

James Garland  
Department of Electronic Engineering and Communications  
engCORE  
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## Biography

Lecturer and principal investigator researching the micro-architectural implementations and robotic applications of deep learning algorithms in FPGA, ASIC and embedded systems. Thirteen years of lecturing and supervising in undergraduate and postgraduate electronics. Three years as an external examiner. Twenty-one years of industrial experience in diverse industries in SoC/IP ASIC, FPGA, and PCB design, test, training, project management, team lead, and customer support.

## Qualifications

PhD, Computer Science, Trinity College Dublin  
04 Apr 2016 → 08 Aug 2021  
Award Date: 08 Apr 2022

## Employment

### Lecturer

Department of Electronic Engineering and Communications  
Carlow and Wexford Campuses  
25 Feb 2015 → present

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Carlow and Wexford Campuses  
25 Feb 2015 → present

## Research outputs

### Zero-shot Learning for Subdiscrimination in Pre-trained Models

Dominguez-Mateos, F., Brien, V. O., Garland, J., Furlong, R. & Palacios-Alonso, D., 28 Jan 2025, In: *Journal of Universal Computer Science*. 31, 1, p. 93-110 18 p.

### Deep-Learning-Based Defect Detection for Light Aircraft with Unmanned Aircraft Systems

Connolly, L., Garland, J., O'Gorman, D. & Tobin, E. F., 11 Jul 2024, In: *IEEE Access*. 12, p. 83876-83886 11 p.

### Image Classification for Defect Detection of Light Aircraft

Connolly, L., Garland, J., O'Gorman, D. & Tobin, E. F., 19 Apr 2024

### Improving Control, Energy Efficiency, and Comfort of Digital Twin Building Environments Using Machine Learning Transformers

Garland, J., 06 Apr 2024.

### Spatial Mapping of light aircraft with stereo-vision camera for use on Unmanned Aircraft System for defect localisation

Connolly, L., O'Gorman, D., Garland, J. & Tobin, E. F., 26 Jun 2023, *2023 International Conference on Unmanned Aircraft Systems, ICUAS 2023*. Institute of Electrical and Electronics Engineers Inc., p. 413-418 6 p. (2023 International Conference on Unmanned Aircraft Systems, ICUAS 2023).

### Feature Representation in Pretrained Deep Metric Embeddings

Furlong, R., O'Brien, V., Garland, J., Alonso, D. P., Mateos, F. D. & Garland, J., 05 Apr 2023

### **Feature Representation in Deep Metric Embeddings**

Furlong, R., O'Brien, V., Garland, J., Palacios-Alonso, D., Dominguez-Mateos, F. & Garland, J., 31 Mar 2023, In: arXiv.

### **Laser Beam Propagation Features via Atmospheric Turbulence-Induced Beam Wander: Testbed Conceptual Design**

Al Juboori, H. M. & Garland, J., 29 Mar 2023, *COAT-2023 - workshop (Communications and Observations through Atmospheric Turbulence)*.

### **Arbitrary Precision and Low Complexity Micro-Architectural Arithmetic Optimisations of Machine Learning Algorithms for Compute Bound and High-Performance Systems**

Garland, J., 03 Dec 2021, 193 p.

### **Low-precision Logarithmic Number Systems: Beyond Base-2**

Garland, J., Jul 2021, In: ACM Transactions on Architecture and Code Optimization.

### **HOBFLOPS CNNs: Hardware Optimized Bitslice-Parallel Floating-Point Operations for Convolutional Neural Networks**

Garland, J., 18 Jun 2021, *21st Workshop on Compilers for Parallel Computing (CPC'2021)*.

### **Many-Core Computing: Hardware and Software**

Garland, J., 03 Jun 2019, ([[]])

### **Low Complexity Multiply Accumulate Units for Convolutional Neural Networks with Weight-Sharing**

Garland, J. & Garland, J., 23 Jan 2019.

### **Hardware and software performance in deep learning**

Anderson, A., Garland, J., Wen, Y., Barabasz, B., Persand, K., Vasudevan, A. & Gregg, D., 2019, In: Modeling and Simulation of Complex Communication Networks.

### **Low complexity multiply-accumulate units for convolutional neural networks with weight-sharing**

Garland, J. & Gregg, D., 2018, In: ACM Transactions on Architecture and Code Optimization.

### **Low Complexity Multiply Accumulate Unit for Weight-Sharing Convolutional Neural Networks**

Garland, J., 12 Jul 2017, *ACACES 2017 Poster Abstracts*.

### **Low Complexity Multiply Accumulate Unit for Weight-Sharing Convolutional Neural Networks**

Garland, J., Garland, J. & Garland, J., 11 Jul 2017.

### **Low Complexity Multiply Accumulate Unit for Weight-Sharing Convolutional Neural Networks**

Garland, J., 01 Jul 2017, In: IEEE Computer Architecture Letters.

## **Activities**

### **Journal of Parallel and Distributed Computing (Journal)**

Garland, J. (Reviewer)

2024 → ...

### **Soft Computing (Journal)**

Garland, J. (Reviewer)

2022 → ...

### **Journal of the Chinese Institute of Engineers (Journal)**

Garland, J. (Reviewer)

2021 → ...

### **Microelectronics Journal (Journal)**

Garland, J. (Reviewer)

2021 → ...

### **IEEE Access (Journal)**

Garland, J. (Reviewer)

2019 → ...

### **IEEE Transactions on Very Large Scale Integration (VLSI) Systems (Journal)**

Garland, J. (Reviewer)

2018 → ...

## **Press/Media**

### **Ministers Harris and Coveney announce €2.4 million funding for Defence Forces to develop innovative solutions to challenges facing them**

Garland, J., Culliton, D. & Vashishtha, A.

17/02/2022

1 item of Media coverage

## **Courses**

### **Bachelor of Engineering (Honours) in Aerospace Engineering - Avionics Fundamentals 2**

Garland, J.

15/01/2024 → 26/04/2024

### **Bachelor of Engineering (Honours) in Electronic Engineering - Artificial Intelligence and Machine Learning**

Garland, J.

11/09/2023 → 06/12/2024

### **Bachelor of Engineering (Honours) in Electronic Engineering - Research Project (Engineering)**

Garland, J.

15/01/2024 → 18/04/2025

### **Bachelor of Engineering (Honours) in Mechanical Engineering - Control System Design**

Garland, J.

11/09/2023 → 06/12/2024

### **Bachelor of Engineering (Honours) in Robotics and Automated Systems - Robotics Programming 1**

Garland, J.

11/09/2023 → 08/12/2023

### **Bachelor of Engineering (Honours) in Robotics and Automated Systems - Robotics Project**

Garland, J.

15/01/2024 → 26/04/2024

**Master of Science in Industrial Networks and Cybersecurity - Dissertation**

Garland, J.  
15/01/2024 → 31/08/2024

**Master of Science in Industrial Networks and Cybersecurity - Programming I**

Garland, J.  
11/09/2023 → 06/12/2024

**Master of Science in Industrial Networks and Cybersecurity - Programming II**

Garland, J.  
15/01/2024 → 26/04/2024