

COST-287 STSM Report

Host Institution: McGill University, Montreal (IDMIL, Music Technology Area)

Applicant: Paradis Matthew (University of York, UK)

Duration: 24.04.06 –5.05.06

Purpose of the meeting

To continue work on a framework for interaction development and associated applications. This is an extension of an existing system which enables feature extraction from simple computer pointing devices to enable more complex interactions to be developed, recorded and analyzed. The system is currently capable of extracting multiple features from simple devices via a JAVA interface. It is hoped that this can be expanded to allow additional custom devices to be accepted as input controllers to allow more rapid prototyping of new musical instruments and mapping strategies.

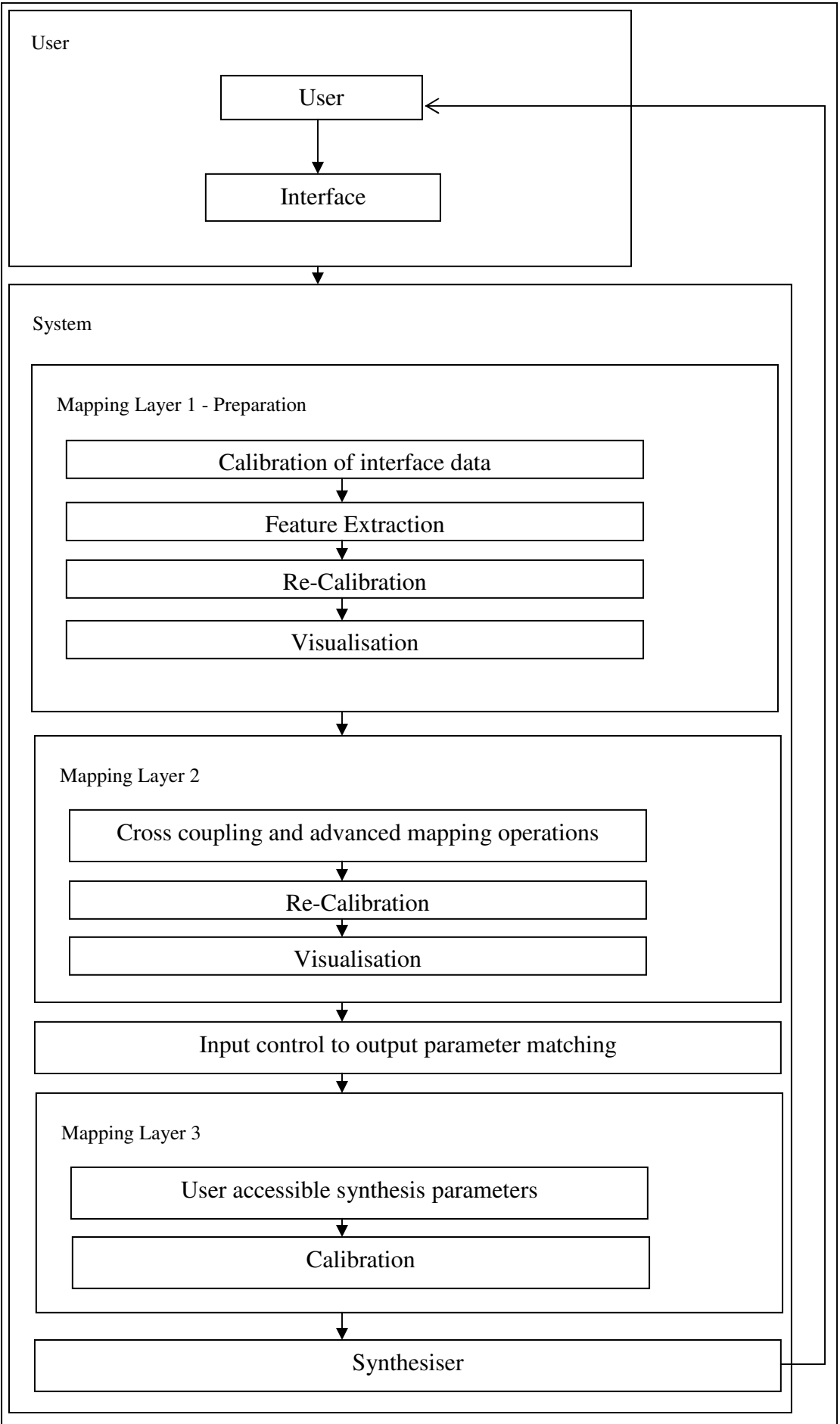
Objectives

1. To expand the capabilities of the software as mentioned above.
2. To test the software with the wide range of interfaces sensors and controllers available in the IDMIL lab.
3. To present my research to the research group at McGill University and to discuss future research and current trends in new musical instrument design.

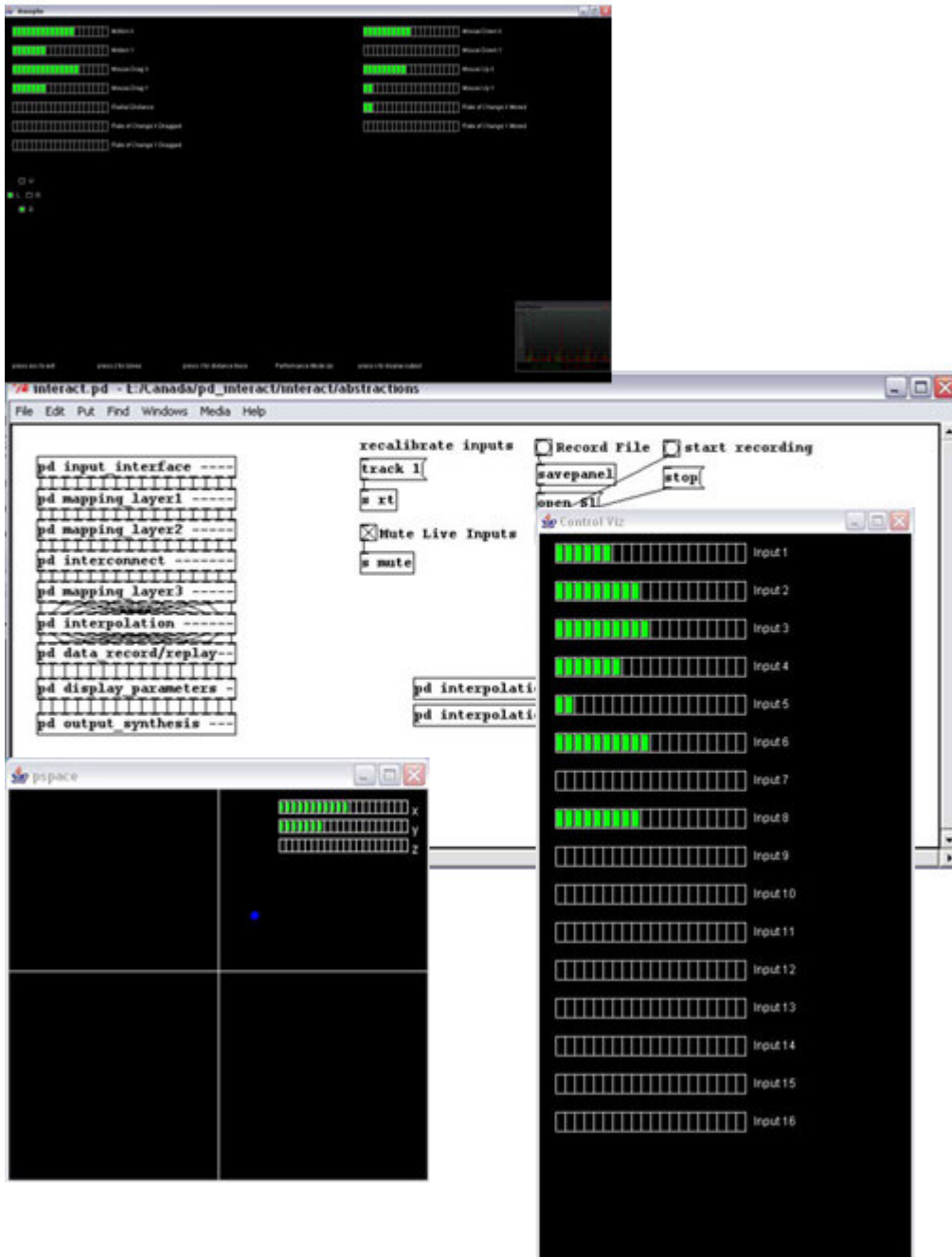
Outcomes

The outcomes of this STSM are primarily in the form of software tools (the interact toolkit) which I am continuing to develop and integrate.

The following diagram gives an overview of the interact framework.



System Components



musopho

musopho is a demonstration application for the extraction of features from simple 2D pointing devices.

Written in Java and with Open Sound Control communication the program allows the following information to be utilised in any OSC enabled application.

Mouse position moved	x
Mouse position moved	y
Mouse position dragged	x (+ optional release curve)
Mouse position dragged	y (+ optional release curve)
Mouse up L position	x (+ optional release curve)
Mouse up L position	y (+ optional release curve)
Mouse down L position	x (+ optional release curve)
Mouse down L position	y (+ optional release curve)
Mouse up R position	x (+ optional release curve)
Mouse up R position	y (+ optional release curve)
Mouse down R position	x (+ optional release curve)
Mouse down R position	y (+ optional release curve)

Dragged Radial Distance

Rate of change	x
Rate of change	y
Rate of change dragged	x
Rate of change dragged	y

Difference in x/y position

Average x/y position over specified time frame

Activity zones with boundary triggers

Directional information with change detection.

pspace

pspace allows input parameters to be displayed in 3 dimensions (x, y, and z) and gives rapid visual feedback on the relationships between cross coupled controller streams.

control_vis

control_vis is a display application for real time parameter monitoring during real-time performance. It allows a user to monitor the relationships between input (raw) sensor data and the output stage of the system (post mapping) pointers can be set on the display to signify specific events which should occur when predetermined values are reached additionally optimum range values may be marked to show when a sensor is not performing correctly or requires recalibration

autocal

The auto calibration objects (pure data) allow for rapid sensor interchange and recalibration during performance, this ensures that the optimum data range is maintained through out a session and also increases efficiency during rehearsal and experimentation when sensors are changed or repositioned.

interact framework

interact framework allows each of the components to interface with each other and provides dedicated space for the user or system developer to insert appropriate mapping strategies. The framework also allows input controller data and mapped controller data to be captured to a time stamped file for analysis or replay.

Summary

Several tools have been developed which in early testing have a very positive effect on the development of real time musical performance systems. Through providing an interaction framework the users can focus on specific areas of the system and take a structured approach to the development of mapping strategies, sensor selection and parameter matching to synthesis inputs. The STSM to McGill has allowed the development of this system to take a great step forward and I am now continuing to work on the toolkit with the goal to produce a standalone system dedicated to interface development and mapping design. I hope that this will be made available to the research community in the near future.

Matthew Paradis, 2006-05-24

Working Diary

Monday 24th April

Arrived at McGill University and was given a tour of the facilities. Discussed the current research taking place there and was introduced to the research group.

Developed a work schedule for the week including a date for the presentation of my research to the group.

Began to organise the prototype applications and identified the most important areas for development.

1. Visualisation tools for parameter input and output.

2. The further development of an interaction framework which will allow applications to work together, and provide a simple means of testing the functionality of the toolkit.
3. Testing and development of the auto calibration routines required to allow for rapid sensor interchange.

Tuesday 25th April

Began work on the integration of open sound control (OSC) with the existing java applications to allow an appropriate communications protocol between processes.

Added data interpolation options to the interaction toolkit to allow input controller information to follow a data lookup table.

Wednesday 26th April

Discussed a survey of current practice in New Musical Instrument design with Marcelo Wanderley and then developed a questionnaire to be circulated to the research group to gather information on their working practices.

Discussed the availability of sensors in the lab so that I could have access to them to test the software toolkit.

Attended a presentation of a research project within the IDIML lab regarding the manipulation of spatialisation parameters in real-time under performer control.

Thursday 27th April

Revised and distributed e-mail questionnaire to all researchers in the group.

Began the development of 2 experiments to test the effectiveness of the interaction toolkit and mouse feature extraction software. These are to be run on my return to York as they will require more time than this STSM allows.

Experiment 1 – is intended to measure the effectiveness of the auto calibration routines and the effect of this ‘low maintenance’ system on the experimentation process when working with improvising musicians. This will also allow gestural data to be captured for future experiments.

Experiment 2 – aims to test the benefits to laptop based performers from extracting additional features from simple pointing devices and to evaluate appropriate features which are useable by performers.

Attended a seminar on musical instrument design presented by Sidney Fells in association with the IDIML seminar series.

Added auto calibration routines to the interaction framework to allow for the rapid interchange of sensors. This routine was then tested with a variety of controllers available in the department.

Friday 28th April

Presented my research to the interaction lab group at their weekly lab meeting and outlined the goals for the following week.

Continued work on the visualisation areas of the toolkit, this involved further development of the OSC routines to allow them to be integrated with the visualisation application.

Monday 1st May

Completed some additional visualisation panels for the toolkit and began correcting some issues in the calibration system.

Assisted researchers in the setup of a local area network of Silicon Graphics machines to run the Genesis graphical physical modelling system developed at the University of Grenoble.

Tuesday 2nd May

Attended an industry presentation on the Phantom Haptic interface and associated MatLab toolkits which should allow communication between the device and PD over Open Sound Control.

Spent some time experimenting with the Lemur interface in order to use it to test some of my toolkit functionality. Unfortunately this had to be abandoned as the appropriate software could not be found to allow the system to communicate effectively with my operating system.

Wednesday 3rd May

Began integrating the Java and C parts of my toolkit. Attempted to integrate the interfaces with PD externals to allow variables to be passed between them without the need for OSC. This was partially successful but will require more work to be stable.

Visited the Centre for Intelligent Machines and Department of Electrical and Computer Engineering. Talked with Jeremy Cooperstock and Stephen Spackman regarding their ultra video technology which has been previously used in York for real-time orchestral coaching.

Thursday 4th May

Developed an additional java display application for translating parameter inputs to a 3 dimensional parameter space.

Had a series of meetings with researchers in the group to discuss their current work in the area of mapping and the development of hardware sensor technology for real time performance.

Friday 5th May

Evaluated the progress of this STSM and started to prepare documentation for the toolkit and associated C/Java code.

Prepared a package of each application along with help files to allow them to be joined together as a functional toolkit.