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366J Exam 2

A proposed change for a future redesign would be to implement some sort of casing around the electronics as shown below in figure 2. Currently, there is no casing around the breadboard and jumper cables; it is simply open as seen in figure 1. With this current design, it would be easy for a K-12 audience member to reach and unplug the wiring or cause potential damage to the Arduino, rendering the autonomous instrument dysfunctional. In addition, there may be safety concerns by interacting with components from the breadboard (e.g. warm transistor).

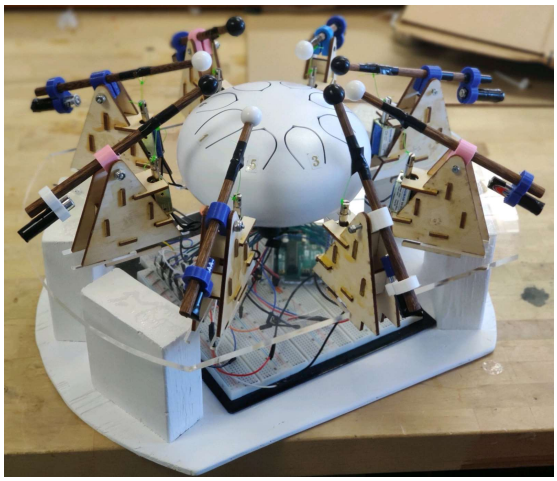

Figure 1. Current Design

Figure 2. Modified Design with casing

In the above redesign, a section of the casing is screwed onto both platforms which can be unscrewed to access the electronics. With the modified design, the interior electronics would be protected from outside interference. The casing material remains acrylic so that a K-12 audience can still see the breadboard, Arduino, and wiring.

The second proposed change would be to implement a third 3D printed piece to the mallet. Rather than the string being attached directly to the mallet as seen in figure 1, the string would instead be attached to a 3D printed piece. In the current design, the string that pulls the mallet down when the solenoid activates varies in length throughout the eight “identical” structures. This poses manufacturing/assembly issues as the string length and string position are not consistent in all assemblies. In addition, in terms of aesthetics, a 3D printed piece would likely look more appealing than the tape used in the current design (figure 1). Lastly, it would make the process of fine tuning the string length and position an easier process.

Figure 3. New 3D Printed Piece

In figure 3 above, the new piece would consist of small holes at different heights to allow for simpler string length modifications. The 3D printed piece would also be friction fit to the mallet, but loose enough to move along the length of the mallet, which allows the string position to be modified and eliminates the need for tape.

Extra Credit

A design change to make the current design more accessible would be to implement easy to use buttons. With the current design, the stop/start buttons and song selection buttons are located on the breadboard. These buttons are small, not easily accessible, and unlabeled making it hard to use them even with explicit knowledge of them. In the proposed design below, the buttons would be located in a more accessible location and be larger in size. In addition, they would clearly indicate the purpose they serve such as start/stop or song selection.

Figure 4. Buttons

Looking at figure 4 above, the buttons would be mounted on the casing from figure 2. The buttons are color coded for added visual information. The buttons are also clearly labeled, a play/pause button and buttons 1-3. The 1-3 buttons would switch between 3 pre-programmed songs.