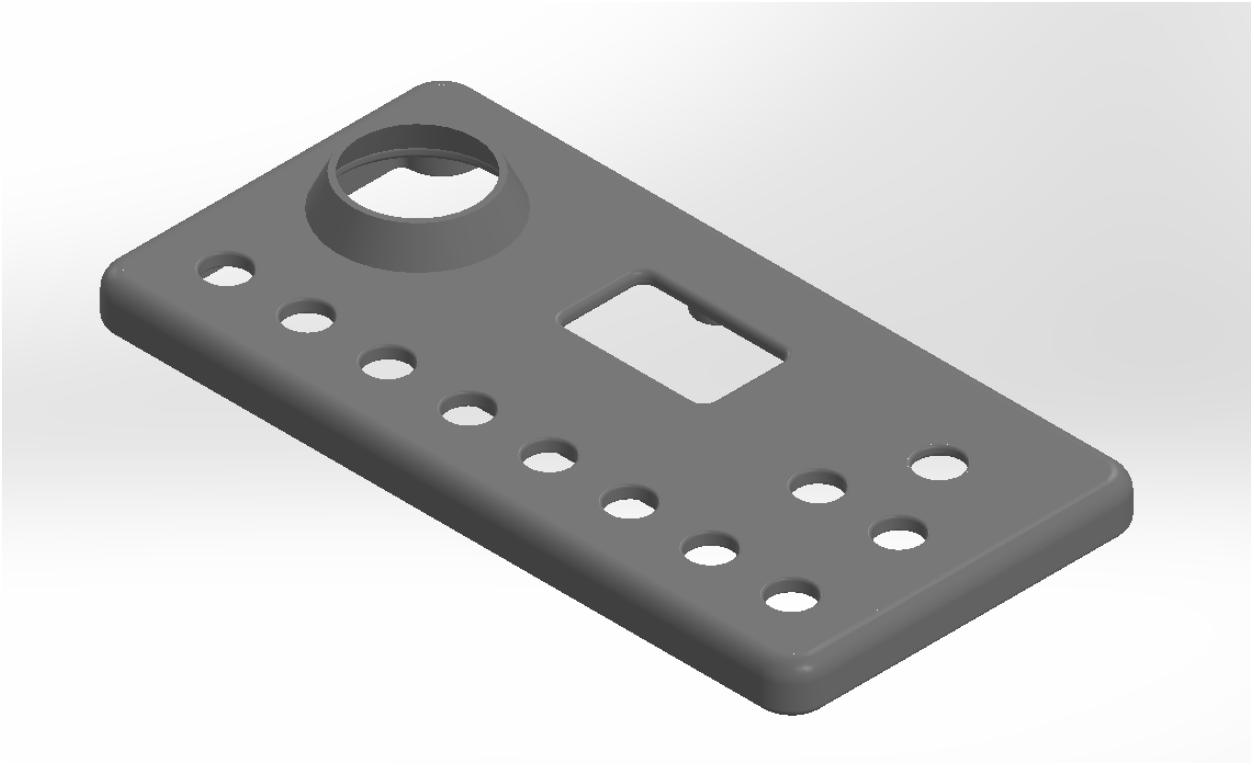
Squidbox hardware documentation- Rajiv Ponduri, Matthew Belmont, Adam Szczudluk

When our group took on the task of making improvements to the Squidbox, we split into two teams. One team focusing on the hardware, and one on the software. From a hardware perspective, our team noticed many quality-of-life changes could be made to the components used in the Squidbox and to the shell's design. So Adam, Rajiv, and myself took on the role to make those changes.

One of the first things we noticed was that the buttons were extremely clicky and wobbly due to the gap between them and the shell. We also noticed multiple changes that could be made to the shell. In the updated CAD model, we modified the shell for the new buttons(and also made sure the buttons didn’t have too much space from the shell), raised the border of the screen so that not as much of the inner components are exposed (and the squidbox looks nicer). Finally, we made sure to include a guard around the joystick to better protect the inner components.

Updated CAD model (Isometric)



The first step we took was to find the right switches. We wanted something that sounded less clicky. Originally, we wanted to use membrane switches instead of the tactile switches that were used in the previous versions of the Squidbox. These are a type of switch that is commonly found in laptops and lower-end keyboards and produces a muted “tap” or “clack” sound. We thought these would be perfect for solving the main problem with the tactile switches. After some research, we found out that this would be a difficult task given the nature of how membrane switches are made. Membrane switches are hard to implement because the component that sends the voltage impulse to the computer is built into the PCB itself. This meant we had to redesign the PCB. So we had to think of something else. After some more research, we found that tactile switches with a smaller activation force produce a less clicky sound. The switches are less clicky due to lighter springs, so there’s less stored energy to release.

| Operating Force Table | | |
|---|---|---|
| Model | Press Force (gf) | Return Force (gf) |
| 100 | 100±30 | >20 |
| 160 | 160±50 | >20 |
| 260 | 260±50 | >20 |

Switch: TS14-1212-120-BK-100-SCR-D by Same Sky

After finding the right switches, we 3D-printed the updated shell, soldered the new switches, and put everything together.

New and improved Squidbox!

We noticed that two of the switches are now not working due to difficulties in desoldering, which caused heat to be applied to the PCB traces. However, this can be avoided when working with a more precise soldering iron.

One of the biggest possible future changes we thought could be beneficial to the Squidbox is changing the joystick to a D-pad, since a D-pad would be able to achieve the same functions, but also allows for a lower profile design and is also less prone to breaking than a joystick. Along with swapping the joystick, we thought changing the knob to a dial would make the squidbox more compact and less prone to damage. If these changes were made, we could create a magnetic case for the Squidbox. However, making these changes would require making changes to the PCB design itself.