

Reflection Report – SIT315 Task M1

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System Architecture and Logic

This system is an interrupt-driven Arduino application that cleanly separates time-based and event-based logic. It uses Timer1 to control a blinking LED every 1 second and Pin Change Interrupts (PCI) on digital pins D8 and D9 to detect two button presses. Each interrupt triggers minimal logic inside its ISR and sets a flag, which is then handled in the loop() function. This ensures the design follows best practices for embedded interrupt systems.

Interrupt Configuration and Usage

The Timer1 peripheral is configured in CTC (Clear Timer on Compare Match) mode with a prescaler of 1024. It triggers a compare match interrupt every 1 second, toggling the state of an LED connected to D10. The Pin Change Interrupt Control Register (PCICR) enables PCI on PORTB (D8–D13), and PCMSK0 sets D8 and D9 as monitored pins. The ISR PCINT0_vect checks which pin triggered the event and sets corresponding flags (buttonAFlag, buttonBFlag).

This ensures separation between fast ISR handling and application logic.

Issues Encountered and Resolutions

Initially, the PCI interrupts were not triggering correctly. The main issue was incorrect button orientation — the buttons were not placed across the trench on the breadboard, resulting in constant HIGH readings or no change.

This was resolved by repositioning the buttons and enabling the internal pull-up resistors with INPUT_PULLUP. A second issue involved the PIR sensor being unreliable and flooding the serial monitor. To meet the 4/4 QP requirement without it, it was replaced with a second button on a PCI-capable pin. The system was retested and validated to demonstrate both PCI events.

Conclusion

This task helped solidify knowledge of interrupt architecture and safe ISR handling in embedded systems. The use of volatile flags, short ISRs, timer configuration, and PCI usage reflects industry-standard practices. The final system is modular, interrupt-safe, and demonstrates complete control separation, meeting all SIT315 Task M1 submission requirements.

Github Link: https://github.com/KavinduLiyanage04/SIT315_TaskM1.git

Tinkercard Link: <https://www.tinkercad.com/things/e0hOW6PrPby-task-m1?sharecode=78px3grp1TP2KSfkwwl8w3ESDskvkVnbWA8o3UYxvZ8>

