Project Identity

Freely Adjustable and Accessible Keyboard for Client with Cerebral Palsy

Work Completed

On Wednesday 2/7/07 Nolan and I met with Sam’s contact Miriam Kurland, and his team at the school. We discussed the progression of the keyboard, and asked for their input on the design of the keyboard stand. In the past month it seems that they have been using a Macintosh Keyboard, with the help of a weight secured to the desk with suction cups. Figure 1 below is an image of how the weight is positioned relative to the keyboard.

![Figure 1. Sam’s Keyboard Layout](image)

The team then explained that the weight was there so that Sam could grasp it with his left arm, and then could type with his right. This was able to give him more controlled and finer movements. Another big improvement is that he now types better when the keyboard is laying flat on the desk, and is not raised up. Up until now, Miriam and his team told us that they wanted the stand to function as a means to hold the keyboard in the vertical position. At this meeting it was confirmed that we need a new design in which the keyboard is secured to the desk and does not move in a vertical position. The staff suggested that if the keyboard can tilt somewhat, this may be useful.

Nolan and I devised a couple of methods in which this can be done. In the first scenario, the keyboard is simply secured to the desk through a rubber base. When we met with Sam and observed him typing, we noticed that the Macintosh keyboard, which is barely secured at all, did not move drastically at all. If we simply lined the bottom with a rubber coating, this should give the keyboard enough friction so that it does not freely move. In this version, the keyboard can tilt through either the use of a hinge device, or we can figure out the exact tilt angle that Sam is most comfortable with, and design the base accordingly.
If a rubber base does not provide adequate suction, then we also devised a method of securing the keyboard to vacuum suction stands, as noted in Figure 2 below.

The vacuum stands provide very good suction through the use of side levers, and then the keyboard can tilt with the use of hinges. The vacuum stands we will use are from Panavise, and they are actually the same stands that can be found in the senior design lab. We have emailed these ideas to Miriam, and she will review them with Sam’s team on this coming Wednesday, 2/14/07.

In reference to the weight that Sam uses to stabilize his hand, we will use something a little more professional. At this time we do not plan on connecting it to the keyboard, because the exact position that Sam liked the weight at could not be determined by us or his staff (they had to continually move it certain ways). We believe as he gets older, he may require a new position, and it will be a mistake for us to mount it to the keyboard stand. Therefore, we will design a better type of grip for him, but it will not be attached to the keyboard stand.

This week Nolan and I also finalized the layout of the keys, as can be seen in Figure 3 below.

![Figure 2. Side View of Keyboard Mounted on Vacuum Stands](image)

![Figure 3. Final Key Layout](image)
We have also emailed this to Miriam, and she will review it with Sam’s team during the meeting on Wednesday.

**Future Work**

The next couple of weeks we have much going on and we should be able to get a lot accomplished. It is anticipated that our parts orders will come in sometime this week, and once we receive the correct switches and the female head receptacle, we can start programming the switches mounted on protoboards. Nolan is learning how to design the PCB for the keyboard, and has completed a layout of the switches we are using. Once Sam’s team approves the key layout we have devised, we can start the total design of the PCB, including the LEDs. Also, when we hear back from Miriam and Sam’s team on which design they like the best, we can order the parts necessary for the keyboard stand.

**Project Review**

The installation of the control board was a pivotal moment during this week, as the programming of the keyboard can soon be started. We have decided on using PCB strips to mount the switches, and aluminum to mount the LEDs. All the major components for the keyboard (excluding the stand) have been ordered, and programming the control board and designing the layout of the PCB strips will be started in the following weeks.

**Hours Worked:**

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