For reference, the one-handed game controller I hope to develop should look like this:

Heuristic Evaluation:

1. Validity of system status

As with any game controller, feedback should be immediate through the games being played. If pressing buttons doesn’t have immediate consequences, something is wrong. Aside from a small light indicating that the controller is getting power, there shouldn’t be any issues with this.

2. Match between system and the real world

There isn’t much in the way of language being used. The controller’s buttons must be marked in a pattern consistent with what the user expects. For example, if the controller is built for a Playstation interface, the buttons should be marked circle, square, x, triangle, R1, R2, L1, L2, etc. Any other choice of label would not make sense because the buttons are always referred to as such in games and instruction manuals.

3. User control and freedom
I can’t think of any way this is relevant to this piece of hardware.

4. Consistency and standards

Actions will be consistent provided that proper button labeling is used. The user will have to adapt to the new placement of buttons compared to standard game controllers, but pressing X on the one-handed pad should always be identical to pressing X on the original controller.

5. Help users recognize, diagnose, and recover from errors

Errors shouldn’t be possible. Either the hardware work or it doesn’t.

6. Error prevention

See above.

7. Recognition rather than recall

Available actions are always visible. The user simply has to know which button corresponds to which actions, and that will vary from game to game.

8. Flexibility and efficiency of use

Again, I don’t think this heuristic applies here. Any shortcuts would be in software rather than hardware.

9. Aesthetic and minimalist design?

Each and every control that is present must be present in order to guarantee functionality with the platform in question. There should be no additional controls or gimmicks. The buttons labeled “extra” in the diagram may not be present, or may be used as an alternative placement for start and select.

10. Help and documentation

No documentation should be required for a controller that interfaces with a standard format like the Playstation or Xbox. In the case of a USB device for pc games, a Readme file and driver disk will need to be provided. Help menus and control mappings are accessed within individual games.

Cognitive walkthrough:

Task 1 - Play an RPG

When playing an RPG or similar game, the most common tasks involve navigating a menu and using the main four buttons. Circle and X on Playstation and A and B on Xbox are used most commonly for selecting a menu option or cancelling. The user will sit down to play the game, and should immediately be able to tell where the analog sticks are and scanning the button labels will quickly reveal where circle and X are. The user will place a hand on the controller. As near as I can tell, there is only one to do this that makes any sense, as the controller mimics the shape of a hand. The user may not be able immediately which analog stick to use. A quick bit of trial and error on the game’s main screen will make it clear that the thumb is used for menu controls.

Revealed constraints-
The primary analog stick must be controlled by a different finger than the main four buttons.

The primary analog stick must be comfortable for menu navigation (pressing all the way up, down, left, or right)

The main four buttons should be easily accessible.

Task 2- Play a first person shooter.

This type of game normally requires the use of both analog sticks and the four shoulder (or trigger) buttons. The user will again need to locate the analog sticks and decide which one is which. Both sticks will be used constantly. The user will also need to locate the shoulder buttons by their labels and realize by the placement of their hand that the buttons should be controlled with the pinky and ring fingers.

Revealed constraints-

Both analog sticks must be comfortable for their entire range of motion. This may require angling the sticks toward the user’s fingers or using smaller than average analog sticks.

The shoulder buttons will be used a lot in this style of game, and controlling them with the pinky and ring fingers may be a bit of a gamble. Most users have decreased dexterity in those fingers, so the shoulder buttons are normally controlled with the index fingers. A one-handed design necessitates that the lesser fingers be used though, so the shoulder buttons seem to be the way to go. Luckily, I have never seen a game that requires both R1 and R2 or L1 and L2 to be pressed at the same time, which would be tricky using the pinky and ring fingers.

Task 3- Play a fighting game.

Fighting games require combinations of buttons to be pressed simultaneously. The analog sticks are not used, but the D-pad, 4 main buttons, and shoulder buttons (L1 and R1) will be used frequently. L2 and R2 are sometimes used, but it is rare. As before, the user should be able to find the controls they need via the labels and hand placement with relative ease.

Revealed constraints-

Multiple-button combos must be easy to use. In the current design, the main four buttons are split into two groups. Two are controlled with the index finger (which doesn’t need to use the analog stick), and the other two are controlled by the middle finger. If anything, I suspect that this will actually make multi-button presses easier, though I can’t be sure until I’ve got it implemented. Shoulder buttons are still suspect.

The D-Pad must be accessible-

Sounds obvious, but the D-pad is rarely used in most games, fighting games being the sole exception. The Xbox and Gamecube controllers actually have very poorly placed D-pads in favor of making the analog sticks more comfortable. My design may end up suffering from a similar fate without some modification. It may be useful to allow the outshoot where the D-pad and analog stick are to rotate. If so, it may be possible to make placement more comfortable for either one, depending on what type of game you want to play.