MAESTRO: Conducting Simulation

Description of Project
Conducting a choir, symphony, band, ensemble or soloist is a skill acquired over time. Teaching Music students this skill requires several resources – an instructor to watch carefully and provide feedback, a minimum of one instrumentalist to be conducted, and a sound-proof place to meet.

The use of technology in music conductor training is a growing area of interest. The expressive, subtle and meaning-rich gestures that are used in conducting, serve as a fruitful ground for innovative research in areas such machine vision, motion sensing and classification, and gesture mapping. Previous virtual conducting projects, such as the installation at the Vienna’s Haus der Musik, have focused on the activity of controlling only speed (tempo) with little support for subtle and sophisticated control of musical elements such as duration, articulation, and dynamics. These projects, therefore, could not fully support conductor training at the pedagogical level.

The goal of this project is to develop a virtual conducting system that would allow for the refinement of kinesthetic skills that are essential to creating subtle gestures improving conductor performance and confidence on the podium. This project will support the learning of kinesthetic conducting skills while furthering development of essential musical and cognitive skills.

Maestro, in its 2016/2017 MDP iterations, was designed in conjunction with the development of a supportive curriculum intended for use in an undergraduate introductory conducting course. This system implements gesture-tracking algorithms based input from a KINECT to provide musical feedback to the beginning conductor. Additionally, user studies, UI/UX development, sound synthesis, and development of the use of IMUs as a main input source are simultaneously occurring.

The goals of Maestro for the 2018 MDP are to build upon the successes of the 2016 and 2017 programs by refining the accuracy and acoustic feedback of the current system and extending the range of musical gestures. Specifically, the goals include

- A gesture anticipation algorithm for more complex conducting patterns and musical expressions
- User testing of the 2017 system to improve usability and accuracy
• Extended sound palettes for conveying musical expressiveness

Maestro is being used in courses taught in the University of Michigan School of Music, Theater and Dance beginning Winter 2018.

Location
All project work will take place on campus, with periodic presentations to School of Music, Theater and Dance faculty.

Project Sponsor Mentor
ANDREA’s BIO

Project Faculty Mentor
GREG’s BIO

Key Skills & Project Roles

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<tr>
<th>ROLE ON TEAM</th>
<th>Description of Skills &amp; Likely Majors</th>
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| Signals, Controls, & Sensing | Electrical Engineering  
Computer Engineering  
Computer Science |
| Biomechanics of Conducting/Musical Performance | Mechanical Engineering  
Biomedical Engineering  
Kinesiology |
| Programming | Computer Science |
| Usability studies/UI design | School of Information  
Computer Science  
Performing Arts Technology  
Conducting |

Legal Requirements

Citizenship and Right to Work Options

• This project is open to all students regardless of citizenship status
Internship Information

- On-Campus Summer Research Stipends for Summer 2018 may be available based on application in February 2018.