

Reaction Time Simulator

A hardware based pulse generator was purpose-built to serve as a highly accurate and repeatable reaction time simulator. The circuit (shown in Figure 1) utilized a 555 timer chip configured as a monostable pulse generator. When the trigger input (pin 2) is momentarily grounded the 555 generates a positive voltage output pulse (pin 3) with a duration that is programmed through the appropriate selection of a timing resistor (R_t) and a timing capacitor (C_t). The duration of the resulting pulse is given by the formula: $\text{time (secs)} = 1.1 \times R_t \text{ (ohms)} \times C_t \text{ (farads)}$. Hence, if R_t is set to its maximum value of 10,000 ohms then the duration of the triggered output pulse will be approximately 220 milliseconds (i.e., 10,000 ohms \times 0.000022 farads = 0.220 secs). The duration of the output pulse was measured using an Owan Model DS6062V oscilloscope while the value of R_t was adjusted until the output pulse duration was set to precisely 200 msec. The resulting circuit generated a 200 msec pulse every time it was triggered by an external device. When connected to an appropriate digital input and output line on the computer being tested this circuit simulated an "ideal observer" with a reaction time of precisely 200 msec. This behavior served as the ground truth level for all subsequent benchmark tests of system latencies.

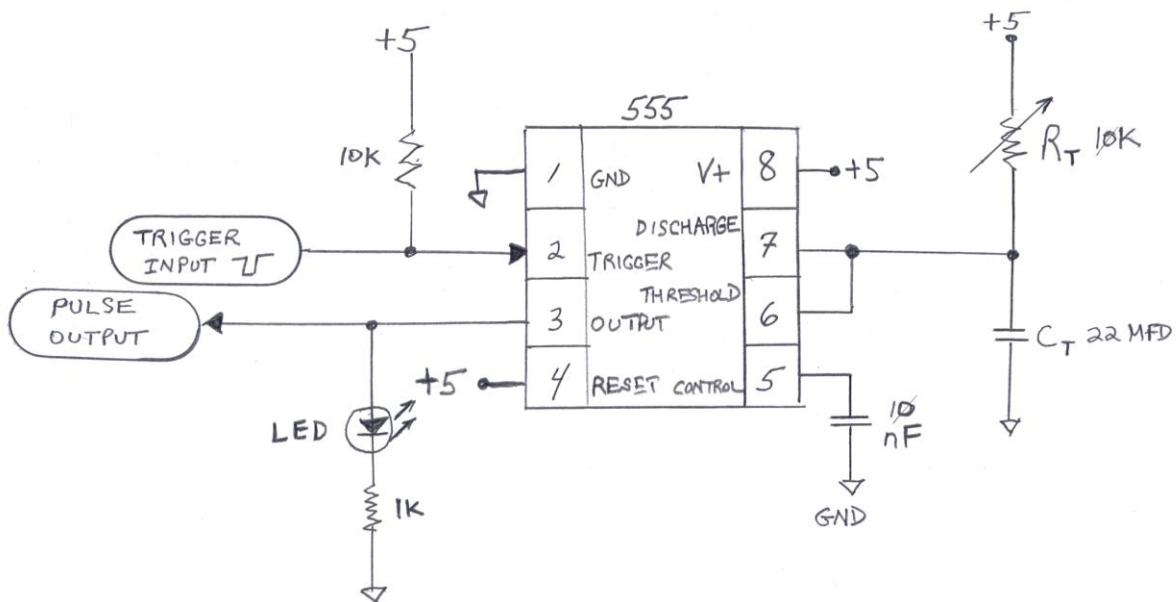


Figure 1.

Hardware-based pulse generator used as 200 msec Reaction Time Simulator.

Output pulse duration set by capacitor C_t and adjustable resistor R_t .