Equipment

- Protoboard Workstation
- Digital Oscilloscope

Objective

Understand and apply 555 Timer IC

- Operational modes Astable and Monostable
- Applications

Conceptual (C-level)

Read chapter 9 "Oscillators and Timers" especially section 9.2 about the 555 Timer IC

- Describe two different operational modes for the 555 Timer IC
 - Describe how the choice of resistor and capacitors changes the operation.
- Draw the schematic for a circuit that uses a 555 Timer IC to produce a 1 kHz signal.
 Explain how the circuit works.
- Draw the schematic for a circuit that uses a 555 Timer IC to add a 10 second time delay

 Explain how the circuit works.

Basic Lab (B-level)

Construct the relay driver (delay timer) circuit (see figure 9.12)

• Verify your circuit - quantify the output

Design and construct a stand-alone external sensing circuit. A suggested touch circuit is provided above, where $R_1=R_2=3.3M\Omega$, $R_3=10K\Omega$, $R_4=1K\Omega$, $C_1=10nF$, $Q_1=BC547$, V+=12 volts and a relay can be placed in series with the LED status light. NOTE: An electromagnetic relay would need a back-biased diode in parallel with it to handle the back EMF generated from powering off the coil.

- The circuit must be powered "off-board"
 - If you design a battery powered circuit, can you power your circuit using just one battery?
 - What is the lowest voltage required?
- Verify your circuit quantify the output

Advanced/Extended Lab (A-level)

Add on to your relay circuit.

• Make the time delay sensitive to light, temperature or other external sensor

Design and construct a siren.

• Use two 555 Timer IC

Design and construct a circuit of your choice. Your circuit should combine multiple elements.

• Analyze your circuit and verify its operation

Substitutions may be considered.

