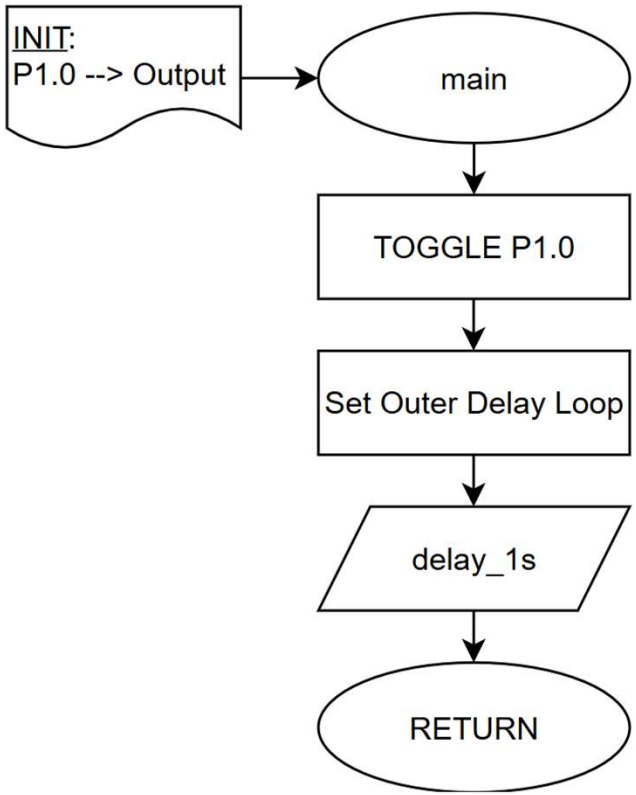
# Project 1: Heartbeat LED Demo

Jay Graham

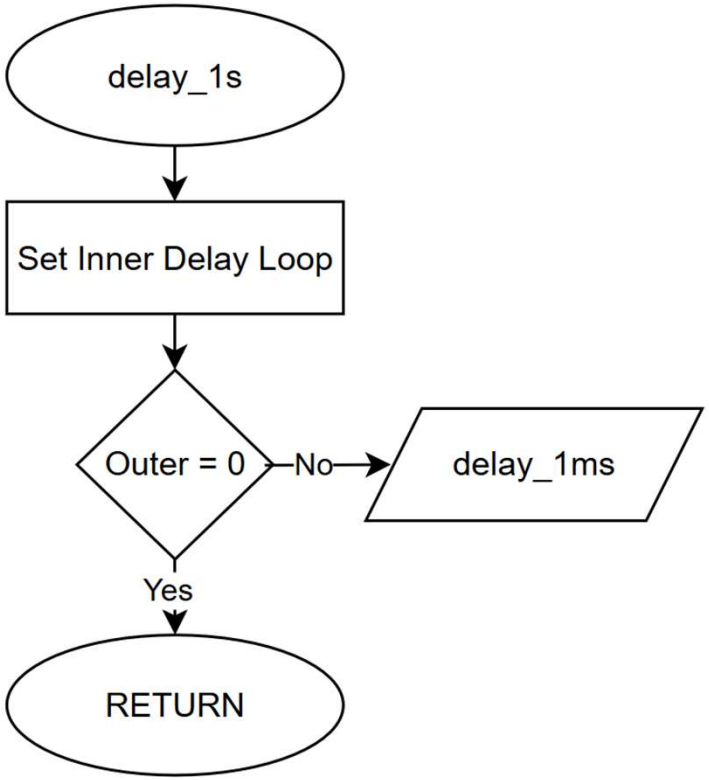
# Project Introduction

- Program two LEDs to blink at 0.5 Hz (1s on, 1s off)
- Implemented with two methods
  - Delay Loops
  - Timer Interrupts
- Calibrated/Verified timing with scope

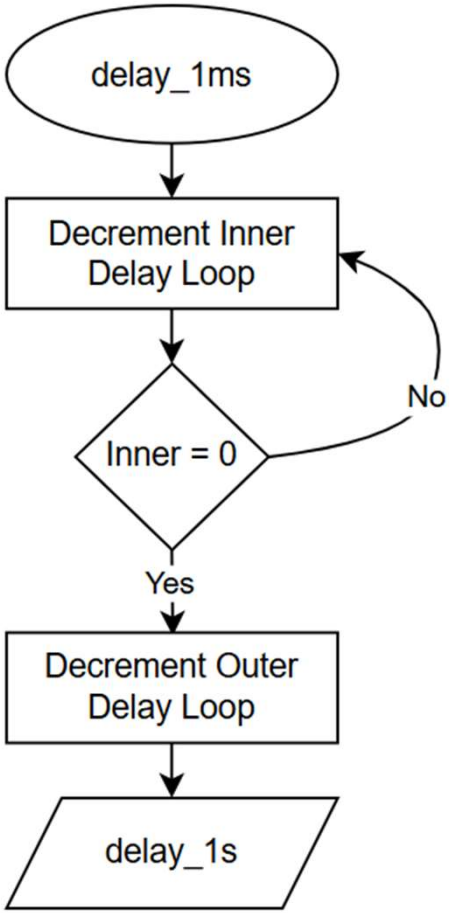
# Delay Loop Method




**Main Loop**




**delay_1s subroutine**

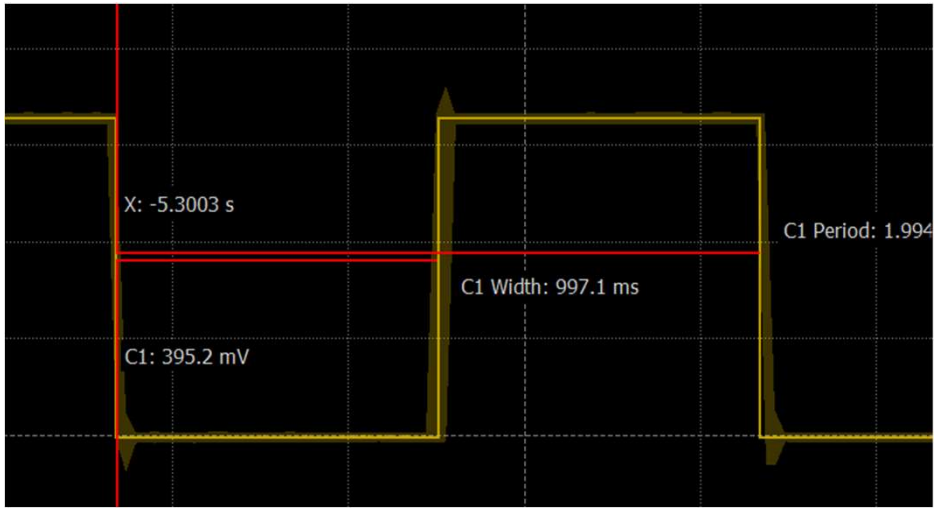



**delay_1ms subroutine**

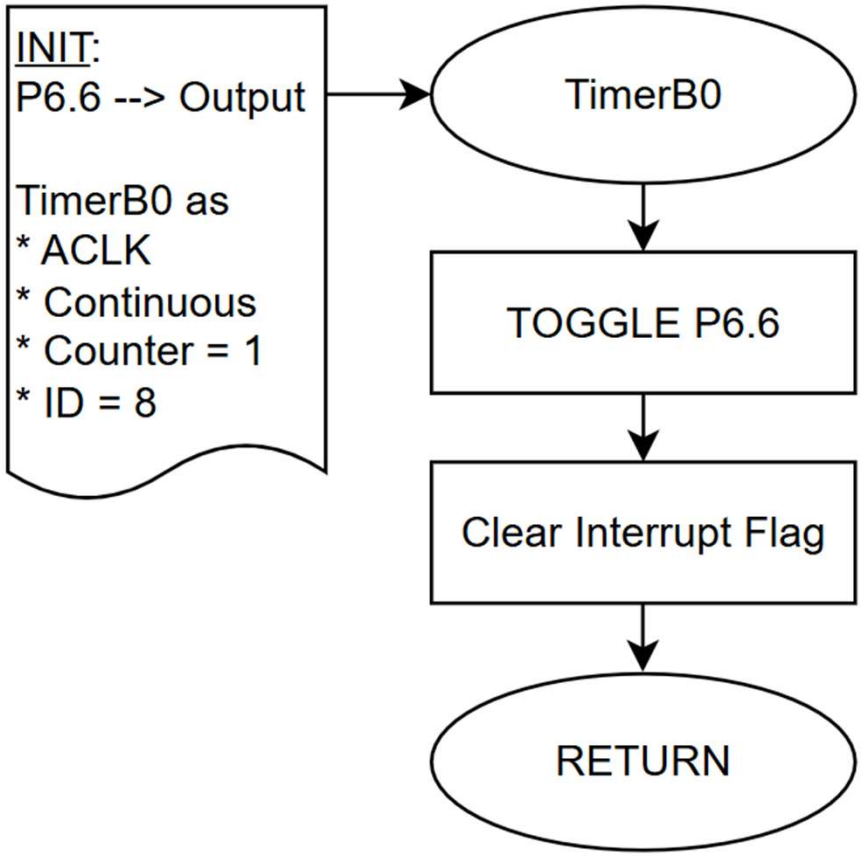
# Delay Loop Method

- Calibrated Inner Loop to be equal to 1ms
  - Started with 500
  - Adjusted incrementally down to 347 to improve accuracy
- Set outer loop to 1000 to reach 1s total

**Pulse Width:**
**997.1ms**



# Timer-Interrupt Method

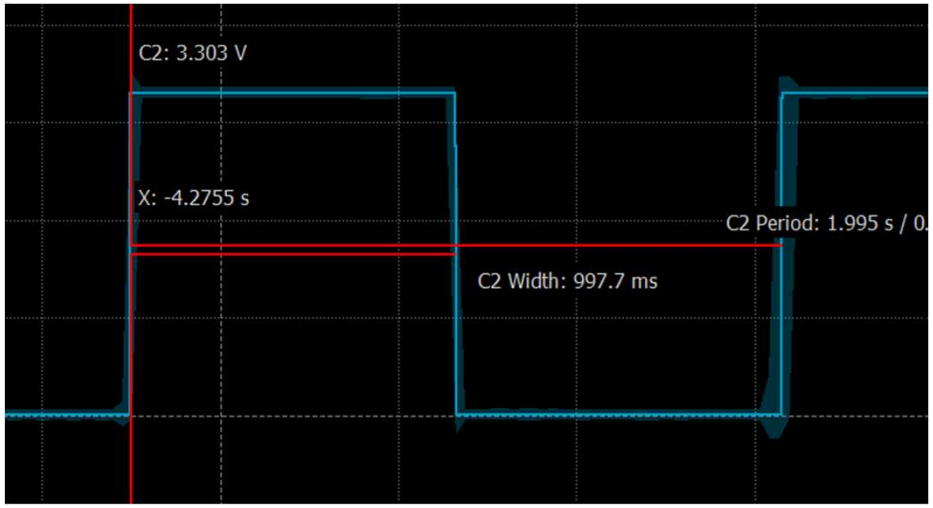



**TimerB0_1s interrupt service routine**

# Timer-Interrupt Method

- Did calculation based on 32768 Hz clock
  - counter length = 12, divider = 8
  - 32760 = ((2^12)-1)*8
- Inspected with scope, needed no adjustment

**Pulse Width:**
**997.7ms**



# Which one to use?

- Interrupts are more useful for processes that you want to run in the background or when you need multiple operations occurring at once
- Delay loops may be more beneficial if you intentionally want to build in a gap between sequential operations