# DDCO MINI PROJECT

**Team Name: Short Circuit**

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## Problem statement

( 15 ) Stopwatch with Start/Stop/Reset functionality

## Abstract Brief Idea For Implementation :

### Technical Explanation

The stopwatch is designed using simple digital building blocks.

We have a **clock divider or frequency divider** that generates a 1 Hz signal from the high-frequency system clock, providing **one tick per second**.

The **Start, Stop, and Reset buttons** are synchronized using two flip-flops each to avoid glitches, and positive-edge detection

ensures each press is registered only once.

A **1-bit Run flip-flop** maintains the running state: Pushing Start sets Run=1 and Stop sets Run=0, and Reset clears counters.

On every 1 Hz tick, if Run=1, the seconds counter increments. When the seconds counter rolls over from 59 back to 0, the minutes counter increments. The minutes counter also wraps after 59. Both counters can be stored in binary or converted to **BCD** for display through a BCD-to-7-segment decoder if required. Thus, the stopwatch provides accurate timing with basic start, stop, and reset functionality using simple Verilog logic.

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## Simple Layman explanation

We can think of the stopwatch like a simple digital watch. we first slow the system or board's clock down to give **1 "heartbeat or tick" per second**. Each button (Start, Stop, Reset) is registered cleanly so that the stopwatch sees a simple press instead of messy electrical signal.

We keep a small memory (Run flip-flop) that remembers whether the stopwatch is currently running or paused. Pressing Start tells it to run, Stop tells it to freeze, and Reset clears everything back to zero.

Every second, if the stopwatch is running, it adds 1 to the seconds. When seconds reach 59, they get rolled back to 0 and minutes increment by 1 — just like a normal stopwatch. If minutes reach 59, it stops assuming 1 hour is the stopwatch limit.

Finally, the stopwatch shows minutes and seconds. The circuit displays numbers but we can turn it into a display by using a 7 segment display if hardware implementation is needed.

Thank You !!