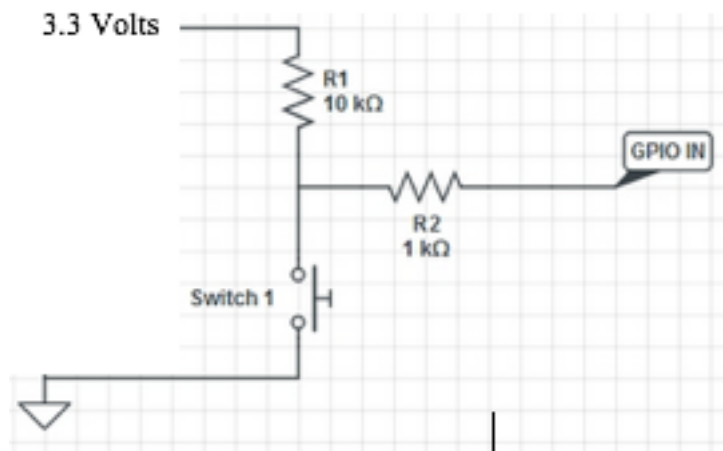


Homework 2

1. For the R-Pi 3, Model B, list all possible GPIO pins that may be used for projects and labs. Identify the maximum set (when not using any special functions). Also, list the minimum set, when special functions (and the Adafruit 2.8 inch piTFT) are used.
2. List all the pins on the R-PI GPIO connector used by the piTFT screen. Explain what each pin is used for by the piTFT.
3. For the following RPi GPIO circuit, describe why R2 is necessary in the figure:



Describe a possible ‘software situation’ that would damage the GPIO without R2. How does R2 prevent the problem? Why is the value of 1k ohm selected for R2?

4. What is the difference between a Linux pipe and a FIFO (or a named pipe)? What can you do with a FIFO (named pipe) that you cannot do with a pipe?
5. Given the following python code:

```
def sum():  
    c = a + b  
  
# main code....  
a = 1  
b = 7  
c = 0 # initial value of c  
print "initial value of c = " + str(c)  
sum()  
print "sum result, c = " + str(c)
```

What are the results of the two print statements? What changes could be made to correct any problems with this code?

6. Lab 2 involves a GUI for starting and stopping an on-screen video. Develop a graphic of how the control panel will appear. Create a logical flow (for example, pseudo code) for the elements of the control panel.
7. Describe pygame screen elements including a surface and a rect. How are these used to animate an image? How would they be used to establish a touch screen button? Draw a step by step diagram illustrating the process of animating 2 frames of an animation on the PiTFT.
8. Setup a temporary environment variable named TEMP_VAR. Setup a permanent environment variable named FIXED_VAR. Which file do you need to change to establish the permanent environment variable? Can you override the permanent environment variable? Show a screen shot from this experiment on the ECE5725 server (or your RPi). The screen shot should show the state of both variables when you first log into the system. What happens to the variables if you use the command 'su – some_other_ID' ?
9. If you run the date command on the ECE5725 server, the date and time are accurate. The RPi does not have a battery-backed real-time clock so how does the RPi maintain accurate time? When would it be appropriate to add an external, battery-backed real time clock to the RPi?
10. Describe two methods used for keeping a callback program from exiting immediately when called. For example, in more_video_control_cb.py (from your work in Lab 2, week 1) you converted the polling loop used in Lab 1 to use multiple threaded callbacks. In this code, what prevents the python from simply exiting once the callback routines are defined and attached to the appropriate GPIO connected buttons? Hint: one method involves 'try' and 'except'. Can you also describe a second method using only callback functions (eliminating 'try' and 'except')? Describe your answer using code snips of the two different methods.