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Experiment no: 03

Student No: EC/2021/006

Discussion

In this experiment, we implemented a simple LED chaser circuit using PIC 16F628A microcontroller. We understood how to configure the input/output pins of the microcontroller and use them to control external devices, in this case, LEDs. The LED chaser effect, also known as the Knight Rider effect.

We used MikroC PRO compiler to write the program and simulated the circuit in PROTEUS before uploading the HEX file to the microcontroller using MPLAB IPE and the Pickit 3 programmer. The microcontroller was programed to use PORTB pins as output. The TRISB register was set to 0x00 to configure PORTB as output. CMCON register was set to 0x07 to disable the comparator module.

The LED movement was controlled using shift operations in two loops first shifting the light from left to right, then back from right to left. A delay of 100 ms between each shift was used to produce a smooth animation. The delay was managed using the Delay_ms() function.

Source Code

```
void knightrider(void) {
    int i;
   // Step 1: Set all pins of PORTB as outputs
    TRISB = 0x00; // Hint: Set all pins of PORTB as outputs
   // Step 2: Initialize PORTB with the first LED lit
    PORTB = 0x01; // Hint: Initialize PORTB to light the first LED (RB0)
   // Step 3: Define the left shift loop
    for (i = 1; i <= 7; i++) {
    PORTB = (PORTB << 1); // Hint: Shift the lit LED to the left
   // Step 4: Delay for smoother animation
       Delay_ms(100); // Hint: Delay for smoother animation
    }
   // Step 5: Define the right shift loop
    for (i = 7; i >= 1; i--) {
       PORTB = (PORTB >> 1 ); // Hint: Shift the lit LED to the right
   // Step 6: Delay for smoother animation
       Delay_ms(100);
    }
}
void main() {
    CMCON = 0x07; // Hint: Disable comparators
    TRISA = 0xff; // Hint: Set all PORTA pins as digital I/O
    while (1) // Hint: Enter a condition for the infinite loop
    knightrider(); // Call the knightrider function
    }
```

```
VOID KNIGHTRIDER(VOID) {
    INT I;
   // STEP 1: SET ALL PINS OF PORTB AS OUTPUTS
    TRISB = 0X00; // HINT: SET ALL PINS OF PORTB AS OUTPUTS
   // STEP 2: INITIALIZE PORTB WITH THE FIRST LED LIT
    PORTB = 0X01; // HINT: INITIALIZE PORTB TO LIGHT THE FIRST LED (RB0)
   // STEP 3: DEFINE THE LEFT SHIFT LOOP
    FOR (I = 1; I <= 7; I++) {
    PORTB = (PORTB << 1); // HINT: SHIFT THE LIT LED TO THE LEFT
   // STEP 4: DELAY FOR SMOOTHER ANIMATION
        DELAY_MS(100); // HINT: DELAY FOR SMOOTHER ANIMATION
    }
```

```
    // STEP 5: DEFINE THE RIGHT SHIFT LOOP
     FOR (I = 7; I >= 1; I--) {
         PORTB = (PORTB >> 1 ); // HINT: SHIFT THE LIT LED TO THE RIGHT
    // STEP 6: DELAY FOR SMOOTHER ANIMATION
         DELAY_MS(100);
     }
}
VOID MAIN() {
     CMCON = 0X07; // HINT: DISABLE COMPARATORS
     TRISA = 0XFF; // HINT: SET ALL PORTA PINS AS DIGITAL I/O
     WHILE (1) // HINT: ENTER A CONDITION FOR THE INFINITE LOOP
     KNIGHTRIDER(); // CALL THE KNIGHTRIDER FUNCTION
     }
```

Porteous Simulation