

DORIEN HERREMANS

Position Marie Skłodowska-Curie Posdoc Fellow
Centre for Digital Music (C4DM)
School of Electronic Engineering and Computer Science
Queen Mary University of London

Address *dorien.herremans@gmail.com*
http://dorienherremans.com

Details Gender: Female
Date of birth: 26th of July, 1982

Research interest My research interests lie in exploring novel applications in the intersection of *machine learning*, *optimization* and *digital music*: generating structured music, automatic piano fingering, dance hit prediction, composer classification, music information retrieval in a health setting and other similar projects.

Teaching interest My main teaching interests focus on *optimization* techniques and *data mining/machine learning*. I also have a experience teaching more general topics in computer engineering such programming languages (including Java, web/mobile) and IT project management courses.

PROFESSIONAL EXPERIENCE

June 2015–... **Queen Mary University of London**

PostDoc fellow, School of Electrical Engineering and Computer Science

Marie Skłodowska-Curie individual fellowship for experienced researchers H2020 (98% evaluation score)

Research topic: MorpheuS: Hybrid Machine Learning – Optimization techniques To Generate Structured Music Through Morphing And Fusion with: Prof. Dr. Elaine Chew, Center for Digital Music (C4DM)

2010-2015 **University of Antwerp, Belgium**

Mandaatassistent Department of Engineering Management (50% teaching, 50% research)

Research topic: Music and Operations Research

May-June 2014 **Universidad del País Vasco UPV/EHU, San Sebastián, Spain**

Visiting Researcher, Department of Computer Science and Artificial Intelligence

Invited by Prof. Dr. Darrell Conklin

Topic: Generating structured music using quality metrics based on Markov models.
Funded by EU FP7 project: Lrn2cre8 grant number: 610859.

2009–2010 **Vanbreda International, Antwerp, Belgium**

Webmaster

Collaboration on project to build a new Drupal site and management of around 170 microsites.

2006–2009 **Holistic Vibes Sàrl (own company), Sierre, Switzerland**

Web Developer & author

Part-time Drupal development/consulting.

2006–2008 **Les Roches, International School of Hotel Management, Montana, Switzerland**

IT Lecturer

Ranked among the top 3 hospitality management schools in the world (Taylor Nelson Sofres, global research, 2013)

EDUCATION

3/2010–12/2014 **PhD**

University of Antwerp, Belgium

Faculty of Applied Economics, Department of Engineering Management

Topic: Compose \equiv Compute, Computer Generation and Classification of Music through Operations Research Methods

Supervisor: Prof. Dr. Kenneth Sørensen

9/2000–7/2005 **MSc Business Engineering in Management Information Systems**

University of Antwerp, Belgium (5 year program)

Major: Management Information Systems

Minor: Operations Research

Thesis: *Tabu Search For The Optimization Of Musical Fragments*

Grade: Great distinction

University of Antwerp is AACSB accredited

GRANTS

European Commission **Marie Skłodowska-Curie individual fellowship for experienced researchers**. Grant number 658914, 2015. €183,454.80

FWO **Travel grant** number K221314N, summer school on Computer Music Analysis (Athens, Greece), 2014.

FWO **Travel grant** number K1D5514N, ICMC/SMC conference (Athens, Greece), 2014.

RESEARCH GROUPS/PROJECTS

- 2015–present **MuPaE** – Music Performance and Expression Group
Center for digital music (C4DM), Queen Mary University of London
- 2010–present **ANT/OR** – University of Antwerp Operations Research Group
University of Antwerp, Belgium
- 2013–present **Music Informatics Group**
Universidad del País Vasco UPV/EHU, San Sebastián, Spain
- 2013–present **Lrn2cre8**, FP7 European project – research collaborator
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PUBLICATIONS

- Submitted Cunha, N., Subramanian, A., Herremans, D. 2016. **An integer programming-based system for generating guitar solos.** *Knowledge Based Systems*
- Submitted Herremans, D, Chuan, C.-H., Chew, E. 2016. **A Functional Taxonomy of Music Generation Systems.** *ACM Computing Surveys*
- Submitted Agres, K, Herremans, D., Bigo, L, Conklin, C. 2016. **The impact of musical structure on enjoyment and absorptive listening states in trance music.** *Invited book chapter for Oxford University Press*
- Submitted Agres, K, Herremans, D., Bigo, L, Conklin, C. 2016. **The Effect of Harmonic Structure on the Enjoyment of Uplifting Trance Music.** *Frontiers in Psychology*
- Submitted Herremans, D., Chuan, C.H. 2016. **A multi-modal platform for semantic music analysis: visualizing audio- and score-based tension.** *IEEE International Conference on Semantic Computing*
- Journal Paper Herremans, D, Weisser S., Sörensen K., Conklin D. 2015. **Generating structured music for bagana using quality metrics based on Markov models.** *Expert Systems With Applications.* 42(21):7424–7435. Impact factor 2.240. SJR: Q1 (“AI”, “Computer Science Applications” and “Engineering”), CORE rank: B
- Journal Paper Balliauw, M, Herremans, D, Palhazi Cuervo, D, Sörensen K. 2015. **A variable neighbourhood search algorithm to generate piano fingerings for polyphonic sheet music.** *International Transactions of Operations Research.* Special Issue on Variable Neighbourhood Search. DOI 10.1111/itor.12211. Impact Factor 0.977
- Journal Paper Herremans, D, Sörensen K. , Martens D. 2015. **Classification and generation of composer-specific music using global feature models and variable neighbourhood search.** *Computer Music Journal.* 39(3):71-91. Impact Factor: 0.474. SJR: Q1 (“Music”), Q2 (“Media Technology”), Q3 (“Computer Science Applications”)
- Journal Paper Herremans, D, Martens D, Sörensen K. 2014. **Dance Hit Song Prediction.** *Journal of New Music Research – special issue on music and machine learning.* 43(3):291–302. Impact factor 0.519. SJR: Q1 (“Music” and “Visual Arts and Performing Arts”)
- Journal Paper Herremans, D, Sörensen K. 2013. **Composing Fifth Species Counterpoint Music With A Variable Neighbourhood Search Algorithm.** *Expert Systems with Applications.* 40(16):6427–6437. Impact factor 2.240. SJR: Q1 (“AI”, “Computer Science Appli-

cations” and “Engineering”), CORE rank: B

- Journal Paper Herremans, D, Sørensen K. 2012. **Composing first species counterpoint musical scores with a variable neighbourhood search algorithm.** *Journal of Mathematics and the Arts.* 6(04):169-189. SJR: Q1 (“Visual Arts and Performing Arts”), Q4 (“Mathematics” and “Computer Graphics and Computer Aided Design”)
- PhD Dissertation Herremans, D. 2014. **Compose \equiv Compute: Computer generation and classification of music through operation research methods.** University of Antwerp, Faculty of Applied Economics. ISBN 978-90-8994-114-5. 250p.
- PhD abstract Herremans, D. 2015. **Compose \equiv Compute: Computer generation and classification of music through operations research methods** *4OR.* 13(3):335-336. Impact factor: 1.000, SJR: Q1 (“Management Information Systems”), Q2 (“Computational Theory and Mathematics” and “Theoretical Computer Science”)
- Conference paper Herremans, D, Chew E. 2016. **MorpheuS: Automatic music generation with recurrent pattern constraints and tension profiles.** *Proceedings of the IEEE TENCON.* Singapore. In press.
- Conference paper Cunha, N, Subramanian, A, Herremans, D. 2016. **Uma abordagem baseada em programação linear inteira para a geração de solos de guitarra.** *Proceedings of the XLVIII Simpósio Brasileiro de Pesquisa Operacional (SBPO).* Vitoria, Brasil.
- Conference paper Agres, K, Bigo, L, Herremans, D, Conklin, D. 2016. **The Effect of Repetitive Structure on Enjoyment in Uplifting Trance Music.** *Proceedings of the 14th International Conference for Music Perception and Cognition (ICMPC).* San Francisco, US. 280-282.
- Conference paper Herremans, D, Chew, E. 2016. **Tension ribbons: quantifying and visualising tonal tension.** *Proceedings of the Second International Conference on Technologies for Music Notation and Representation (TENOR).* Cambridge, UK. 8–18.
- Conference Paper Herremans, D, Sørensen K. 2013. **FuX, an Android app that generates counterpoint.** *Proceedings of the IEEE Symposium on Computational Intelligence for Creativity and Affective Computing (CICAC).* Singapore. 48-55.
- Conference Paper Herremans, D, Sørensen, K, Conklin, D. 2014. **Sampling the extrema from statistical models of music with variable neighbourhood search.** *Proceedings of ICMC-SMC.* Athens. 1096–1103.
- Book Herremans, D. 2010. **Drupal 6: Ultimate Community Site Guide.** Sun Flare Ltd, Switzerland, ISBN 978-2839904902.
- Book Chapter Herremans, D, Martens, D, Sørensen, K. 2015. **Composer classification models for music-theory building.** *Computational Music Analysis*, Editors: David Meredith, Springer, Switzerland, ISBN 978-3-319-25929-1 (Print) 978-3-319-25931-4 (Online).
- Book Chapter Balliauw, M , Herremans, D, Palhazi Cuervo, D, Sørensen. 2015. **Generating fingerings for polyphonic piano music with a tabu search algorithm.** *Mathematics and Computation in Music. Lecture Notes in Computer Science*, Springer International Publishing, 9110:149-160. Impact factor: 0.302, STJ: Q2 (“Computer Science”), Q4 (“Theoretical Computer Science”)
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PRESENTATIONS AT CONFERENCES

- 2016 *Morpheus: automatic music generation with recurrent pattern constraints and tension profiles*. IEEE TENCON, November, September 21–24, 2016.
- 2016 *Clouds and vectors in the spiral array as measures of tonal tension*. 14th International Conference for Music Perception and Cognition (ICMPC), San Francisco, US, July 5-9, 2016.
- 2016 *Music generation with structural constraints: an operations research approach*, ORBEL 30 (Belgian Association of Operations Research), Catholic University of Leuven, Louvain-la-Neuve, Belgium, January 27–28, 2016.
- 2015 *Generating Fingerings for Polyphonic Piano Music with a Tabu Search Algorithm*, The Fifth Biennial International Conference on Mathematics and Computation in Music (MCM 2015), Queen Mary University of London, UK, June 22–25, 2015.
- 2015 *Generating music with an optimization algorithm using a Markov based objective function*, ORBEL 29 (Belgian Association of Operations Research), University of Antwerp, Belgium, Feb 5–6, 2015.
- 2014 *Markov Based Quality Metrics For Generating Structured Music With Optimization Techniques*, DMRN+9: Digital Music Research Network One-day Workshop 2014, Queen Mary University, London, UK, Dec 16, 2014. – **Funded by Lrn2Cre8 FP7**
- 2014 *Sampling the extrema from statistical models of music with neighbourhood search*, SMC/ICMC - 40th International Computer Music Conference joint with the 11th Sound & Music Computing conference, Athens, Greece, September 14-20, 2014. – **Funded by FWO travel grant**
- 2014 *Composing counterpoint music with variable neighbourhood search*, Bridges, Seoul, South-Korea, August 14-18, 2014. (invited speaker in JMA session)
- 2014 *Sampling and statistical models*, Workshop on EDM, Sony Computer Science Laboratory, Paris, France, July 10-11, 2014. – **Funded by Lrn2Cre8 FP7**
- 2014 *First species counterpoint music generation with VNS and vertical viewpoints*, ORBEL 28 (Belgian Association of Operations Research), University of Mons, Belgium, Jan 30–31, 2014.
- 2013 *First species counterpoint generation with VNS and vertical viewpoints*, DMRN+8: Digital Music Research Network One-day Workshop 2013, Queen Mary University, London, UK, Dec 17, 2013. – **Funded by Lrn2Cre8 FP7**
- 2013 *Dance Hit Song Science, Workshop on Music and Machine Learning (MML)*, ECML/PKDD 2013, Prague, Czech-Republic September 23, 2013
- 2013 *Classifying and Generating Composer Specific Music*, European Conference on Data Analysis (ECDA), Luxembourg, June 10–12, 2013.
- 2013 *Fux, an Android App that Generates Counterpoint Music*, IEEE SSCI - Symposium on Computational Intelligence for Creativity and Affective Computing (CICAC), Singapore, April 16–19, 2013.
- 2012 *Composing Counterpoint Music With VNS*, EU/ME meeting 2012, Copenhagen, Den-

mark May 10–11, 2012.

- 2012 *Composing Counterpoint Music With A Variable Neighbourhood Search*, ORBEL 26 (Belgian Association of Operations Research), Université Libre de Bruxelles, Brussels, Belgium, Feb 2–3, 2012.
- 2012 *Composing Counterpoint Music With Variable Neighbourhood Search*, EURO 2012, Vilnius, Lithuania Jul 8–11, 2012.
- 2010 *A Variable Neighbourhood Search Algorithm for Composing First Species Counterpoint Musical Fragments*, Doctoral Day, University of Antwerp Applied Economics, Antwerp, Belgium, Nov 23, 2010.

INVITED LECTURES, GUEST LECTURES AND SEMINARS

- 2016 *Machine learning and optimization applied to digital music*. Seminar – Agency for Science Technology and Research (A*STAR), Singapore, November 21th, 2016.
- 2016 *Morphing Music According to a Long-term Tension Profile and Detected Patterns*. Invited Seminar – Institut de Recherche et Coordination Acoustique/Musique (IRCAM), Paris, France, April 20th, 2016.
- 2016 *Morpheus: generating music with structure*. Stimulus talk at Dagstuhl Seminar – Computational Music Structure Analysis, Schloss Dagstuhl – Leibniz-Zentrum für Informatik, Germany, February 28th–March 4th, 2016.
- 2016 *Digital representations of music & Automatic music generation*, guest lecture for the Music and speech perception course, Queen Mary University of London, UK, February 2016.
- 2015 *Generating structured music using operations research methods*, Complex Systems Seminar Series, School of Mathematical Sciences, Queen Mary University of London, UK, June 19th, 2015.
- 2015 *Music and operations research: applications in automatic generation music and dance hit prediction*, Seminar, Department of Computer Science, Research Group SCALAB, Universidad Carlos III de Madrid, Spain, November 27th, 2015.
- 2015 *Generating structured music with local optimisation and machine learning*, Seminar, Department of Computer Science, Imperial College London, UK, October 14th, 2015.
- 2015 *An automatic composition system for structured music based on optimization and machine learning*, Seminar, Harvey-Mudd College, Claremont, US, July 23rd, 2015.
- 2015 *From music theory to machine learning for evaluating generated music*, Seminar, Department of Music (part of summer school), University of San Diego (UCSD), San Diego, US, July 17th, 2015.
- 2015 *Setting Optimal Parameters Of Metaheuristic Algorithms*, guest lecture in Doctoral Course on Metaheuristics, University of Antwerp, Belgium, April 8, 2015.
- 2014 *Setting Optimal Parameters of a VNS for Music Generation*, guest lecture in Doctoral

Course on Metaheuristics, University of Antwerp, Belgium, April 10, 2014.

2013 *Classifying And Generating Composer Specific Music*, Research Seminar, Queen Mary University, London, UK, Dec 6, 2013.

2012 *Classifying And Generating Composer Specific Music*, Research Seminar, Department of Engineering Management, University of Antwerp, Belgium, Nov 16, 2012.

COURSES TAUGHT

2010–2015 Courses taught/assisted at the University of Antwerp, Belgium

- Technological Project Management
- Seminar Applied Mathematics (Matlab)
- Supply Chain Management
- Operations Management
- Total Quality Management
- Forum Corporate Social Responsibilities

2006–2008 Courses taught at Les Roches, Switzerland

- 3D Computer Animation (newly designed course) (MBA programme)
 - Principles of Computer Applications (Bachelor students)
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SUPERVISION OF PHD THESES

2015–current **Queen Mary University of London, UK**

- Janis Sokolovskis: New Technologies for Piano Learning
Co-supervisor with Prof. dr. Elaine Chew
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SUPERVISION OF MASTER THESES

2015–current **Queen Mary University of London, UK**

- Generating music for computer games (Li Tang)
- A guitar fingering algorithm (Kairan Liao)

2010–2015 **University of Antwerp, Belgium**

- A variable neighbourhood search algorithm to generate piano fingerings for polyphonic sheet music (Matteo Baliauw)
 - won ORBEL award best Master thesis in Operations Research Belgium 2014
 - nominated for Pop Music Thesis Award 2014
 - resulted in publications in “International transactions of OR” and “Lec-

ture notes in computer science”

- Data mining & music - Hit prediction (Tom Bergmans)
 - nominated for Pop Music Thesis Award 2014
 - journal publication currently in writing phase
- Generating neoclassical guitar music with metaheuristics (Max Hein)
- Supply chain management and vendor managed inventory (Malco Cambula)
- Visualizing the evolution of alternative hit songs over time (Wim Lauwers)
 - conference paper currently in (internal) editing phase
- Developing a cello fingering algorithm (Dries Van Overloop)

WORKSHOPS, DOCTORAL COURSES AND SUMMER SCHOOLS

- 2016 ZiF Workshop – From Computational Creativity to Creativity Science – Center for Interdisciplinary Research, Bielefeld University, Germany
- 2016 Dagstuhl Seminar – Computational Music Structure Analysis, Schloss Dagstuhl – Leibniz-Zentrum für Informatik, Germany
- 2015 Lorenz Workshop – Music Similarity: Concepts, Cognition and Computation, Leiden, The Netherlands
- 2014 Workshop Deep Learning – 2-day workshop on Deep Learning for Sound and Music Processing, Austrian Research Institute for Artificial Intelligence (OFAI), Vienna, Austria
- 2014 Computational Music Analysis – *The Sound and Music Computing Summer School*, Athens, Greece – **Funded by FWO travel grant**
- 2013 Advanced Data Mining – (greatest distinction) with Prof. Dr. D. Martens, *University of Antwerp*, Antwerp, Belgium
- 2011 Optimization: Special Topics – (distinction) with Prof. Dr. F. Spieksma, *KU Leuven*, Leuven, Belgium
- 2010 Advanced Optimization Techniques – (greatest distinction) with Prof. Dr. K. Sörensen, *University of Antwerp*, Antwerp, Belgium

COMPUTER SKILLS

Systems Linux (UNIX), Mac, Windows.

Applications Familiar with most common applications.

Statistical JMP, SPSS, R, Weka,...

Languages C, C++, Java, Python, Android, Matlab, Bash, PHP, HTML & CSS, Pascal, SQL, \LaTeX ,...

IN THE PRESS (EXTERNAL)

(Click the title to view the original item)

Press articles

- A Machine Successfully Predicted the Hit Dance Songs of 2015, *Motherboard, Vice.com*, 17/12/2015.
- The science behind chart success, *Flanders Today*, 12/12/2014.
- Dancehits almaar sneller en luider, *Nieuwsblad*, 23/11/2014.
- Universiteit Antwerpen ontwikkelt een app om hits te herkennen, *De Standaard*, 23/11/2014.
- Onderzoek Antwerpen “Een grappige tool, dat wel”, *Gazet Van Antwerpen*, 23/11/2014.
- Software maakt piano spelen voortaan een stuk makkelijker, *Knack*, 8/9/2014.
- Software als hulpmiddel om pianostukken in te studeren, *Metro*, 08/09/14.
- App genereert oneindige muziek van bekende componisten, *De Standaard*, 21/02/2013.
- Oneindig klassieke muziek van bekende componisten dankzij Belgische app, *De Morgen*, 21/02/2013.
- Ga Beethoven achterna met nieuwe Fux-app, *Gazet Van Antwerpen*, 21/02/2013.
- App genereert oneindige muziek van grote componisten, *Knack*, 21/02/2013.

Radio

- Comment prédire qu'une chanson sera un tube?, *France Info (radio interview)*, 23/11/2014.
- FuX-app genereert muziek in de stijl van Bach, Beethoven en Haydn, *Interview Radio 2*, 23/02/2013.

TV

- Op een wetenschappelijk verantwoorde manier te weten komen of je een dance-hit hebt gemaakt of niet?, *Talkshow: Reyers Laat*, 01/12/2014.
- App voorspelt of nummer hit wordt, *VTM tv-news*, 22/11/2014.
- Beethoven met een streepje Bach?, *CampusTV*, 6/11/2013.

ACADEMIC & RESEARCH SERVICE

Reviewer:

- European Journal of Operations Research (EJOR)
- Expert Systems With Applications
- ACM Transactions on Intelligent Systems and Technology
- IEEE/ACM Transactions on Audio, Speech and Language Processing
- IEEE TENCON
- Journal of New Music Research
- Journal of Mathematics and Music
- International Conference on Fuzzy System and Data Mining (FSDM)
- International Workshop on Musical Metacreation (MUME)
- Springer book on Computational Music Analysis

Program Committee Member:

- International Conference on Mathematics and Computation in Music (MCM)
- The International Society of Music Information Retrieval (ISMIR)
- International Conference on Principle and Practice of Constraint Programming (CP)
- International Workshop on Music and Machine Learning MML (part of ECML/PKDD)

Member of Athena Swan (QMUL) program by the Equality Challenge Unit to advance women’s careers and promote equality in Science, Engineering, Maths and Medicine.

Developer of website of the ANT/OR research group (antor.uantwerpen.be) and the ORBEL29 conference website (orbel.be)

Mentor in WIMIR mentorship programme for Women in Music Information Retrieval

Member of IEEE

Panel Member: ASyMMuS Workshop on Audio-Symbolic Music Similarity Modelling, British Library, London, July 8th 2015.

Former member of the **Faculty Council** of Applied Economics, University of Antwerp.

Member of organizing committee: ORBEL29: 29th Belgian Conference on Operations Research.

LANGUAGE KNOWLEDGE

	Spoken	Written
Dutch	native	native
English	near native	near native
French	near native	near native
German	very good	good
Spanish	fair	fair