

Code for debounce button

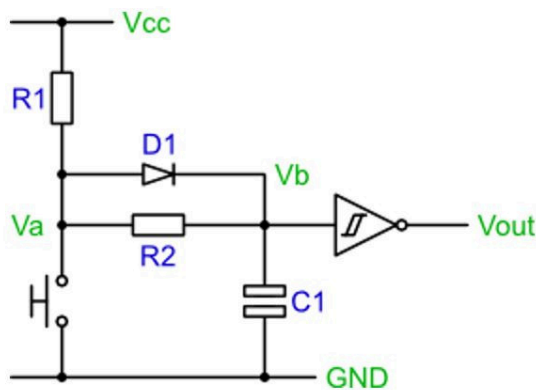
Import Necessary Libraries

```
In [1]: import numpy as np
import matplotlib.pyplot as plt
import matplotlib.font_manager as fm
```

Load Raleway Font

```
In [2]: # Load Raleway font from the specified file path
raleway_path = 'Raleway-Regular.ttf' # Adjust the path to your font file
raleway_prop = fm.FontProperties(fname=raleway_path)
```

Cabling's schematic



Define Constants

```
In [3]: # Define the resistance, capacitance, and input voltage values
R1 = 10e3 # Resistance in ohms (10 kΩ)
R2 = 10e3 # Resistance in ohms (10 kΩ)
C = 1e-6 # Capacitance in farads (1 μF)
V_in = 5 # Input voltage in volts (5V)

# Compute the RC time constant
tau1 = R1 * C # Time constant τ = RC
tau2 = R2 * C # Time constant τ = RC
```

Generate Time Vector

```
In [4]: # Create a time vector from 0 to 10 times the time constant (with 1000 points)
t = np.linspace(0, 10 * tau1, 1000)
```

Compute Output Voltages

For a constant input (initial charge at 5V):

$$u_s(t) = V_{\text{in}} \cdot e^{-\frac{t}{\tau_1}}$$

For a step input from 0V to 5V at (t= 0):

$$u_s(t) = V_{\text{in}} \cdot \left(1 - e^{-\frac{t}{\tau_2}}\right)$$

```
In [5]: # Calculate the output voltage for a constant input (initial charge at 5V)
u_s_constant = V_in * np.exp(-t / tau1)

# Calculate the output voltage for a step input from 0V to 5V at t=0
u_s_step = V_in * (1 - np.exp(-t / tau2))
```

Plot the Graphs

```
In [6]: # Create a figure with a specific size
plt.figure(figsize=(10, 6))

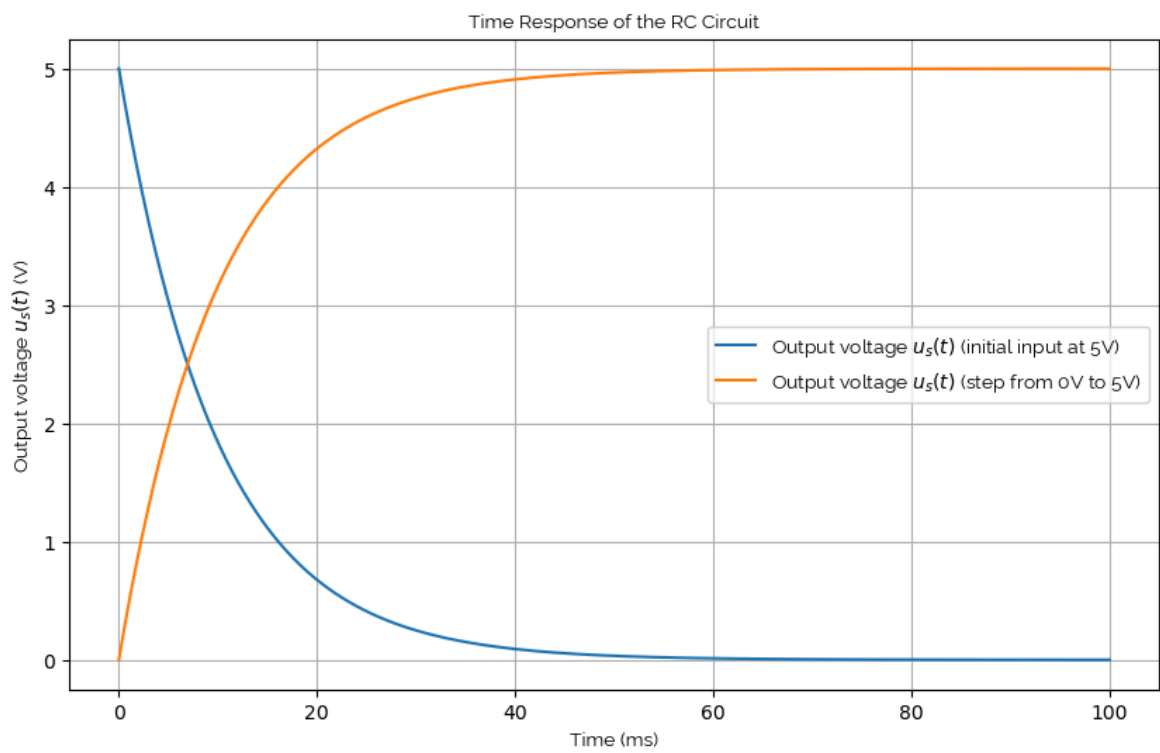
# Plot both voltage curves: constant input and step response
plt.plot(t * 1e3, u_s_constant, label='Output voltage $u_s(t)$ (initial input at 5V)')
plt.plot(t * 1e3, u_s_step, label='Output voltage $u_s(t)$ (step from 0V to 5V)')

plt.title("Time Response of the RC Circuit", fontproperties=raleway_prop)
plt.xlabel("Time (ms)", fontproperties=raleway_prop)
plt.ylabel("Output voltage $u_s(t)$ (V)", fontproperties=raleway_prop)

# Show the grid
plt.grid(True)

# Add a Legend using the Raleway font
plt.legend(prop=raleway_prop)

# Display the final plot
plt.show()
```



In []: