Dark Matter (live coding)

THE BIRMINGHAM ENSEMBLE FOR ELECTROACOUSTIC RESEARCH (BEER)
KONSTANTINOS VASILAKOS, Istanbul Technical University, Istanbul, Turkey
SCOTT WILSON, University of Birmingham, Birmingham, UK
TSUN WINSTON YEUNG, University of Birmingham, Birmingham, UK
EMMA MARGETSON, University of Birmingham, Birmingham, UK
ERIK NYSTRÖM, City, University of London, London, UK

1 PROGRAM NOTES

This performance, created in collaboration with the art@CMS project at CERN [1] in Switzerland, involves the real-time sonification of data streams from the Large Hadron Collider, the world's largest and most complex particle accelerator. Experimental data containing clues towards possible 'new physics' becomes the raw material for improvised music and visualisations programmed with an aim to creating a result that while beautiful, is both musically and scientifically meaningful.

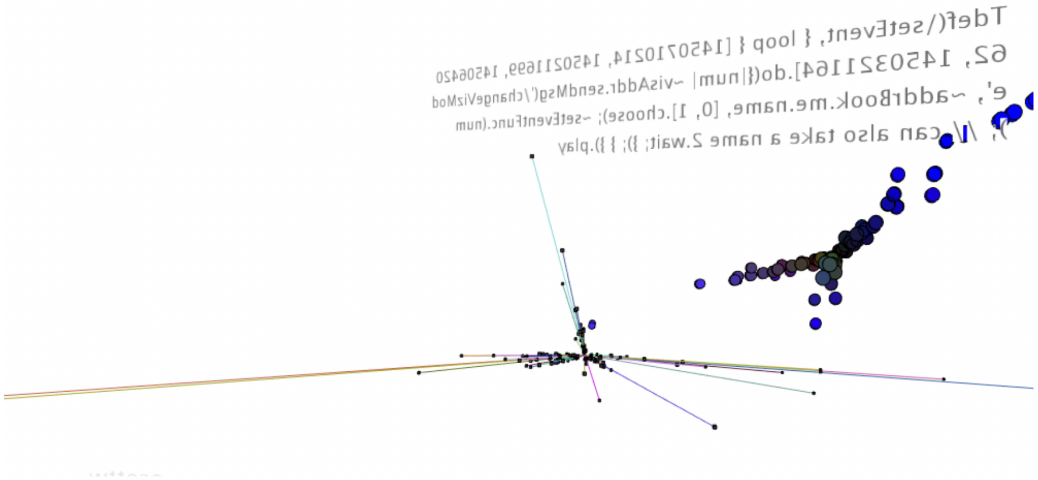

Fig. 1. Screenshot of Dark Matter Visuals.

Licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0). Copyright remains with the author(s).

Music Proceedings of the International Conference on New Interfaces for Musical Expression
NIME'20, July 21-25, 2020, Birmingham, United Kingdom

2 PROJECT DESCRIPTION

This project makes use of a networked live coding system developed in the SuperCollider programming language [2] to facilitate the real time sonification of data from the Compact Muon Solenoid experiment at CERN's Large Hadron Collider. Bespoke pattern classes facilitate the creation of real-time streams sonifying the subatomic components and groups of particle collisions. In keeping with established live coding practices, the mapping strategies used or the algorithms themselves can be redefined while running. Similarly, via an interface, performers can inspect and select different collision events to sonify, changing the input data being sonified on the fly. Bespoke data and code visualisations (some more abstract than others) have been developed in the Processing language, and serve to illustrate (in a hopefully aesthetically engaging manner) the event and components being sonified by each performer, utilising Open Sound Control for inter-process communication. The project aims to create performances that engage audiences both with improvised live coded music and particle physics.

3 PERFORMANCE NOTES

For this performance we propose a 5-7 minute improvisation. The piece is highly flexible, and has been presented in a variety of different spaces, formal and informal. We are happy to adapt to what the conference organisers feel is the most appropriate venue, providing video quality is sufficient. Spatial distribution of the performers is an option and has been utilised in some past performances.

Technical

Audio Requirements – Again flexible. Options in order of preference:

(1) A separate stereo pair of loudspeakers located by each performer, i.e. 10 in total for this performance
(2) Distribution of each performer's stereo output over a multichannel sound system
(3) 5 stereo sends combined to one stereo mix

Video Requirements – One projector and surface. Resolution and aspect ratio flexible, but ideally best quality available. Output from one performer's computer, HDMI preferred.

Network Requirements – Local network between all participants, wired if at all possible for reasons of robustness. We can provide cables and a switch if needed.

In addition we require table space (or another surface) and a chair for each performer, and power accessible from each performer's location.

Feasibility

This piece has been performed extensively both within the U.K. and internationally (Canada, France, Mexico, Greece, Colombia) and in a wide variety of configurations. As such it has been extensively road-tested under sometimes difficult conditions, and the performers involved have substantial experience of working with the interface. We feel the current

Dark Matter (live coding)

setup is extremely robust and reliable and would be delighted to present it at NIME.

4 MEDIA LINKS

- Video: https://youtu.be/YPGkDjeNl6s

ACKNOWLEDGMENTS

Our thanks to Maurizio Pierini (CMS, CERN), Michael Hoch and Angelos Alexopoulos (art@CMS, CERN). We also wish to acknowledge the contributions of the various members of the ensemble, who road-tested tested various aspects of the project, and made small contributions or suggestions in the development of some of the SuperCollider and visualisation resources.

This work was supported by the University of Birmingham and the art@CMS project at CERN.

REFERENCES

[1] https://artcms.web.cern.ch

[2] "The SuperCollider language". https://supercollider.github.io/