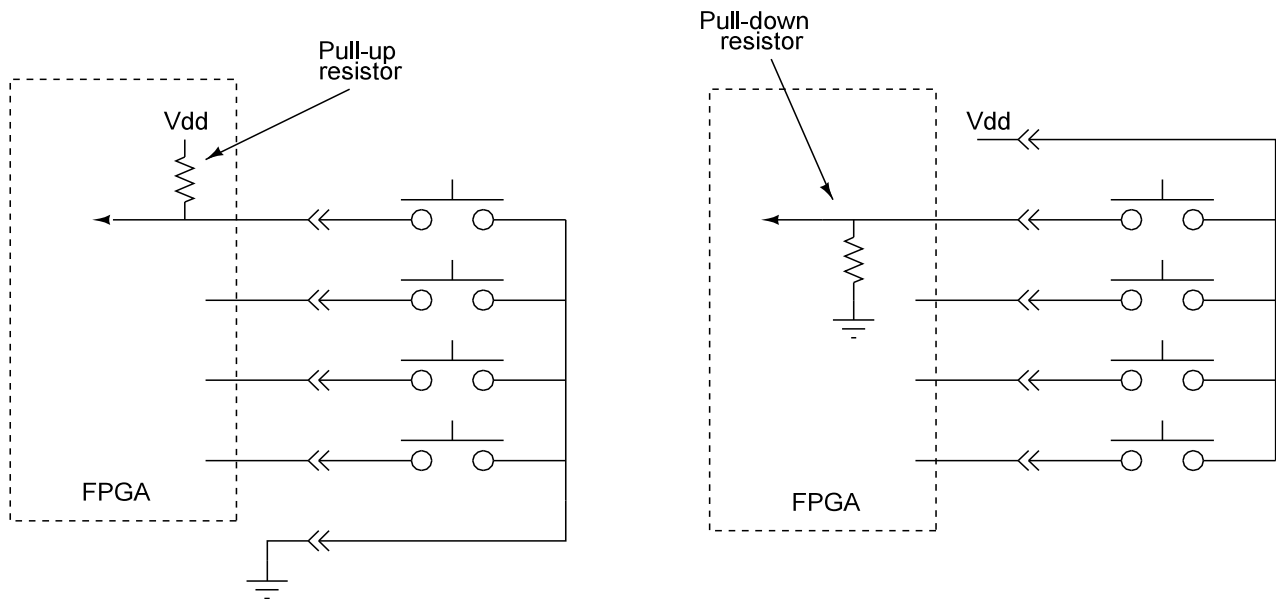


For the project, external game switches can be used. Below are details for hooking them up.



A pull-down or pull-up resistor can be turned on in the FPGA on one or more input lines. See the extin0 to extin7 entries in the constraint files for an example of specifying pull-down resistors. The word PULLDOWN specifies a pull-down resistor to be turned on but can be replaced with PULLUP to specify a pull-up resistor connected to Vdd.

The purpose of the pull-up or pull-down is to specify the desired logic level when a button is not pressed. Leaving an FPGA input unconnected when a button is not pressed will leave that input with an unknown logic level and it might change as you place your hand near a switch even without touching the switch (recall the very high input impedance of CMOS logic).

I have not attempted to add the PULLDOWN or PULLUP specifications to an attribute statement in the entity of a VHDL source file. I have used them in the constraints file, so I suggest that you use a constraints file rather than putting the pin designations directly into the entity of your design.

I do not know if