Computational Self-Awareness in Musical Robotic Systems

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Abstract

Acknowledgements

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1 Introduction

1.1 Motivation

- **Why is the thesis topic, and its outflowing proposed solutions/improvements, of relevance in the world today?**

  - History of field, how things have been done before — and why the situation/needs/requirements might have changed, or why these traditional/typical solutions may be ripe for improvements or better solutions? Why are these concerns/problems/factors of importance?

    * Demonstrate, illustrate, and explain these changes / this new situation so that the reader understands why your topic's contributions are necessary or needed.

  - What are the relevant real-world problems in need of solutions/improvement, where the thesis topic can provide such solutions/improvements?

  - Differentiate between what the "Background-/Related-works-proposed method" conributes with, and the "new proposed method" that you yourself want to try out (e.g. differentiate between ODA-loops and MAPE-K-loops, and endowing computational systems with *computational self-awareness* (and *self-expression*).

    * Explain why the "new proposed method" is needed/granted, maybe in relation to a lack or challenge with the original "Background-/Related-works-proposed method". Perhaps also mention the absence or "freshness" of this "new proposed method" in the history or field of the "Background-/Related-works-proposed method".

Engineering a computing system for a certain environment often requires some knowledge of said environnement — both on the end of the creator of the computing system, as well as for the computing system in turn. This is at least the case in autonomous computing, where computing systems are supposed to be able to observe, learn, adapt, and act on their own — independently from their creator.

However, predicting all possible future states of complex, dynamic, and ever-changing environments is hard, and at times impossible. This calls for online and continuous learning, don't you think? How to best tackle this problem? Glad you asked. — With Self-Awareness of course. Because ...

1.2 Goal of the thesis

1.3 Outline

2 Background

BULLETPOINTS FRA MULIGE INSPIRASJONER OG REFERANSER

Nymoen et al. [1] showed how one can, by endowing musical agents with self-awareness capabilities, achieve *harmonic synchrony* of phases and frequencies in pulse-coupled oscillators.

Tools and engineering?

EN INTRODUKSJON TIL DE FORSKJELLIGE VERKTØYENE OG PROSESSENE BRUKT ILØPET AV MASTEROPPGAVEN. FOKUSERER PÅ FYSISK ARBEID GJORT, OG INGENIØR-DELENE AV MASTEROPPGAVEN, INKLUDERT 3D DESIGN AV DE FYSISKE ROBOTENE, VALG AV DELER, SIMULERING I EVOLUSJONÆRE SYSTEMER, OG TESTINGEN, VALIDERINGEN, OG VERIFIKASJONSMETODER BRUKT I OPPGAVEN. GJERNE OGSÅ EN OVERSIKTS-TABELL AV VERKTØY OG PROGRAMVARE BRUKT.

Proposed Algorithm?

METODEN/IDEEN BAK MITT BIDRAG/FORSLAG, FORKLART I DETALJ.

Benchmark?

DET SAMME SOM SEKSJONEN 'Implementation'?

PRESENTERING AV METODEN BRUKT TIL Å EVALUERE PERFORMANCEN AV DEN FORESLÅTTE/PROPOSED'E ALGORITMEN. FØRST ER KANSKJE EN REFERANSE-ALGORITME BRUKT FOR SAMMENLIKNING BESKREVET. DERETTER ER (F.EKS. OBJEKTIV-) FUNKSJONER BRUKT I TESTENE FORKLART. ENDELIG (TIL SLUTT) ER KANSKJE MILJØENE (ENVIRONMENTS'A) OG PARAMETERNE BRUKT PRESENTERT.
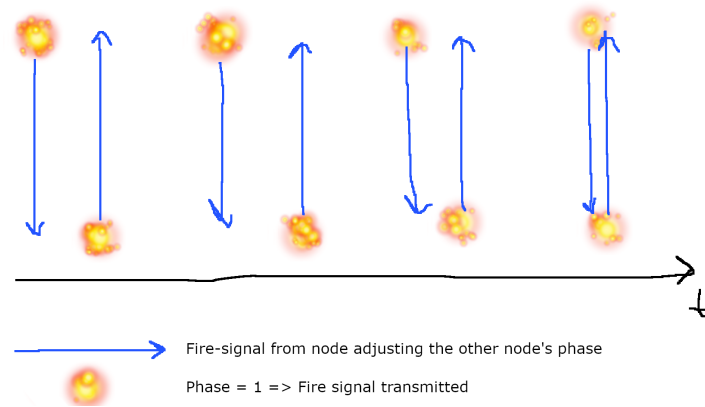
Implementation

DET SAMME SOM SEKSJONEN 'Benchmark'?

WORKLOG-MATERIALE DANDERT I HENHOLD TIL GODE MASTER-THESES

HUSK FINGRENE OG TIDSAKSEN PÅ BORDET (ISH DET SOM ER I FIGUREN UNDER FOR FASE, OG SÅ DET SAMME FOR FREKVENS-JUSTERING BARE MED F.EKS. HALVE—ELLER NOE ANNET— SOM START-FREKVENS; OG AT DE DA ENDER I "HARMONISK SYNKRONI").

Phase adjustments only (equal and constant frequencies and periods)

Fire-signal from node adjusting the other node's phase

Phase = 1 => Fire signal transmitted

Experiments and Results

Discussion

References

[1] Kristian Nymoen et al. "Decentralized Harmonic Synchronization in Mobile Music Systems". In: *Grant agreement no. 257906 (EPiCS) from EU FP7* (2014).