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Electronics Engineering Design and Prototyping

5/15/19

**Final Project Problem Statement**

**Goal:**

The goal of this project was to design a noise filtering circuit for a non-ideal push button. The this had to be designed and implemented on the breadboard and in Multisim. Students could also only use components available to the class. The supply would be from 0 V to 3.3 V and the resistors had to be a minimum of 1KOhm. Then, the circuit had to designed in Eagle. All of the files would then be uploaded to Github and Ulearn.

After doing research it was determined that an RC debouncer was the best solution for the assignment. Not only is it a relatively simple design but it requires few components. It requires two resistors, a capacitor, and the push button.

**Design:**

Even thought the circuit is simple it is complex in that there is a lot of different things happening in the circuit. There is a lot that goes into this simple circuit. If the button is pushed the voltage of the capacitor is zero but it starts to rise. The bouncing of the pushbutton will cause the capacitor to slow down the voltage increase. If the pushbutton is pushed for a long period of time and it is let go the circuit will also debounce. This is because the voltage from the debounce goes through R2 and is recharging the capacitor slightly. The main purpose of R2 is to make sure the capacitor will discharge slowly. This limits the flow of current in the entire circuit. The values of the components used were based on making sure that the capacitors voltage stages above the required threshold.

**Calculations:**

Vcap= Vinitial (e^-t/RC)

Vcap= Voltage across capacitor

Vinitial= Voltage initially across capacitor

t= time

R and C = Resistor and Capacitor values

Charging the capacitor

Vth= Vfinal(1-e^-t/RC)

Vth= worst case transition point for high signal

Vfinal = final charged value – power supply in circuit