1 My approach

1.1 Introduction

The following chapter opens with an appraisal of currently available graphical synthesis systems that were discussed in the previous chapter to more clearly define the niche that SonicSketch seeks to fill. Some theory behind the development is then given including HCI considerations, the Musical Interface Technology Design Space and research into cross modal perception. The practical approach is then given which delves into the more technical aspects of the project build out including a discussion on the Web Audio Api, *tone.js*, *paper.js*, *clojurescript* and *react.js*.

1.2 Appraisal of options

1.3 Approach - theory

1.3.1 HCI considerations

1. The natural user interface

   NUI is an evolution of the concept of the graphic user interface and refers to an approach to human computer interaction beyond that of the traditional keyboard and mouse or what has been termed the WIMP model. It encompasses a set of guidelines and best practices which are set out most comprehensively by Wigdor (2014). Some of the basic tenets of NUI are as follows:

   - Harness existing skills when possible without necessarily mimicing the real world tool or instrument [@wigdor_brave_2011, p.13].
   - Be friendly and learnable by beginners but allow for mastery given enough practice (a sentiment shared by Levin, above) [@wigdor_brave_2011, p.13].
   - Immediate feedback for all interactions should take place, most usually but not limited to, visual feedback. [@wigdor_brave_2011, p.87]

   Furthermore, the interface should take advantage of the particular affordances offered by the input method. [@wigdor_brave_2011, p.115] An apt example of this is the early introduction of digital pens for windows laptops where the pen wasn't suited to the WIMP interface and failed to receive widespread usage. In this case, the interface forces the user to carry out awkward gestures for the medium, including double clicking and right clicking, failing to take advantage of the stroke gesture much more suited to it.

The system CrossY, referenced in Wigdor (2014), uses a cross gesture stroke to interact with buttons, menus, and widgets, as well as the painting functionality [@apitz_crossy_2004]. The CrossY gesture system enables the user to, for instance, select brush size and colour in one stroke by dragging the pen from right to left across an icon and validating selection by dragging past the left or bottom selected leaf icon. This is illustrated clearly in the left-most diagram of the provided figure (fig. 3).

1.3.2 The Musical Interface Technology Design Space (MITDS)

1.3.3 Cross modal perception

1.4 Approach - practice

1.4.1 Delivery on Web Browser

1.4.2 Modern web browser as a delivery platform

1.4.3 Benefits of using tone.js cite:mann_interactive_2015

1.4.4 Paper.js for the graphics system

1.4.5 FM synthesis

1.4.6 Live coding workflow

1. [Introduction]
2. React.js framework

   react is a web framework built by facebook that aids the developer in updating the dom (document object model), a process that is required when the state of teh applciation changes. this was a role traditionally carrried out on the server and served to users as a static page. this all changed however with the rise of single page applications (spa) around the 2???s. the value proposition of the spa is increased interactivity and responsives to user input, allowing the look and contents of the page to update dynamically as the user interacst with the system. to aid in the construction of these spa's a number of frameworks to help the process were introduced by the open source community. some popular early examples include *backbone.js* and *angular.js*. a technique that saw some popularity was a system called two way binding which created two way link between the current state in the model and the visual appearance of the view. this however has a number of issues including some serious performance issues, in addition to some conceptual problems (???ref). react offers a simpler

one way bidning ssytem using what is termed the virtual dom. in this model a special virtual version of the dom is constructed and when the model changes is updated. the parts of the dom that require changing can thusly be pinpointed and the real dom can be efficiently updated. this system has proven to be particulalrly beneficial when paired with functional programming techniques, a style of programming that emphasizes the use of pure functions as the primary building block of programs. in the case of working with the dom, it can lead to not only an increase in efficiency in the rendering of the applications but also a simplification of the programming model. a number of projects have emerged that attempt to bring this benefits of the react model beyond the realm of the dom including writing console prgorams (???ref), writing web audio applications (???ref) and even arduino projects (???ref).

3. Clojurescript
4. Managing state with re-frame

1.5 Conclusion