Kaleb Golden

Special Projects + Descriptions

2/20/2019

1. **Automated Drum Tuning System (Senior Thesis):**

Tuning drums, the bane of almost every drummer in the industry. It can be a long and arduous process takes precious time that could be used for practicing instead of sitting there turning a drum key. The problem in question is, how can I tune my drums without having to take time to do it? The answer is simple, an automated drum tuner. I first became interested in this idea for an automated drum tuning system when I was playing in church one Sunday and spent a good 10-15 minutes tuning the drums to get my preferred sound from them. I realized that if there was a system that could do it for me, I could’ve spent that time rehearsing with the rest of the band and been more prepared for the set. This is when I realized that I simply can’t be the only drummer who has thought this before and so I began putting some serious time and effort into researching this idea. There have been ideas for drums that come pre-tuned and then tend to stay tuned for longer, but they were unsuccessful because they were made with cheap materials and affected the tone of the drums significantly. There are also several products that can detect the frequency of the drum head at specific points which then allow you to be able to tune every lug to that exact frequency. These are every helpful but still require you to spend time tuning your drums by hand. There are “automated” tuners out there, but you can’t play the drum while they are attached to it because they rest on top of the drum and obstruct the batter head. The automated drum tuner I am proposing to create hasn’t been patented or published anywhere so it may be the first of its kind. It will be a fully integrated system in which there is a frequency sensor, processing unit, and several motors to be able to automatically detect and change the tuning of your drum as needed. The system will be attached directly to the drum and be compact enough so that it does not interfere with drum and hardware spacings. I know that this product would be fantastic not only for beginners who are just learning drums but also professionals who play drums daily for a living. By the end of this project I expect to have fully integrated the system into a single drum with at least 6 motors (Price depending and drum size depending), to where it can detect the frequency of the drum once struck and be able to automatically adjust the tuning rods as needed to obtain a frequency desired plus or minus a few Hertz.

1. **Arithmetic Logic Unit (Digital Logic):**

![A close up of a piece of paper

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\*Picture of ALU Circuit Below

![A close up of text on a white background

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1. **Digital Clock (Microcomputers):**

**Purpose**:

The purpose of this project is to create a digital clock using the HSC12 architecture and support hardware and Software and a list of available parts from our Digital Electronic library.

**Objectives**:

This project comes with a set of primary objectives:

1. The designer should choose a design that minimizes cost as much as possible
2. The designer should only use products and parts from our Digital Electronic library (See Product Sheet)
3. When the designer decides to use another product/part, this can only be done in consultation with the TA and there will be a penalty.

**Requirements**:

Project requirements are detailed below. Students can add requirements per permission of the TA. Added requirements that improve the design will receive extra credit.

1. Your clock **shall [1]** Keep track of hours, minutes, and second
2. Your clock **shall [1.1]** be displayed using 7 segment displays time **shall [1.2]** be displayed using military time
3. Your clock **shall [2]** keep time as close to 1 second as possible
4. Your clock **shall [2.1]** operate using a .01 second interrupt and only update the time after 100 interrupts
5. Your clock **shall [3]** have a button that when pressed for 3 seconds will allow you to adjust the time
6. During time adjustment the 7 segment displays of your clock **shall [3.1]** blink
7. The 7 segment displays of your clock **shall [3.1a]** blink at a rate of .5 seconds off, .5 seconds on
8. Your clock **shall [3.2]** have one button to increment the hours
9. Your clock **shall [3.3]** have one button to increment the minutes
10. Once a clock button is pressed again, the clock **shall [3.4]** stop blinking

**\*Picture of Working Clock Below**

A circuit board

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