

Union

Shelly Knotts

Durham University, Durham, United Kingdom
michelle.knotts@durham.ac.uk

Abstract. Union is an algorithmic system for mediating collaboration in telematic improvisation. OFFAL (Orchestra For Females And Laptops), a geographically dispersed collective of female sound artists and musicians, will perform using this system. Remote artists will send audio streams from their locations to the performance venue in a live collaborative improvisation. The musicians interact via the Union system which is an algorithmic mechanism which aims to mediate interaction between performers and find 'musical consensus' in the incoming audio streams.

Keywords: Improvisation, Telematic, Algorithmic, Collaboration, Machine Listening.

Description of Work

Union is an algorithmic mixing mechanism which aims to mediate interaction between geographically dislocated performers and find 'musical consensus' in their audio streams. The system analyses audio streams sent by the performers to an online server in realtime using SuperCollider's Music Information Retrieval library. Streams which are sonically the most 'average' are mixed louder than divergent streams. The algorithmically mixed streams are played in the performance space and sent back out to server so performers can hear the final mix as it is played in the performance venue.

The mixing process is regulated by an algorithm which generates a sonic density graph for the performance, which defines how many audio streams are audible in each section, to ensure a musical ebb and flow to the performance. This is balanced by a further algorithm which tries to give all performers approximately the same amount of 'air time'.

Union, and the later formation of OFFAL, responds to the logistical challenges of developing a large ensemble of female laptop musicians and aims to mediate collaboration between geographically distributed performers in a non-hierarchical way. Strategically the most practical way to develop a large ensemble of female performers was to develop a system for telematic collaboration. This allowed the inclusion of many more women without the need for large funding grants to rehearse and perform. In order to be inclusive to as wide a range of participant the system uses free and open-source software, allows performers to collaborate with minimal intervention to their normal performance setup, and work on non-institutional and low-speed and -bandwidth internet connections. The audio streaming software used is IceCast which is low bandwidth but has a long network delay time (up to ca.10 seconds), meaning performers are playing with a degree of asynchronicity.

This temporal dislocation adds an interesting structural challenges to collaborating with performers who are already dislocated from the site of the performance and from each other. Temporal asynchronicity and lack of visual feedback mean performers can less easily perceive the actions of the other performers in relation to their own actions. *Union* aims to ease these challenges by taking care of some elements of musical organisation and structure. The chat client also provide a site of social cohesion, to describe the remote locations, performance site and audience interaction, and to give textual feedback and discuss creative aims.

During the performance the online chat between performers will be projected along with processed video content from the performers which will show which performer's are currently audible in the mix. The performance will be multi-channel with spatial panning of the audio streams relating to the geographical location of performers and the audio

similarities of the streams. A visualisation of the panning gives a further indication of the output of the algorithmic process.



Figure 1. OFFAL performing with *Union*, 12th March 2016.

Biographies

The infrastructure for *Union* is designed and programmed by Shelly Knotts. The performers are OFFAL (Orchestra For Females And Laptops).

Shelly Knotts develops performances and systems for technologically-facilitated improvisation which explore aspects of live-coding, algorithms and computer networks. She performs internationally, collaborating with computers and other humans. She is studying for a PhD in Live Computer Music at Durham University with Nick Collins and Peter Manning, where her research interests lie in the political practices implicit in collaborative network music performance practice and designing systems which play with particular data structures for algorithmic and improvised music creation. The improvisation systems she designs explore social (and/or antisocial) structures in collaborative performance situations. She has received commissions and residencies from Digital Media Labs, Sonic Pi: Live & Coding, PRSF and Sound and Music. Current collaborative projects include network laptop bands BiLE (Birmingham Laptop Ensemble) and OFFAL (Orchestra For Females And Laptops), and live coding duos UIAESK! (with Holger Ballweg), ALGOBABEZ (with Joanne Armitage) and *[Sisesta Pealkiri]* (with Alo Allik).

OFFAL (Orchestra For Females And Laptops) is an international collective of female¹ laptop performers who devise performances involving multi-location collaborative improvisation. The group formed in 2015 in response to research around gender in digital technology and laptop ensemble practice. As a non-hierarchical collective it aims to connect an international group of women engaged in electronic music by developing technological systems and organisational structures that facilitate collaboration. The group provides a platform for the creation and performance of new laptop music by women. Current members include Joanne Armitage (UK), Lina Bautista (ESP), Alexandra Cardenas (MX/DE), Libertad Figueroa (MX), Annie Goh (UK/DE), Shelly Knotts (UK), Diana Medina (ESP), Jenny Pickett (FR), Andrea Young (USA/CA).

¹ OFFAL use an inclusive definition of “women” and “female” and welcomes any member who identifies with a gender other than male.