Delft)*, Delft, The Netherlands  
Aerospace Engineering (Distinction/ cum laude)  
2005–2009 **BEng. Degree**, *Universiti Sains Malaysia (USM)*, Nibong Tebal, Malaysia  
Aerospace Engineering (Gold Medal)

## Working Experience

2017–current **Senior Lecturer/ Assistant Professor**, *Universiti Sains Malaysia (USM)*

- **UAV Laboratory Manager**, School of Aerospace Engineering
- **Coordinator for the Career and Alumni Unit**, School of Aerospace Engineering
- **Advisor for the Drone Club**, USM

2017–2023 **Guest Researcher**, *Department of Control & Operations, Faculty of Aerospace Engineering, Delft University of Technology (TU Delft)*, The Netherlands

2019 **Visiting Scholar**, *Northwestern Polytechnical University*, China

2018–2019 **University Associate**, *Curtin University of Technology*, Malaysia

2010 **Design Engineer**, *Matromatic Handling Systems (M) SDN. BHD.*, Malaysia

2009 **Production Engineer**, *Shimano Components (M) SDN. BHD.*, Malaysia

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## Research Publications

(\*corresponding authors)

Selected Articles:

- [1] **H. W. Ho\***, G. C. H. E. de Croon, E. van Kampen, Q. P. Chu, and M. Mulder, *Adaptive gain control strategy for constant optical flow divergence landing*, IEEE transactions on robotics, 34(2):508-516, 2018. **(SCI, JCR Ranked 2/26, 6% in ROBOTICS, IF 6.483)**
- [2] **H. W. Ho\***, C. De Wagter, B. D. W. Remes, and G. C. H. E. de Croon, *Optical-flow based self-supervised learning of obstacle appearance applied to MAV landing*, Robotics and Autonomous Systems, 100:78-94, 2018. **(SCI, JCR Ranked 45/134, 33% in COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE, IF 2.928)**
- [3] **H. W. Ho\***, C. De Wagter, B. D. W. Remes, and G. C. H. E. de Croon, *Optical flow for self-supervised learning of obstacle appearance*, in IEEE/RSJ International Conference on Intelligent Robots and Systems, 2015 (**IROS 2015**) (IEEE, Hamburg, Germany, 2015)
- [4] Y. Zhou, **H. W. Ho\***, Q. Chu, *Extended Incremental nonlinear dynamic inversion for optical flow control of micro air vehicles*, Aerospace Science and Technology, 106889, 2021. **(SCI, JCR Ranked 2/34, 4% in ENGINEERING, AEROSPACE, IF 5.457)**
- [5] H. Y. Lee, **H. W. Ho\***, Y. Zhou, *Deep learning-based monocular obstacle avoidance for unmanned aerial vehicle navigation in tree plantations*, Journal of Intelligent and Robotic Systems, 101(1):1-18, 2021. **(SCI, JCR Ranked 78/145, 53% in COMPUTER SCIENCE, ARTIFICIAL INTELLIGENCE, IF 3.129)**
- [6] **H. W. Ho**, Y. Zhou, *Incremental Nonlinear Dynamic Inversion based Optical Flow Control for Flying Robots: An Efficient Data-driven Approach*, in Robotics: Science and Systems, 2023 (**RSS 2023**) (Daegu, Republic of Korea, 2023)

Others:

- [7] Zhi Wei Lee, Wai Hoe Chin, and **Hann Woei Ho\***, *Air-to-air Micro Air Vehicle Interceptor with an Embedded Mechanism and Deep Learning*, Aerospace Science and Technology, 108192, 2023. **(SCI, JCR Ranked 3/34, 7.4% in ENGINEERING, AEROSPACE, IF 5.6)**
- [8] Yiting Feng, Ye Zhou, **Hann Woei Ho**, Nor Ashidi Mat Isa, *Reinforcement learning control with function approximation via multivariate simplex splines*, International Journal of Adaptive Control and Signal Processing, 2023 (Online) **(SCI, JCR Ranked 121/275, 43.8% in ENGINEERING, ELECTRICAL & ELECTRONIC, IF 3.1)**
- [9] H. Jiang, Y. Zhou, **H. W. Ho**, E. A. Bakar, *Modeling of two-stroke aviation piston engines for control applications*, Advances in Mechanical Engineering, 15(2), 16878132231153234, 2023. **(SCI, JCR Ranked 82/135, 60.4% in ENGINEERING, MECHANICAL, IF 2.1)**

- [10] Ye Zhou and **Hann Woei Ho**, *Online robot guidance and navigation in non-stationary environment with hybrid Hierarchical Reinforcement Learning*, Engineering Applications of Artificial Intelligence, 114, 105152, 2022. **(SCI, JCR Ranked 7/65, 10% in AUTOMATION & CONTROL SYSTEMS, IF 8.0)**
- [11] Poh Ling Ching, Shu Chuan Tan **Hann Woei Ho\***, *Ultra-wideband Localization and Deep Learning based Plant Monitoring using Micro Air Vehicles*, AIAA Journal of Aerospace Information Systems, 1-12, 2022. **(SCI, JCR Ranked 22/34, 63.2% in ENGINEERING, AEROSPACE, IF 1.5)**
- [12] N.A.M. Yussof and **H.W. Ho\***, *Review of Water Leak Detection Methods in Smart Building Applications*, Buildings, 12(10):1535, 2022. **(SCI, JCR Ranked 23/68, 33.1% in CONSTRUCTION & BUILDING TECHNOLOGY, IF 3.8)**
- [13] H. Jiang, Y. Zhou, **H. W. Ho**, *Aerodynamic Design and Evaluation of a Ducted Fan Lift System for VTOL Flying Cars*, Proceedings of the Institution of Mechanical Engineers, Part A: Journal of Power and Energy, 09576509221106395, 2022. **(SCI, JCR Ranked 97/135, 71.5% in ENGINEERING, MECHANICAL, IF 1.7)**
- [14] Seng Man Wong, **Hann Woei Ho\***, Mohd Zulkifly Abdullah, *Design and fabrication of a dual rotor-embedded wing vertical take-off and landing unmanned aerial vehicle*, Unmanned Systems, 9(01): 45-63, 2021.
- [15] B.H. Cheaw, **H. W. Ho\***, E. Abu Bakar, *Wing design, fabrication, and analysis for an X-wing flapping-Wing micro air vehicle*, Drones, 3: 65, 2019.
- [16] **H. W. Ho\***, G. C. H. E. de Croon, and Q. P. Chu, *Distance and velocity estimation using optical flow from a monocular camera*, International Journal of Micro Air Vehicles, 9(3):198-208, 2017. **(SCI, JCR Ranked 20/31, 63% in ENGINEERING, AEROSPACE, IF 0.854)**
- [17] G. C. H. E. de Croon, **H. W. Ho**, C. De Wagter, E. van Kampen, B. D. W. Remes, and Q. P. Chu, *Optic-flow based slope estimation for autonomous landing*, International Journal of Micro Air Vehicles, 5(4):287–298, 2013. **(SCI, JCR Ranked 18/28, 63% in ENGINEERING, AEROSPACE, IF 0.471)**

#### Conferences:

- [18] A. Janarthanan, **H. W. Ho**, L. Gopal, V. Shanmugam, and W. K. Wong, *An Unmanned Aerial Vehicle Framework Design for Autonomous Flight Path*, in International Conference on Smart Computing & Communications 2019 (ICSCC 2019) (Sarawak, Malaysia, 2019) p. 1-5.
- [19] **H. W. Ho\***, G. C. H. E. de Croon, and Q. P. Chu, *Distance and velocity estimation using optical flow from a monocular camera*, in International Micro Air Vehicle Conference and Competition 2016 (IMAV 2016) (Beijing, PR of China, 2016) p. 121-128. **[Best Paper Award Finalist]**
- [20] **H.W. Ho\*** and G. C. H. E. de Croon, *Characterization of flow field divergence for MAVs vertical control landing*, in AIAA Guidance, Navigation, and Control Conference (San Diego, California, USA, 2016) p. 0106.

- [21] G. C. H. E. de Croon, **H. W. Ho**, C. De Wagter, E. van Kampen, B. D. W. Remes, and Q. P. Chu, *Optic-flow based slope estimation for autonomous landing*, in International Micro Air Vehicle Conference and Competition 2013 (IMAV 2013) (Ecole Nationale de l'Aviation Civile, Toulouse, France, 2013).
  - [22] **H. W. Ho\***, Q. P. Chu, *Automatic Landing System of a Quadrotor UAV Using Visual Servoing*, in CEAS EuroGNC conference 2013 (Delft University of Technology, Delft, The Netherlands, 2013). [**Best Graduate Student Paper Award**]
- Book:
- [23] **H. W. Ho\***, *Autonomous landing of Micro Air Vehicles through bio-inspired monocular vision*, Delft University of Technology, 2017. ISBN: 978-94-6186-818-3

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## Selected Awards

- 2023 USM Excellent Service Award 2022 (“Anugerah Perkhidmatan Cemerlang 2022”) [**University**]
- 2023 Fifth place in the International Unmanned System Swarm Technology Competition (IUSC) [**International**]
- 2022 First runner-up of AIoT, FPGA & Embedded Systems Design Challenge in Innovate Malaysia 2022 “Guardian Of Area 51: Detecting, Tracking, And Intercepting Intruders From The Sky” [**National**]
- 2021 Winner of CREST Design Challenge in Innovate Malaysia 2021 “Plant Health Monitoring and Indoor Positioning for Micro Air Vehicles Using Deep Convolutional Neural Network and Ultra-Wideband” [**National**]
- 2021 IEM Best Paper Award in Innovate Malaysia 2021 “Plant Health Monitoring and Indoor Positioning for Micro Air Vehicles Using Deep Convolutional Neural Network and Ultra-Wideband” [**National**]
- 2021 Sanggar Sanjung Award, Journal Publication Category, USM [**University**]
- 2019 First runner-up in Petronas Technology Challenge 6 “Autonomous Drone Capable of Performing Ultrasonic Thickness (UT) Measurement at Height” [**National**]
- 2019 Sanggar Sanjung Award, Journal Publication Category, USM [**University**]
- 2018 Hadiah Sanjung Award, Journal Publication Category, USM [**University**]
- 2016 Best Paper Award Finalist in International Micro Air Vehicle Competition and Conference “Distance and velocity estimation using optical flow from a monocular camera” [**International**]
- 2013 Best Graduate Student Paper in CEAS EuroGNC Conference “Automatic Landing System of a Quadrotor UAV Using Visual Servoing” [**International**]
- 2013 First prize in International Micro Air Vehicle competition 2013 (IMAV 2013) [**International**]
- 2012 Distinction/ Cum laude for MSc. in Aerospace Engineering, TU Delft [**University**]
- 2010 Academic Staff Training Scheme (ASTS), a fellowship co-funded by Malaysia Ministry of Higher Education (MOHE) and USM [**National**]
- 2009 USM Gold Medal for the best final year student in Aerospace Engineering [**University**]

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## Computer Skills

- category 1 C, C++, MATLAB, Fortran, Python
- category 2 Tensorflow, Paparazzi/Pixhawk Autopilot, OpenCV, Ubuntu Linux
- category 3 Advanced Aircraft Analysis (AAA), DATCOM, XFOIL
- category 4 CATIA, Solidworks, Autodesk Inventor
- category 5 MS Word, Excel, Power Point, Latex

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## Research Grants

### Principal Investigator

- [1] Fundamental Research Grant Scheme (FRGS) [**National-MoHE\***], "Formulation of a Novel Online Target-oriented Navigation Method with Optical Flow for Unmanned Aerial Vehicles in Cluttered Environment", 1.11.2020-30.4.2024
- [2] Short-Term Grant [**Research University Grant**], "Autonomous landing of miniature Unmanned Aerial Vehicles (UAVs) using monocular vision", 14.8.2017-14.11.2020 - **KPI Achieved**

### Co-Principal Investigator

- [3] Fundamental Research Grant Scheme (FRGS) [**National-MoHE\***], "Formulation of Online Actor-Critic Reinforcement Learning with Multivariate Splines for Autonomous Control of Unmanned Aerial Vehicles", 1.11.2020-31.10.2022
- [4] Research University Grants (RUI) [**Research University Grant**], "Development of Fully Autonomous MALE UAS for Monitoring and Surveillance Purposes (MALE UAS: Mid-altitude Long Endurance Unmanned Aerial System)", 1.11.2020-31.10.2022
- [5] Research University Grants (RUI) [**Research University Grant**], "Investigation into Perpetual Solar-Powered UAV Designs for Global Operation", 1.12.2019-28.2.2022
- [6] Research University Grants (RUI) [**Research University Grant**], "Seismic Risk Assessment and Vulnerability Study for Lahad Datu, Sabah", 1.11.2018-31.10.2021
- [7] Short-Term Grant [**Research University Grant**], "Development of YOLO on Drone based Deep Learning Method using High Performance Edge Computation for Palm Oil Tree Detection and Health Assessment", 1.4.2023-31.3.2025
- [8] External Agency [**Industry**], "Research and Development with Lestari Aero Technology PLT-To Design, Develop, Test & Commission of Our Unmanned Aerial System (UAS) Layang-layang & Lang Merah", 1.12.2020-31.7.2021 - **KPI Achieved**

\*MoHE-Ministry of Higher Education, Malaysia

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## Academic Activities

### Invited Speaker:

- Plenary speaker, "Deep Learning based Monocular Navigation and Tracking for Micro Air Vehicles", in the 3rd International Conference on Unmanned Aerial System in Geomatics 2023 (UASG 2023), Kuala Lumpur, Malaysia

### Reviewer:

- IEEE Transactions on Mechatronics
- IEEE Robotics and Automation Letters
- Applied Soft Computing
- Knowledge-Based Systems
- International Journal of Distributed Sensor Networks
- Journal of Field Robotics
- IEEE ICRA & IEEE/RSJ IROS
- Expert Systems With Applications
- Aerospace Science and Technology
- International Journal of Micro Air Vehicles (IJMAV)

### Main Supervision:

- On-going PhD students: 2
- On-going MSc students: 3

### Co-Supervision:

- On-going PhD students: 1
- Graduated PhD students: 1
- Graduated MSc students: 1

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## Teaching Courses

- ESA412 Final Year Project (Fourth-Year Engineering)
- ESA369 Flight Stability and Control (Third-Year Engineering)
- ESA352 Modern Control for Autopilot (Third-Year Engineering)
- ESA211 Aerospace Laboratory I (Second-Year Engineering)
- Introduction to Aerial Robotics (short course for overseas Bachelor's students)
- Intelligent Control & Future Smart Cities (workshop for overseas Bachelor's students)