Touch screen control for digital mixing consoles using a wireless MIDINet system

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01/03/2013

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Project Title

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Statement of Problem

Modern digital mixing consoles offer a range of different functions such as comprehensive EQ (Audio Equaliser), level, and routing control, and are used across a variety of setups from live music events to restaurants and conference venues. Some of these digital consoles allow for control via MIDI (Musical Instrument Digital Interface) messages. Typically audio engineers are tethered to the mixing console so that levels and other parameters can be altered as needed. These consoles are generally large and weighty, and are often installed in a fixed location, only being moved when absolutely necessary. Studios as well as larger venues are likely to have more than one mixing console, and these may not be positioned in close proximity to each other. Maintaining control of the console(s) while remaining mobile is therefore a problem that is faced in many environments. The purpose of this project is thus to create a system allowing an audio engineer to control one or more digital mixing consoles from a portable, touch-enabled device, addressing the problem of mobility as well as managing multiple consoles from a single interface.

Object of Research

Based on the above problem statement, the objectives of this project are:

- Primary goals

    Create a control application for the Apple iPad

    Modify and extend Jabrudian Industries' Missing Link to use MIDINet

    Allow for enumeration of Missing Link using MIDINet

- Secondary goals

    Explore the possibility of controlling multiple consoles simultaneously using MIDINet

Therefore an application with a touch-centric interface will need to be developed for the iPad to allow a user to send control messages in an intuitive and efficient manner. The Missing Link currently uses OSC (Open Sound Control) messages sent over wifi to provide MIDI control; the device will need to be modified/reprogrammed in order to correctly interpret the packets being sent from the iPad. To allow for multiple consoles to be controlled over wifi, the Missing Link devices will need to be enumerated to allow for the implementation of MIDINet.

History and Background

MIDI (Musical Instrument Digital Interface)(Loy, 1985) is best described as a protocol for communication between various musical devices.

> MIDI messages are divided into two basic categories: channel messages and system messages.(Hosken, 2010)

It can be used to send note on and note off messages to represent key presses on a keyboard controller, or can be used to set parameters on effects units and digital mixing consoles. MIDI has been widely utilised throughout the music production and recording industries, and is currently found on most studio devices (Foss, 1996). It provides a consistent and uniform method for control across devices while additionally lending itself to integration with computing devices. Last year I was introduced to the MIDINet system(Mosala, 1995): A system for routing MIDI messages to IP addresses over an Ethernet network.

> The MIDINet system allows the user to look at the collection of his MIDI devices as a single, unified system.(Mosala, 1995, p. 18)

There has been extensive research done in the field of audio networking(Bailey, 2013)(Gang *et al.*, 1997) as well as MIDI control and MIDI message routing(Mosala, 1995)(Time & Orlarey, n.d.).

Touch screen computing devices have recently gained popularity(Fling, 2009), largely due to their ability to provide natural and intuitive interfaces. Due to

this simple style of interaction many music production applications have been produced for these devices, with Apple's iPad being preferred in the music industry. Many manufacturers, particularly in the home theatre field, release remote control applications for tablets as companion software to their products.

Approach

The first phase of this project will develop a working knowledge of the Yamaha 01V96 mixing console as well as any currently available control software including the control interface developed by Philip Foulkes (Foulkes, 2006). This includes Foulkes's thesis entitled "A Grid Patch-Bay for Audio Mixers" in which he documents the creation of an application for controlling the Yamaha 01X using MIDI messages. In this phase I will also refresh my knowledge of MIDINet as well as its underlying architecture while researching and comparing alternative control protocols. A network will be set up where the Yamaha 01V96 connected to one desktop computer can be controlled from Foulkes's application running on a second desktop computer.

Learning to develop applications for the iPad, using JUCE to develop the GUI, will require becoming well-acquainted with this interface development tool. This will constitute the second phase of the research project which will culminate in the creation of a control application that will run on the iOS, the iPads operating system. In order to progress to the third phase of the project, the Missing Link will need be reprogrammed to work with MIDINet using knowledge gained from the interfacing course conducted by Anthony Sullivan, focusing on microcontrollers.

The third phase of the project will consist of implementation and testing of the complete system developed in earlier phases. This will entail using the iPad application to control the Yamaha mixing console over a wifi network. Successful testing will allow for the expansion to controlling multiple mixing consoles.

Deliverables

This research will produce an application for the Apple iPad allowing for the remote control of the Yamaha 01V96 mixing console. The application will communicate over a wireless network, and will utilise MIDINet to allow for the identification and control of multiple remote consoles.

Requirements

Hardware requirements:

- Yamaha 01V96 digital mixing console
- Apple iPad (4th generation)
- Access to Apple Macintosh computer
- Jabrudian Industries Missing Link

Software requirements:

- Apple OS X
- Apple Software Development Kit
- JUCE GUI (Graphical User Interface) Development Environment

Project Progression and Time-line

Date	Task
01-03-2013	Submit project proposal.
08-03-2013	Have working knowledge of Philip Foulkes's thesis and identify sections relevant to this project.
12-03-2013	Project Seminar: Introductory presentation explaining the research goals and what the project will entail.
18-03-2013	Understand operation of Yamaha 01V96. Have experience in using Philip Foulkes's control application.
08-04-2013	Set up and use MIDINet system for control using desktop computers.
15-04-2013	Start development of iPad application.
29-04-2013	Begin reprogramming of Missing Link to incorporate MIDINet.
22-07-2013	Working iPad control application.
09-08-2013	Missing Link running MIDINet. Capable of controlling Yamaha 01V96 using iPad over wifi.
23-09-2013	Capable of controlling multiple mixing console from single iPad.
11-10-2013	Submission of complete project thesis.

References

Bailey, A. 2013. *Network Technology for Digital Audio.* Taylor & Francis.

Fling, B. 2009. *Mobile Design and Development: Practical concepts and techniques for creating mobile sites and web apps.* O'Reilly Media.

Foss, Richard John. 1996. *A networking approach to sharing music studio resources.*

Foulkes, Philip James. 2006. *A Grid Patch-Bay for Audio Mixers.*

Gang, Dan, Chockler, Gregory V., Anker, Tal, Kremer, Alex, & Winkler, Tomas. 1997. TransMIDI: A System for MIDI Sessions Over the Network Using Transis. *Pages 283–286 of: Proceedings of the International Computer Music Conference (ICMC.*

Hosken, D. 2010. *An Introduction to Music Technology.* Taylor & Francis.

Loy, Gareth. 1985. Musicians Make a Standard: The MIDI Phenomenon. *Computer Music Journal*, **9**(4), pp. 8–26.

Mosala, Thabo Jerry. 1995. *Routing MIDI messages in a shared music studio environment.*

Time, Real, & Orlarey, Yann. *Midi Share.*