Dr Louis McCallum

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About

I am currently a Senior Lecturer and Course Leader for the MSc Data Science and AI for the Creative Industries at the Creative Computing Institute, UAL. Since starting in 20/21 academic year I have developed and delivered a novel curriculum across multiple units, maintaining high levels of student satisfaction and growing recruitment year on year (220 applicants by 4th year). Previously at the Embodied Audio Visual Interaction Group at Goldsmiths, London, I researched feature engineering of motion sensor data for users of interactive machine learning software and built web frameworks to support musicians using machine learning. My most recent commericial post was as Senior Developer for London-based artificial intelligence firm HeresyAI, where I built out multiple propositions applying AI to the areas of music and video, sport and FinTech.

With 15 years experience, I have excellent programming skills with a focus on multimedia applications and working in interdisciplinary, research-led environments. I am comfortable working in small or large teams in agile workplaces and have knowledge of and commitment to software development best practices. I can adopt new programming languages, libraries, and platforms easily and quickly and have experience of analysing, researching, and solving complex programming problems. I also have outstanding research skills including critical analysis and report writing.

I am the main developer for the MIMIC creative ML Web platform, used by over 70k students at UAL and online. I has secured multiple grants from Google (AMI and Tensorflow.js) to fund the above projects. I am also the Award Lead on a Network Grant from the Alan Turing Institute with which I have engaged the local community with open source tools for AI music creation. Freelance projects undertaken have included generative composition and remix, music information retrieval, gesture recognition, machine learning, electromechanical instrument design and construction, projection mapping, computer vision, augmented reality, concatenatative synthesis, generative lyricism and digital sound design. This work, both individual and collaborative, have been widely exhibited across London, notably at the Royal Festival Hall, and in Dublin, New York and Austria. The robotic drummer I developed for my PhD, *Mortimer*, has appeared on the BBC's Christmas Lectures and on Channel Five's The Gadget Show.

Skills

Programming

Languages: Python, Javascript, Swift and Objective C (iOS and Mac), Java, C++,

Skills: Data Science and Machine Learning, User Centered Design, Multimedia Programming, Machine Listening, Computer Vision, Generative Music and Art, Mobile Development and Distribution (iOS and Android), Code Reviewing, TDD, Scrum

Frameworks: Git/Bitbucket, Jira, Tensorflow, SuperCollider, OpenFrameworks, Processing/P5, QT, Tensorflow/Keras, BLE, Arduino,

Teaching

Course Leadership

Curriculum Design and Validation

Delivering and authoring high quality content across STEM and Arts subjects

Developing content for MOOCs

Production Techniques

Audio recording and mixing (Logic Pro, ProTools), Synthesis and Sound Design

Filming and Editing (Final Cut Pro), CAD (Rhino), Graphic Design (Sketch)

Selected Employment History

From	To	Employer	Position and Responsibilities
10/20	-	CCI, UAL	Senior Lecturer & Course Leader MSc Data Science and AI for the Creative Industries, MRes Creative Computing
3/23	4/23	Abertay University	Guest Lecturer - Delivering lectures and workshops on Creative AI
5/22	10/22	Processing Foundation	Mentor - Mentoring Translation of p5.js Documentation Project
4/22	4/22	Music Hackspace	Mentor - Mentoring intern on Innovate UK funded recommender systems project
11/21	4/22	DIS Copenhagen	Guest Lecturer - Delivering lectures on AI and Creative Industries
9/21	1/22	AI Artathon (Global AI Summit)	Expert and Mentor - Delivering workshops on creative AI, mentoring competition teams
09/20	10/20	Goldsmiths, University of London	Post Doctoral Researcher - DDSP HDI grant
05/20	08/20	CCI, UAL	Subject matter expert, developer and course writer for FutureLearn course Apply Creative Machine Learning.
09/19	06/20	Goldsmiths, University of London	Associate Lecturer - Data and Machine Learning for Creative Practice
12/18	04/19	Actress (Ninja Tune Artist)	AI Music Software Developer for Young Paint project. Used in performances for Transmediale 2019 in Berlin, Germany
05/18	09/20	Goldsmiths, University of London	Post Doctoral Researcher on MIMIC Project. Building a web platform for musicians to adopt cutting edge machine learning research into their practise
10/17	09/19	Goldsmiths, University of London	Post Doctoral Researcher in End-User Design of Sensor-based Interactions. Researching feature engineering for motion sensor data for users of interactive machine learning software. Developing software (Java), designing and conducting user studies, publishing output.
04/17	07/17	University of Sussex	Lead Mobile Developer, Syncphonia Project. Developing iOS and Android application for distributing and performing musical scores. Involves bespoke and novel use of BLE and Direct WiFi between large numbers of cross platform tablets.
12/14	02/17	HeresyAI	Senior Developer. Developing software for new artificial intelligence propositions. Maintaining live releases and beta tests of iOS mobile applications (Mashtraxx Music and Video App, AiPex Tennis Sensor). Product design/concepts and business models. Graphic design for user interfaces. Supervising junior staff, interns and musicologists. Assisting with Patent Applications.
05/14	08/14	QMUL and Di Mainstone, Artist	Hardware Developer. Designing and building electromechanical beaters for Human Harp Project for Reverb Festival (Roundhouse).

From	To	Employer	Position and Responsibilities
09/13	07/14	Saint Digital, Digital Agency	Lead iOS Developer. Developing prototype location based social network/dating iOS app (Fayt).
05/13	07/13	QMUL and Keir Williams, Researcher	Java and Hardware Developer. Novel controller and software for research project, "Digital Media in a Special Needs Classroom".
08/12	03/13	The Technical People	Appcelerator Cross Platform Mobile Developer. Bespoke programming projects for iOS and Android (Trolleywise, QRCode Newspaper Scanner).
08/12	08/12	In The Woods, Art and Music Festival	OpenFrameworks and Hardware Developer. Building and installing interactive birdhouse/projection mapping installation.
07/12	08/12	Arthur Carabot, Designer	Onsite Technical Supervisor. Coca-Cola Interactive Beat Box Pavillion Installation for London Olympics.
07/12	09/12	Philter Phactory, Digital Marketing Agency	SuperCollider Developer. Development of Algorithmic Composition driven by social bots (Weavrs) for Botstep and Whistling for Weavrs projects.
05/12	07/12	Richard De-Domenici, Artist	Hardware Developer. Designing and Building remote controlled mobile robot for Bomb Predisposal Unit project.
03/11	04/12	Helma Rudd, Artist	OpenFrameworks Developer. Software development and on site installation of large scale, interactive projection mapped sculpture in Klagenfurt Cathedral, Austria.
01/12	06/12	City Of London Boys School	Extracurricular Programming Teacher. Creating and delivering novel programming syllabus using Processing.
09/11	05/12	QMUL and Di Mainstone, Artist	Artist and Sound Designer. Construction and design of augmented water organ for Hydrocordian project, installation at Science Gallery (Dublin) and Eyebeam Gallery (New York).
02/11	08/11	United Visual Artists, Art Studio	Researcher. Research project in partnership with QMUL into mechanical instruments in interactive art installations.
09/09	05/10	University of Sussex	Peer Assisted Learning Tutor. Running of weekly support sessions for undergraduate students.

Education

PhD, Media and Arts Technology
Queen Mary, University of London, UK
Friend Me Your Ears: A Musical Approach to Human Robot Relationships   Oct 2011 - Jun 2015

Bachelor of Science First Class Honours, Music Informatics
University of Sussex, Brighton, UK   Oct 2007 - Jun 2010

Grants

McCallum, L; *Tensorflow RFP Grant*

Supporting Creative Machine Learning with TensorFlowj.s and the Mimic Platform   August 2022
£15,000

McCallum, L; *Alan Turing Institute Network Development Grant*
Open Source AI Tools for Music and Art   Feb 2022
£25,000

McCallum, L and Yee-King, M; *Google AMI Research Award*
Network-bending Differentiable Digital Signal Processing (DDSP)   Oct 2020
$20,000

Selected Publications

G Vigliensoni, L McCallum, E Maestre, R Fiebrink;*R-VAE: Live latent space drum rhythm generation from minimal-size datasets* Journal of Creative Music Systems. 2022

McCallum, L and Yee-King, M; *Studio report: sound synthesis with DDSP and network bending techniques* July 2021, AIMC'21

McCallum, L and Yee-King, M; *Network Bending Neural Vocoders* Dec 2020, Machine Learning for Creativity and Design Workshop, NeurIPS 2020

Louis McCallum, Rebecca Fiebrink, *The challenge of feature engineering in programming for moving bodies* Oct 2020, NordiCHI '20 Workshop on Programming for Moving Bodies.

Gabriel Vigliensoni, Louis McCallum, Esteban Maestre, Rebecca Fiebrink, *Generation and visualization of rhythmic latent spaces,*, Sept 2020, AIMC '20

Vigliensoni, Gabriel, Louis McCallum, and Rebecca Fiebrink *Creating Latent Spaces for Modern Music Genre Rhythms Using Minimal Training Data* Sept 2020 , ICCC '20.

Grierson, M; Yee-King, M; McCallum, L; Kiefer, C and Zbyszynski, M., *Contemporary Machine Learning for Audio and Music Generation on the Web: Current Challenges and Potential Solutions*, June 2019, ICMC/NYCEMF 2019.

McCallum, L. and R. Fiebrink., *Supporting Feature Engineering in End-User Machine Learning*, May 2019, Emerging Perspectives in Machine Learning Workshop, held at CHI 2019

McCallum, L. and McOwan, P.W., *Extending Human-Robot Relationships Based in Music with Virtual Presence*, Dec 2017 IEEE Transactions on Cognitive and Developmental Systems,

McCallum, L. and McOwan, P.W., *Face the Music and Glance: How Nonverbal Behaviour Improves Human-Robot Relationships Based in Music*, March 2015, ACM Human Robot Interaction Conference, Portland, OR

McCallum, L. and McOwan, P.W., *Shut up and Play: A Musical Approach to Engagement and Social Presence in Human Robot Relationships* August 2014 IEEE International Symposium on Robot and Human Interactive Communication, *Shortlisted for Best Paper Award*

Show Us Your Screens Winter 2011 Computer Music Journal, MIT Press, Winter 2011, DVD supplement (23k views online)

IWARP: Interactions with a Robotic Percussionist June 2010
Undergraduate Thesis, *Winner of Best Artificial Intelligence Project, 2010*

Selected Released Software

Network Bending DDSP
Real time manipulation of DDSP synthesis networks
- https://github.com/Louismac/network-bending

Learner.js
Open source machine learning library

- https://github.com/Louismac/learnerjs

MIMIC Project Website
Online coding platform for creative computing and AI, used for teaching in CCI, workshops
- https://mimicproject.com

maximilian.js
Browser version of popular c++ DSP library
- https://github.com/Louismac/maximilian-js-local

Wekinator Motion Sender App
Companion mobile application for Wekinator machine learning software to transmit sensor data via OSC.
- iOS app, in store, open source.

CBMicro:Bit
Wrapper round CoreBluetooth to receive Micro:Bit button, pin and accelerometer data. Can be standalone as a Unix Executable, included in C++ projects or native Objective C apps (Desktop macOSX apps or iOS phone apps).
- Open source project.

Syncphonia Conductor and Performer Apps
Synchronised Score App for Amateur Ensembles.
- iOS and Kindle apps, in stores.

Selected Workshops and Talks

Empowering Musicians and Artists using Machine Learning to Build Their Own Tools in the Browser, W3C Workshop on Web and Machine Learning, 2020

Using Machine Learning to Build Musical Instruments in the Browser with MIMIC, NIME2020, July 2020

Using Machine Learning to Build Musical Instruments in the Browser with MIMIC, Network Music Festival 2020, July 2020

Using Machine Learning to Build Musical Instruments in the Browser with MIMIC, ICCC2021, Sept 2021

Building Interactive Controllers with Machine Learning, , AI Artathon 2.0 (Global AI Summit), Oct 2021

Machine Learning for Mapping, Intermedia Mapping and Scripting Workshop, CIRMNT 2019

Selected Creative Projects

Young Paint   Jan 2019
2 Highlight Performances, CTM x transmediale
- AI Performance Software for Actress (Ninja Tune)

Deep Melt   September 2022
Iklektik, London
- Music Performance with AI software

Executive Order   May 2021
NIME 2021
- Collaborative Live Coding

Wasser und Wort   September 2011-April 2012
Klagenfurt Cathedral, Austria   w/Helma Rud and Joe Lyske
- Projection Mapped Fabric Sculpture
- Programming and Installation

Hydrocordian   October 2011-January 2012; June 2012-August 2012
Science Gallery, Dublin; Eyebeam, New York   w/Di Mainstone
- Full body water organ
- Design, Construction, Sound Design and Installation

Whistling for Weavrs and Botstep   July-September 2012
                                                    w/ Thor Magnusson for Philter Phactory
- Dubstep and Whistling for Artificial Social Actors
- Algorithmic Composition and Sound Design

Projection Mapped Cubes   September 2011
In the Woods Festival, Kent   w/Keir Williams and Joe Lyske
- Programming, animation and installation

High Arctic   June 2011-January 2012
National Maritime Museum, London   for United Visual Artists
- Programming of interactive audio and installation of audio system

Marble Piano   May 2011; June 2011
Royal Festival Hall, London; BEAM Festival
- Augmented electromechanical piano, construction and installation

Digital Media in a Special Needs Classroom   May 2013
QMUL   for Keir Williams
- Novel controller and software for research project

23, Going On 8   May 2011; June 2011
QMUL (Digital Shoreditch); BEAM Festival
- Collection of electromechanical instruments, construction and installation

Augmented Reality Installation for Erland and the Carnival Album Launch   Nov 2010
XOYO, London   w/Davy Smith and Joe Lyske
- Programming and installation