Design Specification for the

Automatic Music Transcriber

Revision: 1.0

Prepared for: Dr. Andrew Rawicz – ENSC 440
Steve Whitmore – ENSC 305
School of Engineering Science
Simon Fraser University

Prepared by: Mike Tyson
Henry Huang
Patrick Wong
Shu Hui Wong

Contact Person: Shu Hui Wong
shw4@sfu.ca

Date: March 19th 2012

Progress Report

Over the past three weeks, ScribeWare Inc. has nearly completed Phase I in the development of our automatic music transcriber, the AutoTab, an all-in-one device that not only functions as a tuner and metronome but also as an automatic music transcriber.

Phase I

Phase I consists of the following tasks:

1. Requirement analysis
   a. Background research
   b. User functional requirements and user interface

2. System Level Analysis
   a. Block diagrams
   b. System architecture
   c. Hardware considerations
      i. Audio line-in
      ii. Audio line-out
      iii. SD card reader
      iv. FPGA board
   d. Software/firmware considerations

3. Technical Specification
   a. System requirements and benchmarks
      i. Performance characteristics
      ii. Error handling and extreme conditions
      iii. Quality issues
      iv. Physical environment
      v. Resource management
      vi. Environmental impact
      vii. Documentation
      viii. Maintenance

1. Requirement Analysis

Since the end-users of the AutoTab will prominently be people with a music background, significant time and resources has been invested in identifying key user function requirements that would set the AutoTab apart from all the competing products already out in the market. One of these requirements involves the inclusion of a tuner and metronome functionality to market the AutoTab as an all-in-one device that brings together devices most musicians carry on them with the novelty of being able to transcribe their music as it is being played.

2. System-level Analysis

ScribeWare Inc. has completed proposed system block diagrams and the resulting system architecture. Various modules of our system has been researched and developed and conclusive results should be yielded by our team deadline of March 23rd.

Using the Internet and reference books, we have investigated various peripherals to determine which would be most appropriate for our product. After researching and comparing available components on the market, ScribeWare Inc. decided upon and obtained an Altera DE2-115 Development and Education Board. This FPGA board was chosen as it provides the greatest degree of flexibility and encompasses all needed peripherals for our product. Currently, we are investigating the boards' potential and functionalities and how we can fully integrate our algorithm onto the processor.

Also, we have read up on many studies regarding the implementation of an automatic transcription algorithm. And through our research, we have decided upon a genetic algorithm to fulfill our product requirements. After testing our algorithm, we discovered that it is able to accurately detect single MIDI notes. Thus, we are currently refining it for instrumental note and chord detection. Upon full integration of our algorithm on Matlab and testing that it works accordingly, the transfer of the algorithm onto our FPGA can be done for ease of troubleshooting.

3. Technical Specification

ScribeWare Inc. has begun the task of outlining crucial system requirements needed for the successful design, implementation and delivery of the AutoTab. Over the next few weeks, these requirements will be completed and fully specified.

4. Budget

ScribeWare Inc. is financially sound and the development costs of the AutoTab are well on schedule. We have not spent any of our initial funding from the Engineering Science Student Endowment Funds and have received additional funding from Terasic in the form of the Altera DE2-115 Development and Education Board.

5. Human Resources

Group dynamics are still well as our product development/integration is underway. We are still friends and don't fear the upcoming meetings we have scheduled.

6. Action Items

March 23rd is the upcoming milestone date for the ScribeWare Inc. team. By this time, sections 1 and 2 of Phase I will be fully completed; in particular, complete hardware consideration, complete software development, and the specification and initial design for the user interface.