The Music Systems Engineering Team

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A Talk in Four 'Movements'

I. Prelude
motivation, and context

II. Fugue
team, funders, and collaborative partners

III. Theme and Variations
projects, results, and outcomes

IV. Finale
links to software engineering
I. Prelude

Music systems are interesting from both *musical* and *engineering* standpoints.
I. Prelude

Musical standpoint

large-scale, consistent music analysis

composition, performance, and sound creation

model aspects of human performance, creativity, and musical participation
I. Prelude

Engineering standpoint

complex systems with constraints including correctness, robustness, resilience, real-time decision-making, natural interfaces, trustworthiness

formal languages for requirements and operation

machine creativity
I. Prelude

Why *systems*?

- real-world application is important
- integrated, usable, complete systems are necessary to gain adoption
- cost is a relevant factor

Prior research?

- much existing work focuses on the parts not the whole
I. Prelude

Research Themes
I. Prelude

novel interfaces for direction and performance (LEAP/Kinect)
clustering applied to performance timing
capturing shape responses
gathering real-time audience response
information theoretic music analysis
search-based melody generation
dependence structures in music
providing dynamic historical and cultural contexts
distributed real-time architectures for music tracking on consumer devices
executable score languages
descriptor-driven synthesis
source code sonification
II. Fugue

The Team
(part of CREST and SSE)

**Members**
- Nicolas Gold
- Samer Abdallah
- Mateusz Dykiert
- Christodoulos Aspromallis

**Visitors**
- Pierre Donat-bouillud

**Alumni**
- Jihyun Han
- Jessica Dussault
- Rebecca Kleinberger
- Octav-Emilian Sandhu
- Sangita Ganesh
- Julian Szafraniec
II. Fugue

Funders

CREST
EPSRC
Arts Council England
Arts & Humanities Research Council
UCL
III. Theme and Variations

Current Projects

MiCLUES
Arts Council England
Jan 2014-Dec 2014

Digital Music Lab
AHRC
Jan 2014-March 2015

Structural Music
Analysis using Probabilistic Programming
EPSRC CREST Platform
Feb 2013-Aug 2014

Forthcoming Projects

An Integrated Audio-Symbolic Model of Music Similarity
AHRC
Sep 2014-Jul 2015

Completed Projects

Sounds Like DNA with Penny Dreadful Productions

CHIPS
AHRC Digital Transformations 2012

PERSONAL TOUCH
EPSRC 2007
III. Theme and Variations

**Aim:** To discover if motives originate in musical performance...

...**a motive** is a short, repeated melodic, rhythmic, and/or harmonic pattern...

...extract **tempo** and **dynamics**, **cluster** proportions of bar or phrase length, **compare**...

...29 recordings of Chopin mazurkas, found **patterns of timing deformation** in the performances, allowing **new interpretations** of performance strategy.

Finding Performance Motives
III. Theme and Variations

**Aim:** To discover similarity in music programs by analysing data-flow languages...

...parse patch structure, generate *clone candidates*, compare and classify...

...a Max/MSP program is a visual *dataflow program* termed a *patch*...

...68 tutorial *patches*, found *clone pairs* under *three criteria* from *new classification* framework for *dataflow language clones*.

**Detecting Clones in Music Programs**
III. Theme and Variations
III. Theme and Variations

Sounds Like DNA

What do you sound like?
a web installation to accompany Penny Dreadful Productions’ show
"HOW TO BE IMMORTAL"

Music Length (approx 30s to 2.5 minutes)
Volume
Quality (lo-hi)

The slider groups represent characteristics (physical, personality, mood). Hover over each slider to find out what it represents and set it to your desired value.
Click the button to generate music based on the effect of DNA sequences that we have interpreted as in some way linked to the characteristics.
If the audio stutters, try switching to low quality.
The site works best on laptop or desktop computers (a mobile-friendly version is available with reduced features).
It has been successfully tested on Chrome (Mac/Win), Firefox (Mac/Win), and Safari (Mac).
Unfortunately, Internet Explorer does not provide the necessary capabilities and so cannot be used.

Nominated for UCL Cultural Project of the Year 2014

bit.ly/DNAsound

> 600 sessions logged since launch
III. Theme and Variations
IV. Finale

Links to Software Engineering

Domain Specific Language Definition/Analysis
Interpretive Execution Semantics
Slicing and Transformation in DSLs
Component Integration
Reasoning over Component Properties
Information Theory
Testing Non-Deterministic, Interactive Programs

More Information
bit.ly/1lwOzaG