

Experiment No: 10

BECS 31421

IMPLEMENTING RELAY CONTROL WITH PIC MICROCONTROLLER

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DISCUSSION

In this experiment, a PIC16F628A microcontroller was used to control a 12V relay, which was connected to an incandescent lamp. Microcontrollers can't directly drive the relay because it requires more current. So, the bc547 NPN transistor used as switch to amplify current. The push button was connected to the toggle relay. Diode (1N4007) was connected across the relay to protect the transistor from back EMF. The system was powered up using 12V power supply while 5V voltage regulator was used to protect microcontrollers.

During the practical session we faced many challenges. Switch bouncing is one of them. Mechanical switches produce multiple pulses during a press. Without a **software delay** (debouncing), the relay toggles erratically. So delay help to overcome this challenge.

Overall, this experiment demonstrated how to interface a microcontroller with higher voltage components using a relay and a transistor.

SOURCE CODE

```
sbit sw1 at RB0_bit;

int state = 0;    // Initialize relay state as OFF

int last_state = 1; // Initialize button state as not pressed (active low)

void main() {

    TRISB = 0x01;  // Set RB0 as input (1), RB1 as output (0)

    PORTB = 0x00;  // Initialize PORTB to all zeros

    while (1) {

        if (sw1 == 0 && last_state == 1) { // Detect button press (falling edge)

            last_state = 0;  // Button is now pressed

            state = !state;  // Toggle relay state (0?1 or 1?0)

            RB1_bit = state; // Output state to RB1 (relay control)

            Delay_ms(50);    // 50ms debounce delay

        }

        else if (sw1 == 1) { // Button is released

            last_state = 1;  // Reset to not pressed state

        }

    }

}
```

SIMULATION SCREENSHOTS



