

# Jonathan Byrne

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**EDUCATION** **Ph.D., University College Dublin** **October 2008–April 2012**

Thesis: “Approaches to Evolutionary Architectural Design Exploration Using Grammatical Evolution”

- Supervisors: Dr Michael O’Neill and Anthony Brabazon (NCRA, University College Dublin)

**B.Sc., National University of Ireland, Maynooth** **September 2000–June 2004**

B.Sc. (Hon) Computer Science and Software Engineering.

- Final-year thesis: “A Framework for a Distributed Search Algorithm on a Mosix Cluster”. Developed a genetic algorithm capable of running asynchronously over a network. (1st class hon).
- Subjects: Robotics, Neurocomputation, Machine Vision, Artificial Intelligence, Hardware Architecture, Software Engineering, Complexity Theory, Advanced Calculus and Number Theory.

**PUBLICATIONS** I have published 9 journal articles (first author of 5) and 12 conference papers (first author of 9). These papers have received 163 citations generating a H-Index of 8.

**RESEARCH** **Research Scientist** **May 2014– December 2016**

*U3D printing hub, School of Civil Engineering, University College Dublin*

Co-founder of U3D, Ireland’s first full commercial 3D printing hub. This ERC funded facility is a world-class manufacturing center and includes a 250,000 metal printer, the only one publicly available in Ireland. My TIDA-funded position focused on developing “scan to print” techniques that convert point clouds to 3D printable meshes. Founder of 3D Surveying services and conducting research into the use of low cost drones for low cost aerial mapping and surveying.

**Postdoctoral Research Fellow** **July 2012– May 2014**

*Financial Mathematical Computation Cluster (FMCC). University College Dublin*

Applied machine learning techniques to large financial data-sets (COMPUSTAT). Developed financial models for successful trading strategies. Implemented distributed algorithms to analyse the 5TB dataset. Compared machine learning techniques that exhibit hysteresis (a basic memory) to discover recurring data patterns. Developed asset selection strategies for portfolio management and regression analyses for large financial data sets by employing evolutionary algorithms.

**Postgraduate Researcher** **October 2008–April 2012**

*Natural Computing Research & Applications, Complex and Adaptive Systems Lab (CASL), UCD*

Completed a PhD in generative design approaches using evolutionary algorithms. Structurally analysed and optimised designs for bridges, electricity pylons and aircraft. Developed an evolutionary algorithm for high performance computing that conducted computational fluid dynamics simulations for each aircraft design proposed by the evolutionary algorithm.

**PROFESSIONAL EXPERIENCE** **Senior Software Engineer** **January 2017–present** *Movidius, Intel.*

- Developed the VOLA format for 3D data on embedded systems including the web interface for dynamically serving data through RESTful api.
- Worked on vision systems for automatic drone navigation.
- Added semantic information to 3D data for processing by convolutional neural nets (CNNs).

**Demonstrator** **2009–2012** *Computer Science Department and Quinn School of Business, UCD.*

- Demonstrated for Business Analytics and Data Mining module. Topics include regression analysis, modelling and forecasting.

- Demonstrated for Natural Computing module. The subject focused on advanced stochastic algorithms including Particle Swarm and Grammatical Evolution.
- Taught Introduction to Computer Science and Programming (ICSP) module for second level students. Students are introduced to the core concepts of computer science and robotics.

### Software Engineer

**October, 2007–June, 2008**

*CR2 Channel Banking Software*, Parkwest Business Park, Nangor Road, Dublin 12, Ireland

- Implemented new design features and contractual enhancements for BWAC3 system.
- Refactored the Distributor Agent software.
- Managed ATM updates and implementing language and localisation for ATM branding.
- Migrated codebase from C++ to C# and replaced aging DCOM framework with the .NET framework.
- Developed a client agent that allowed remote access and maintenance of ATMs.

### Software Engineer

**November, 2004–January, 2007**

*LMI Ericsson*, Beech hill, Clonskeagh, Dublin 4, Ireland

- Developed integration software between radio towers and radio network controllers.
- Designed and implemented features including Dynamic Connection Switching, and a generic Interface.
- Supervised a 4 person team, through which all targets and deadlines were met.
- Migrated configuration manager to an automatic XML based configuration system.
- Created a perl/python based emulator for automating CORBA testing.
- Constructed a new test harness for regression testing using JUNIT.
- Implemented standardisation process for existing and future software tools.

### ORGANISATION EXPERIENCE

*Co-founder of the UCD CoderDojo*

**January 2011–2013**

I developed a syllabus for beginner, intermediate and advanced courses and mentored ten exceptional students. The CoderDojo is a voluntary movement aimed at teaching young people programming skills.

*Administrator*

**January 2009–October 2010**

Oversaw several group clusters. My responsibilities included maintaining the repositories, running distributed computing clusters and setting up backup servers.

*GECCO 2011 Organisation team member*

**June 2011**

Helped organise the Genetic and Evolutionary Computation Conference. Over 600 members attended the 5 day conference. Organised the 3D printing open day (2015) attended by over 1000 people and the fly scan print open day (2016) attended by 500 people.

### SKILLS

- Programming: Python, Java, C, C++, C#, Bourne Shell, AWK, Perl, PHP, JavaScript, Processing, Haskell, Lisp, Lua, R Statistics, Matlab.
- Certifications: Java Certified Programmer 1.4, Object Oriented Design patterns (learning tree,), Intermediate C++ (Brainbench), CELLO Platform (Ericsson)
- Operating Systems: Ubuntu 8.04-14.04, Redhat 9, CentOS 6.5, SuSE 6.1, OSX 10.5-10.8, Solaris.
- Packages: PCL, OpenCV, OpenCFD, Hadoop, ROS, Apache, Ant, Junit, Three.js Pylint, Findbugs, CVS, Subversion, GIT, Mercurial, RMI, Clearcase, MySQL, LaTeX, SQLite, imagej, Rational Rose.
- 3D Modelling: Rhino, Blender, Meshlab, Meshmixer, Solidworks, Inventor, Cloudcompare.
- Game Engines: Unity, Unreal Engine 4.

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### REFEREES

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### HONOURS, AWARDS AND COMPETITIVE FUNDING

**Human-competitive Artificial Intelligence Award(2017):** Bronze Award for work on "Automatic Innovative Truss Design with Grammatical Evolution" at the HUMIES Awards held at ACM GECCO in Berlin.

Awarded funding for development of rapid prototyping techniques and its application to the visual arts.

**Spatial Arts and Visualisation (2015):** Awarded funding for development of rapid prototyping techniques and its application to the visual arts.

**UCD Seed funding (2012):** Awarded funding for 3 month investigation into the development of design optimisation software into a marketable product.

**Evostar Best Paper Award (2011):** Awarded best paper for: "Combining Structural Analysis and Multi-Objective Criteria for Evolutionary Architectural Design", Genetic Programming and Evolvable Machines, Volume 14, Springer, 2011, 204-213.

**Winner of CASL ACE award (2011):** Recognition of academic excellence in research (2011).

### JOURNAL ARTICLES

Byrne, Jonathan and O'Keeffe, Evan and Lennon, Donal and Laefer, Debra F. 3D Reconstructions Using Unstabilized Video Footage from an Unmanned Aerial Vehicle, *Journal of Imaging*, Volume 3 Number 2, 2017, ISSN: 2313-433X, <http://www.mdpi.com/2313-433X/3/2/15>

**J Byrne**, E O'Keeffe, D Lennon, D Laefer, "3D Reconstructions Using Unstabilized Video Footage from an Unmanned Aerial Vehicle" *Journal of Imaging*, 22 April 2017, ISSN 2313-433X

M Fenton, C McNally, **J Byrne**, E Hemberg, J McDermott, M O'Neill, "Discrete Planar Truss Optimization by Node Position Variation using Grammatical Evolution", *IEEE Transactions on Evolutionary Computation*, 23 November 2015, ISSN 1089-778X, <http://dx.doi.org/10.1109/TEVC.2015.2502841>.

**Byrne J.**, Fenton M., Hemberg E., McDermott J., O'Neill M., "Optimising Complex Pylon Structures with Grammatical Evolution", *Information Sciences*, 19 March 2014, ISSN 0020-0255, <http://dx.doi.org/10.1016/j.ins.2014.02.011>

**Byrne J.**, Cardiff P., Brabazon A., Michael O'Neill, "Evolving Parametric Aircraft Models for Design Exploration and Optimisation", *Neurocomputing*, 6 May 2014, ISSN 0925-2312, <http://dx.doi.org/10.1016/j.neucom.2014.03.011>

**Byrne J.**, Hemberg E., Brabazon A., O'Neill M., "A methodology for user directed search in evolutionary design" *Genetic Programming and Evolvable Machines*, 2013, 14 (3):287-314

McDermott J., **Byrne J.**, Swafford JM., O'Neill M. and Brabazon A., "Higher-Order Functions in Aesthetic EC Encodings", *IEEE Congress on Evolutionary Computation*, IEEE press, 2010.

Fenton M., McNally C., **Byrne J.**, Hemberg E., JMcDermott J., O'Neill M., "Automatic innovative truss design using grammatical evolution.", *Automation in Construction*, Volume 39, 1 April 2014, Pages 59-69, ISSN 0926-5805.

O'Neill M., McDermott J., Swafford JM., **Byrne J.**, Hemberg E., Shotton E., McNally C., Brabazon A., Hemberg M., "Evolutionary design using grammatical evolution and shape grammars: Designing a shelter." *International Journal of Design Engineering*, 2011.

PEER-REVIEWED **Jonathan Byrne**, Debra Laefer "Variables effecting photomosaic reconstruction and ortho-rectification  
CONFERENCE from aerial datasets," *Civil Engineering Research Association of Ireland (2016), Galway, Ireland*  
PAPERS

Fred Cummins, **Jonathan Byrne**, "Zero Mean Lag Communication Over Networks: A Route to Co-Presence?," *3rd European Symposium on Multimodal Communication, 2015, Dublin, Ireland*

**Byrne J.**, Nicolau M., Brabazon A. and O'Neill M. An Examination of Synchronisation in Artificial Gene Regulatory Networks, 2014 IEEE Congress on Evolutionary Computation, Beijing, China, IEEE press, 2014.

**Byrne J.**, Nicolau M., Brabazon A. and O'Neill M. "Evolving an Aircraft Using a Parametric Design System." *EvoMUSART, 2014, Granada, Spain, LNCS, Springer Verlag.*

**Byrne J.**, Hemberg E., O'Neill M., and Brabazon A. "A local search interface for interactive evolutionary architectural design". In Applications of Evolutionary Computing, *EvoApplications 2012: EvoMUSART, LNCS, Malaga, Spain, 2012. Springer Verlag.*

**Byrne J.**, Hemberg E., O'Neill M. 2011. "Interactive Operators for Evolutionary Architectural Design", GECCO 2011: Genetic and Evolutionary Computation ACM Dublin, Ireland.

**Byrne J.**, Fenton M., McDermott J., Hemberg E., O'Neill M., McNally C., Shotton E. 2011. "Combining Structural Analysis and Multi-Objective Criteria for Evolutionary Architectural Design", *EvoMUSART 2011 9th European Event on Evolutionary and Biologically Inspired Music, Sound, Art and Design Springer Torino, Italy. (Best Paper).*

**Byrne J.**, McDermott J., O'Neill M., and Brabazon A.. "An analysis of the behaviour of mutation in grammatical evolution". In Genetic Programming, Proceedings of EuroGP2010, Springer- Verlag, 2010.

McDermott J., **Byrne J.**, Swafford JM., O'Neill M. and Brabazon A.. "Higher-Order Functions in Aesthetic EC Encodings", 2010 IEEE Congress on Evolutionary Computation, IEEE press, 2010.

**Byrne J.**, McDermott J., Galvan E. and O'Neill M. "Implementing an Intuitive Mutation Operator for Interactive Evolutionary 3D Design", In Press, 2010 IEEE Congress on Evolutionary Computation, IEEE press, 2010.

**Byrne J.**, O'Neill M., Brabazon A.. "Evolving Offensive Moves in Toribash Using a Genetic Algorithm", 16th International Conference on Soft Computing, Brno, Czech Republic.

**Byrne J.**, O'Neill M. and Hemberg E. and Brabazon A.. "Analysis of Constant Creation Techniques on the Binomial-3 Problem with Grammatical Evolution", 2009 IEEE Congress on Evolutionary Computation, IEEE press, 2009.

**Byrne J.**, O'Neill M., and Brabazon A. "Structural and nodal mutation in grammatical evolution." In Proceedings of the 11th Annual conference on Genetic and evolutionary computation, pages 1881-1882. ACM, 2009.

O'Neill M. Swafford JM. McDermott J. **Byrne J.**, Brabazon A., Shotton E., McNally C. and Hemberg M. "Shape grammars and grammatical evolution for evolutionary design", *GECCO '09: Proceedings of the 11th Annual conference on Genetic and evolutionary computation*