# RICHARD F. GRAHAM, Ph.D.

# **CURRICULUM VITAE**

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### Education

Ph.D. in Music Technology - School of Creative Arts, Ulster University, Derry, Northern Ireland.

Dissertation: "The Expansion of Electronic Guitar Performance through the Development of Interactive Digital Music Systems."

Committee: Dr Ricardo Climent, NOVARS, University of Manchester. Dr Paul Moore, Head of Creative Arts & Technologies, Ulster University. Dr Stanley Black (Chair), Head of Research Graduate School, Ulster University. Awarded in 2012

M.Mus. in Music - School of Creative Arts, Ulster University, Derry, Northern Ireland. Specialization: Music Performance and Music Production.

Awarded in 2007

B.Sc. in Music Technology — Sonic Arts Research Centre, Queen's University of Belfast, Belfast, Northern Ireland. Specialization: Audio Engineering.

Awarded in 2006

## **Professional Appointments**

Stevens Institute of Technology, United States - Assistant Professor of Music and Technology September 2012 to Present

Ulster University, United Kingdom - Junior Lecturer in Music and Creative Technologies and Electric Guitar Instructor October 2007 to June 2012

### **Peer Reviewed Publications**

R. Graham, W. Brent, B. Bridges, C. Manzione. "Exploring Pitch and Timbre Spaces in VR: Virtual Reality as an Incubator for Performance Systems Design" in Proceedings of the International Conference on New Interfaces for Musical Expression. Aalborg University. Copenhagen, Denmark. May 2017 (accepted, forthcoming).

- R. Graham and B.Bridges. "Competing Attractions, Orbital Decay and the Music of the Spheres: Force—based relational dynamics for organizing space and timbre in performance using physical modeling." In Emille: Journal of the Korea Electro-Acoustic Music Society. Late 2017 (accepted, forthcoming).
- R. Graham. "To Notice and Remember: a collaborative work exploring the application of historical data in virtual reality." Artist Statement. In Leonardo Music Journal (Issue 27), MIT Press. Special Issue on History and Memory. Late 2017. (Submitted/Pending Review).
- R. Graham and B. Bridges. "Competing Attractions, Orbital Decay and the Music of the Spheres: Force—based relational dynamics for organizing space and timbre in performance using physical modeling." In Proceedings of the Korean Electro-Acoustic Society Annual Conference. Seoul, S. Korea. October 2016.
- R. Graham and S. Cluett. "The Soundfield as Sound Object: Virtual Reality Environments as a Three-Dimensional Canvas for Music Composition" in the Proceeding of the Audio Engineering Society International Conference on Audio for Virtual and Augmented Reality. Paper Number: 7-3. AES E-Lib: 18510. Los Angeles, USA. October 2016.
- R. Graham. "High-Density Loudspeaker Arrays as a Performance Environment." Artist Statement. In Computer Music Journal. Special Issue on Computer Music for High-Density Loudspeaker Arrays. MIT Press. 40:4. Winter 2016.
- R. Graham and B. Bridges. "Managing Musical Complexity with Embodied Metaphors" in Proceedings of the International Conference on New Interfaces for Musical Expression. Louisiana State University, Baton Rouge, USA. May 2015. ISBN: 978-0-692-49547-6. ISSN: 2220-4806.

- R. Graham and J. Harding. "SEPTAR: Audio Breakout Circuit for Multichannel Guitar" in Proceedings of the International Conference on New Interfaces for Musical Expression. Louisiana State University, Baton Rouge, USA. May 2015. ISBN: 978-0-692-49547-6. ISSN: 2220-4806.
- R. Graham and B. Bridges. "Strategies for Spatial Music Performance: Practicalities and Aesthetics for Responsive Mappings" in *Divergence Press*. Issue 3. December 2014. ISSN: 2052-3467 (Online).
- R. Graham and B. Bridges. "Gesture and Embodied Metaphor in Spatial Music Performance Systems Design" in Proceedings of the International Conference on New Interfaces for Musical Expression. Goldsmiths, University of London, United Kingdom, July 2014. ISSN: 2220-4792 (Print), 2220-4806 (Online), 2220-4814 (USB). ISBN: 978-1-906897-29-1 (Online).
- R. Graham and B. Bridges. "Mapping and Meaning: Embodied Metaphors and Non–Localised Structures in Performance System Design" in *Re-New Digital Arts Festival 2013 Catalogue* (ISSN. 2245-7801). Copenhagen, Denmark, October 2013.
- R. Graham. "A Live Performance System in Pure Data: Pitch Contour as Figurative Gesture" in Proceedings of the Pure Data Convention. Bauhaus-Universität, Weimar, Germany, August 2011.

### **Grants and Scholarships**

Arts Council of Northern Ireland (ACNI) - \$2500 - Individual Artist Award 2016.

Stevens Institute of Technology - Ignition Grant Initiative (IGI) - \$20,000 - July 2016.

Innovation and Entrepreneurship Project - Stevens at Propellerfest - \$38,000 - January 2016.

Arts Council of Northern Ireland (ACNI) - \$500 - Travel Award - Tour of Belgium and Germany 2011.

Arts Council of Northern Ireland (ACNI) - \$3000 - Individual Artist Award 2009.

Arts Council of Northern Ireland (ACNI) - \$1000 - Travel Award - Tour of Japan 2009.

Department for Employment and Learning (DEL) Scholarship Award - \$12500 - Ph.D. 2008.

European Social Fund Scholarship (ESF) Award - \$6000 - M.Mus. 2006.

### Artist Residencies, Certifications, and Honors

EMS Elektronmusikstudion - Artist in Residence - Stockholm - June 2017.

EMS Elektronmusik<br/>studion - Artist in Residence - Stockholm - July 2016.

Product Specialist for Keith McMillen Instruments - 2013 to Present.

Certified Ableton Trainer - 2012 to Present.

STEIM - Artist in Residence - Amsterdam 2010.

STEIM - Orientation - Amsterdam 2009.

Grade 8 Electric Guitar (Professional Level) - Trinity College of Music, London 2002.

Honors for Music and Drama - Bangor Grammar School 2002.

## **Professional Affiliations and Service**

Sound and Music Computing 2017 - Reviewer for Installations.

New Interfaces for Musical Expression 2017 - Reviewer for Workshops.

New Interfaces for Musical Expression 2017 - Reviewer for Papers.

New Interfaces for Musical Expression 2017 - Reviewer for Performances.

Pure Data Convention - Conference Chair - 2016.

Irish Sound, Science, and Technology Association - Conference Paper Chair - 2016.

Computer Music Journal (MIT Press) - Reviewer for Issue on High-Density Loudspeaker Arrays - 2016.

International Computer Music Association (ICMA) - Member 2015 to 2016.

Society for Electro-Acoustic Music in the United States (SEAMUS) – Member 2014 to 2016.

American Society for Composers, Authors, and Performers (ASCAP) - Member 2012 to 2016.

Society for Musicology in Ireland (SMI) & College Music Society (CMS) – Student Member 2012.

Society for Musicology in Ireland (SMI) International Conference Committee Member - May 2010.

## Performances and Installations of Original Music and Artworks

Disrupt/Construct - New Interfaces for Musical Expression, Aalborg University, Copenhagen - May 2017.

Quiet Arcs, Axon, and Disrupt/Construct (Excerpts) - Sonic Arts Research Centre, Belfast, N. Ireland - February 2017.

Improvised Set - International Pure Data Convention - Stevens & NYU (w. Cluett) - Hoboken, USA - November 2016.

Improvised Set - Electroacoustic Barn Dance - University of Mary Washington, Fredericksburg, USA - November 2016.

Improvised Set - Berklee College of Music - Electronic Production and Design Department, Boston, USA - October 2016.

To Notice and Remember (VR) - iDMAa - Winona State University (w. Cluett, Manzione) - October 2016.

To Notice and Remember (VR) - Moving Image Immersive Media Festival - Alt Art Space, Istanbul - September, 2016.

Improvised Set - ISSTA 2016 (w. Gregory Taylor and Mark Henrickson) - Sandinos, Derry, N. Ireland - September 2016.

VESPERS - VR & 3d Audio Exhibition (w. Cluett, Manzione) at Propellerfest, Hoboken, NJ - May 2016.

To Notice and Remember (VR) - Virtual/Transposed Landscapes - apexart, NYC - March 2016.

Senses Under Fire - Fire Sculpture Exhibition (w. Josie Deane) - City life, Jersey City - March 2016.

1314 - Electric guitar, amplifiers, & electronics - SEAMUS 2016, Georgia Southern University, USA - February 2016.

Sonifying Tidmarsh - Multichannel Audio Installation - MIT Media Lab Members Meeting - October 2015.

1314 - Electric guitar, amplifiers, & electronics - Spectrum, NYC, USA - October 2015.

Quiet Arcs - Guitar and 24-channel loudspeaker diffusion - ICMC 2015, UNT - Denton, Texas, USA - September 2015.

Quiet Arcs - 16-channel tape - New York City Electroacoustic Music Festival, NYC, USA - June 2015.

Quiet Arcs - Guitar and 8-channel tape - SEAMUS 2015, Virginia Tech, Blacksburg Virginia, USA - March 2015.

Axon - Root Signals Electronic Music Festival at Jacksonville University, FL, USA - September 2014.

Matic/Denizen - Experimental Music Series (w. Jay Dickson) - ShapeShifter Lab, Brooklyn, NYC, USA - May 2014.

On the Relativity of Distance (w. Ingo Appel) - National Academy, NYC, USA - October, 2<sup>nd</sup> to November 7<sup>th</sup> 2013.

Thorn Reader (w. Ingo Appel) - Faculty Exhibition - National Academy, NYC, USA - December 2012 to January 2013.

Quiet Arcs - Spatial Music Concert - Crescent Arts Centre in Belfast, N. Ireland - May 2012.

Nascent - Elements Tour (w. N, Premonition Factory) - Belgium & Germany - September 2011.

Axon - Pure Data Convention - SeaM Werkstattstudio, Weimar, Germany - August 2011.

Axon - Electronic Arts Research Society - SARC, Belfast, N. Ireland - May 2011.

Axon - Contemporary Music Center - Ulster University, Derry, N. Ireland - April 2011.

Improvised Set - Ambient Antwerp (w. Dirk Serries, N, Steve Lawson) - Arenberg, Antwerp - March 2010.

Improvised Set - Celtronic Festival (w. Ulrich Schnauss) at Saint Columb's Hall, Derry, N. Ireland - June 2009.

Improvised Set - ISEA 2009 - Ulster University, Derry, N. Ireland - August 2009.

Multiple Live Sets - Tour of Japan - Tokyo, Japan - May 2009.

Live Set - Celtronic Festival (w. Boxcutter & Mary Anne Hobbs) at Sandinos, Derry, N. Ireland - June 2008.

Multiple Live Sets - Tour of Japan - Tokyo, Japan - July 2007.

# **Music Productions**

Disrupt/Construct - New Electronic Music Album - Forthcoming 2017.

Axon Reprise - Remix of Axon Reprise by Evan Marien - February 2014.

Querschalltapes - Limited Edition Tape Loop Release - Inselkind-Schalltraeger (DE) - March 2013.

Origins and Evolutions - Featured Guitarist - Install (NYC, U.S.) - September 2012.

Nascent - 12-track studio album - Sentric Music Publishing (Liverpool, U.K.) - May 2012.

Refraction - Full metal band track for Rock Band Network - RBN - March, 2011.

Mecca - 6-track studio album - Sentric Music Publishing (Liverpool, U.K.) - February 2010.

Rain Down Fire - EP - CD Lunch (Tokyo, Japan) - July 2009.

Beautiful Beginning - Single - Sentric Music Publishing (Liverpool, U.K.) - August 2008.

Where are the People? - (w. Shiro) - Sentric Music Publishing (Liverpool, U.K.) - July 2008.

Tape for *Golden Circle* (w. J. McLachlan) commissioned by Miso Music. Performed by Sond'Ar-te Electric Ensemble in Portugal, September, December 2011.

## **Software and Hardware Development**

sinedelay~ v1 - A waveform generator and delay line external for Pd, written in C - April 2017.

fibo v1 - A fibonacci sequence generator for rhythm creation for Pd, written in C - February 2017.

factorial v1 - A factorial generator for ambisonic optimization coefficients for Pd, written in C - July 2016.

grambilib~ v1 - An ambisonics library for Pd and Max/MSP, written in C - March 2016.

lerdahl v1 - A tonal abstraction external for Pd, written in C. Based on tonal theory by Lerdahl - January 2016.

ambi~ - A set of ambisonic abstractions for Pd and Max/MSP - November 2015.

Septar v2 - An audio breakout and low-pass filter for multichannel guitars (w. John Harding, Ulster University) - May 2015.

pd2live - A live performance system for multichannel guitar (in support of Ph.D. dissertation) - May 2012.

Septar v1 - An audio breakout and low-pass filter for multichannel guitars (w. John Harding, Ulster University) - August 2011.

## Invited Guest Lectures, Performance Demonstrations and Artist Presentations

Artist Presentation and Performance Demonstration - Bell Labs, Dublin, Ireland - March 2017.

Artist Presentation and Performance Demonstration - Trinity College, Dublin, Ireland - March 2017.

Artist Presentation and Performance Demonstration - University of Limerick, Ireland - February 2017.

Artist Presentation - Bell Labs, Murray Hill, NJ - December, 2016.

Lecture and Recital at Berklee College of Music, Massachusetts - October 2016.

Artist Presentation at American University, Washington DC - January 2016.

"Computers and Music" at Salem State University, Massachusetts - April 2015.

"Managing Musical Complexity with Embodied Metaphors" at MIT, Massachusetts - February 2015.

"Electronic & Experimental Music in the Americas & Europe" at MIT, Massachusetts - February 2015.

"Spatial Audio and Ambisonics" at American University, Washington DC - April 2014.

"Live Performance Systems" at American University, Washington DC - March 2014.

"Augmented Musical Instruments" at Stevens Institute of Technology, New Jersey - April 2012.

## Conference Papers, Posters, and Workshops

New Interfaces for Musical Expression 2017 - "Exploring Pitch and Timbre Spaces in VR: Virtual Reality as an Incubator for Performance Systems Design" at the Aalborg University. Copenhagen, Denmark. May 2017 (accepted, forthcoming).

Korean Electro-Acoustic Society Annual Conference (KEAMSAC) - "Competing Attractions, Orbital Decay and the Music of the Spheres: Force—based relational dynamics for organizing space and timbre in performance using physical modeling" (w. Bridges), October 2016.

Weird Realities Conference - "To Notice and Remember" (w. Cluett, Manzione) at Carnegie Mellon University - Pittsburgh, Pennsylvania, October 2016.

Audio Engineering Society International Conference on Audio for Virtual and Augmented Reality (AVAR) - "The Soundfield as Sound Object: Virtual Reality Environments as a Three-Dimensional Canvas for Music Composition (w. Cluett) - Los Angeles, October 2016.

Toronto International Electroacoustic Symposium 2016 - "Sonifying Tidmarsh Living Observatory" at the Canadian Music Centre, Toronto, August 2016.

Irish Sound Science and Technology - "An Introduction to Audio Synthesis in Pd" (Workshop) - Ulster University, N. Ireland, September 2016.

Society for Electro-Acoustic Music in the United States 2016 - "Sonifying Tidmarsh Living Observatory" at Georgia Southern University, February 2016.

Irish Sound, Science, and Technology Association 2015 Conference - "Embodied Resonances and Thoughts of Electroacoustic Music: What can we learn from theorizing disembodied sound using embodied schemas?" (w. Bridges) at the University of Limerick and Mary Immaculate College, R. Ireland, August 2015.

Sounds, Images, and Data Conference 2015 - "Exploring Creative Divergences through Data-Driven Practices" (w. Manzione, Veleni) at New York University, NYC, July 2015.

Electroacoustic Music Studies Conference 2015 - "Electroacoustic Music as Embodied Cognitive Praxis: Denis Smalley's theory of spectromorphology as an implicit theory of embodied cognition" (w. Bridges) at the University of Sheffield, June 2015.

 $New\ Interfaces\ for\ Musical\ Expression\ 2015\ -\ "Managing\ Musical\ Complexity\ with\ Embodied\ Metaphors"-Poster\ Session\ at\ Louisiana\ State\ University,\ Baton\ Rouge,\ May\ 2015.$ 

 $New\ Interfaces\ for\ Musical\ Expression\ 2015\ -\ "SEPTAR: Audio\ Breakout\ Design\ for\ Multichannel\ Guitar"-Poster\ Session\ at\ Louisiana\ State\ University,\ Baton\ Rouge,\ May\ 2015.$ 

Society for Electro-Acoustic Music in the United States 2015 - Emotion and Electroacoustic Music - "Creative Strategies for the Performance of Spatial Music" at Virginia Tech, March, 2015.

New Interfaces for Musical Expression 2014 - "Gesture and Embodied Metaphor in Spatial Music Performance Systems Design" – Poster Session at Goldsmiths, University of London, July 2014.

Peace and Justice Studies Association 2013 Conference - "Creative Bridge Building in Northern Ireland using Music Technology" (w. L. Graham) at the University of Waterloo, Ontario, Canada, October 2013.

Irish Sound, Science, and Technology Association 2013 Conference - "Loose Coupling and Gestural Structures in Spatial Music Performance Systems" (w. Bridges) at the Dún Laoghaire Institute of Art and Design in Dún Laoghaire, R. Ireland, August 2013.

Music & Diplomacy Conference - "Creative Bridge Building in Northern Ireland: open-source technologies as a tool for social capital development" (w. L. Graham) at Tufts-Harvard, Massachusetts, March 2013.

eNTERFACE 2012 - "Extraction and Application of Figurative Instrumental Gesture" at Supélec, Metz, France, July 2012.

Pure Data Convention - "A Live Performance System in Pure Data: Pitch Contour as Figurative Gesture" at the Bauhaus-Universität, Weimar, Germany, August 2011.

Music Showcase Conference - "Electronic Music Performance" at the Nerve Centre, Derry, N. Ireland, July 2011

Imagine Create Festival - "Performance and Pure Data" at Ulster University, Derry, N. Ireland, March 2011.

Irish Pure Data Conference - "Considering Pitch Contour" at Trinity College, Dublin, R. Ireland, January 2011.

Society for Musicology in Ireland Annual Conference - "The Communication of Musical Gesture in Real-Time Electronic Guitar Performance" at the University of Ulster, Londonderry, N. Ireland, May 2010.

Society for Musicology in Ireland Postgraduate Conference - "The Effects of Polyphonic Technology on Contemporary Electric Guitar" at the Dublin Institute of Technology, Dublin, R. Ireland, January 2010.

### **Notable Industry Features and Press**

Featured installation in Hyperallergic - "Seeing with the Body at a Virtual-Reality Art Show", May 2016. Featured installation in the New York Times - "SoHo and TriBeCa, a Cradle of Contemporary Art", April 2016. Featured artist on Darwin Grosse's (Cycling '74) Art + Music + Technology Podcast, January 2016. Selah IV - Synchronized composition on MTV's Catfish (USA) TV Show, November 2014 to Present. Nascent - Synchronized composition on Channel 4's Hollyoaks (UK) TV Show, November 2014 to Present. Live music session (w. Shiro) for BBC Introducing (Stephens) - BBC Radio 1 (national), March 2008. Live music session (w. Shiro) for BBC Introducing (McConnell) - BBC Radio 1 (regional), March 2008. Decadence - Featured production on the Breezeblock (Hobbs) - BBC Radio 1 (national), February 2007. Live music session (solo) for Electric Mainline (McCauley) - BBC Radio Foyle (regional), December 2006.

# Teaching Experience (Graduate, Undergraduate, and Pre-College Courses)

Audio Programming (G) S17.

Electronic Music Production (Pre-College) Summer 2015 - 2017.

Software Instrument Design (UG) F13 - S16.

Spatial Music Applications (UG/G) S13 - S16.

Research & Writing Seminar (UG) S13 - S16.

Senior Thesis (UG) F12 - S17.

Interactive Performance Systems (UG) F12 - F16.

Sound Recording (UG) F12, S13, S16.

Introduction to Digital Media (UG) F12, F13.

Introduction to Electronic Music (UG) S13, S14.

Introduction to Music Technology (UG) S13 - F16.

Music History I (UG) F12.

Sound Design (UG) F12.

Music Business (UG) S13.

## **Professional Development Courses and Workshops**

[gen∼] with Gregory Taylor - ISSTA 2016 - September 2016.

SuperCollider with John King - ISSTA 2016 - September 2016.

Audio Signal Processing for Music Applications – Stanford & UPF - Online, October 2014.

Electrify – University of Liverpool – Online, September 2014.

Mathematical Symbolism – Loughborough University – Online, September 2014.

Creative Coding with Processing – Monash University – Online, May 2014.

Designing Audio Objects for Max/MSP – Harvestworks, NYC, May 2013.

Introduction to C Programming – Online, May 2012.

#### **Academic Service**

Co-founder of the Sensory Computation / Experimental Narrative Environments Lab - 2016.

Stevens Graduate Curriculum Committee, 2014-16, Graduate School Academic Integrity Board, 2015-16.

College of Arts and Letters Curriculum Committee, 2014-15.

Search committee for one tenure-track position in Music and Technology, 2014-15.

Search committees for two tenure-track positions in Visual Arts, 2012-14.

Developed and taught Stevens first Electronic Music Summer Pre-College Program, 2015-16.

Developed Stevens research spaces throughout 2012-16, incl., its first Electroacoustic Lab, 2013.

Qualified Stevens to become New Jersey's first Certified Ableton Training Center in 2013.

Negotiated music hardware and software license purchases for the Music & Technology program, 2012-16.

Secured donations & academic discounts from Ableton & Keith McMillen Instruments, 2013-16.

Advised students on study plans, scholar's projects, theses, and senior design projects, 2012-16.

Supervised music students involved in Stevens 2013 Solar Decathlon entry in 2012-13.

Composed and synchronized original music for Stevens 2013 Solar Decathlon entry.

Managed course evaluations, curriculum development, and collaborations with Stevens undergraduate admissions office on student recruitment and pre-college programs.

Developed and taught undergraduate music and visual arts core and free elective courses.

Developed graduate music courses in spatial audio, digital signal processing, and audio programming.

Managed an extracurricular soccer club for CAL faculty and students, 2014-15.

### **Campus Events**

Pure Data Convention 2016 - NYU / Stevens Institute of Technology, November 2016.

Andrew Raffo Dewar (University of Alabama) - "Anabolism" - Afternoon Concert, November 2016.

Adriano Clemente (Ableton University Tour) - April 2016.

Enda Bates (Trinity College, Dublin, IE) - Composer Colloquium, March 2016.

Martin Roth (Enzien Audio, London, UK) - What's the deal with Procedural Audio?, November 2015.

R. Luke DuBois (NYU Poly, NY) - Sex, Lies, and Data Mining, October 2015.

Steve Kemper (Rutgers, NJ) - Re-Imagining Electroacoustic Performance, October 2015.

Adam Rokhsar (Ableton University Tour) - April 2015.

Nathan Brewer (IEEE History Center, NJ) - History of Electronic Music, March 2015.

Marco Donnarumma (Goldsmiths, London, UK) - Xth Sense, October 2014.

Simon Jermyn (Dublin, IE) - Extended Bass Guitar Practice, October 2014.

Brian Bridges (Ulster University, UK) - Experimental Music, February 2014.

William Brent (American University, DC) - Computer Music and Pure Data, December 2013.

Todd Reynolds (Bang On a Can, NY) - Music Performance Technology, October 2013.

Enda Bates (Trinity College, Dublin, IE) - The How, What, and Why of Spatial Music, April 2013.

# **Industry Appointments**

Product Specialist for Keith McMillen Instruments, February 2013 to present.

Certified Ableton Trainer, September 2012 to present.

Media Arts and Electric Guitar Instructor at the Crescent Arts Centre, February 2012 to August 2012.

Guitar Instructor and Administrator at the Yamaha School of Music, February 2006 to June 2006.

Studio Engineer for the Making Music Workshop: Cross-Community Project, September 2005 to January 2006.

### References

# Anthony Pennino, Ph.D.

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Lecturer - Creative Technologies & Music Arts and Humanities Research Institute University of Ulster, Magee Campus Londonderry, U.K.

## Ricardo Climent, Ph.D.

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# Seth Cluett, Ph.D.

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