For my final project in cs465, I’m considering making a game controller that can be comfortably used with a single hand. This is, admittedly, designed for a relatively small audience of handicapped people who only have use of one hand (or possibly people who just want one hand free while gaming). The idea of a one handed controller isn’t a new and there have been several variants. The only commercially available design I have seen so far is this one:

![Controller design](image)

Even that one is only available through a handful of online retailers. The most promising design I’ve seen so far comes from the console modification genius Ben Heck:

![Ben Heck design](image)

The problem is that none of them have truly managed to make the one-handed experience as comfortable and natural as the original controller. The commercial one requires one analog stick to be
used with the pinky finger, which is incredibly awkward. It also has the thumb controlling the largely useless directional pad, which is a waste of the second-most dexterous finger on the hand. It does have the advantage of being ambidextrous though and it allows the user to set it down instead of holding it, freeing more fingers for pressing buttons. Heck’s design has a much better button layout and is really quite reasonable... except that the right analog stick requires the entire controller to be moved and pressed against the leg.

My goal is to build a controller that exploits the natural constraints of the average controller layout. PS2, PS3, Xbox, Xbox 360, and many PC pads follow almost identical layouts that use only the thumb and forefinger of each hand (the remaining fingers are only used to grasp the controller). Additionally, those controller designs never require the right analog stick to be used at the same time as the main four buttons (triangle, circle, square, X for Playstation, ABXY for Xbox) because they are controlled by the same finger. The same goes for the left analog stick and the directional pad. I have two possible designs in mind that could take advantage of those constraints to produce a more natural one-handed button layout.

I am reasonably skilled at wiring, soldering, dremeling (if that isn’t a word by now, it should be) and other myriad tasks that modding projects like this require. I hope that I can get the help of a classmate that knows a little more about circuit board layout and the USB interface than I do. Starting with a USB PC game controller seems like a good choice because I plan to use a specific USB gamepad as the base for my design.

Rewrite:

I’m convinced that the scale of my project is reasonable, so I’ll provide some mock-ups and sketches to give you a better idea of what I’m planning. First, take a look at this:

This is a gamepad designed for people who play first-person shooters. It replaces the left side of the keyboard and has a directional pad in easy reach of the thumb. It’s very comfortable to use (I’ve got one). It also solves many of the most difficult issues in getting a one-handed game controller to feel
comfortable. It lies flat on a surface and does not need to be gripped, allowing all fingers to be free to hit buttons. Now imagine that you had this pad, but placed an analog stick where the D-pad is and another where the index finger lies naturally (somewhere near the F key). Now simply place the rest of a standard game controller’s buttons in natural places near the other fingers and you have a one-handed controller design that should feel very comfortable. I imagine it looking something like this:

![Controller Diagram](image)

Note that this scheme takes advantage of the button placement limitations that I listed before.

I plan to take apart a USB controller that I have, using its circuit board and buttons, but extending them with wires to new positions. I’ll make a casing, probably out of wood, that is very close in shape to the Belkin pad to remount the buttons on. This means I can use the existing USB connection and PC drivers and need only concern myself with wiring and comfortable button placement.

I really wish I could use the analog stick from a PSP because it is so much smaller and better suited to manipulation by the tip of your finger instead of your thumb, but alas, I don’t have the kind of money to go destroying PSPs for fun. The Xbox 360 also has a nice analog stick with a concave grip instead of convex, but again I can’t afford to break one open. I’ll settle for the crappy analog stick from the USB controller for now.

Anyone interested in this project, feel free to send along an email.