

IR MOTION DETECTION WITH UART COMMUNICATION

TERM PROJECT

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**B.TECH COMPUTER AND COMMUNICATION ENGINEERING
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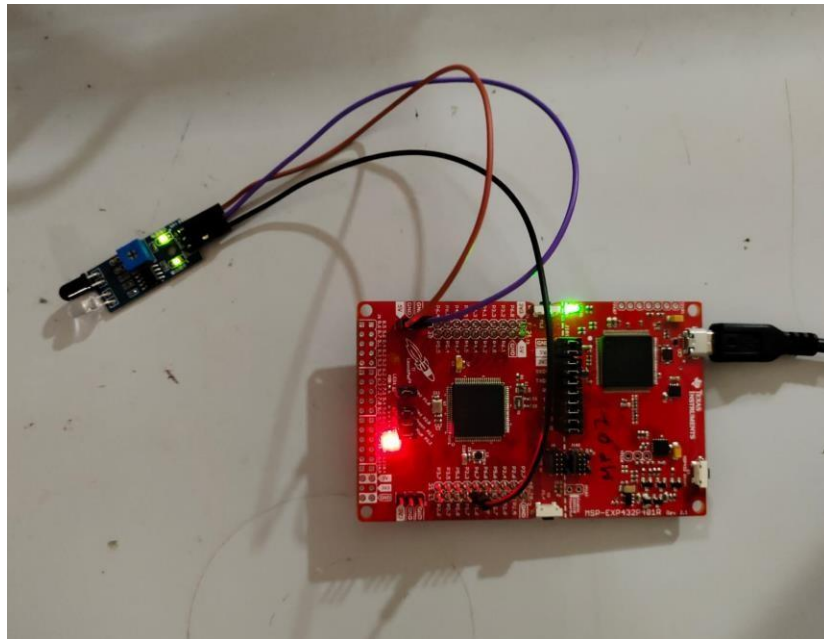
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Aim:

The aim is to utilize a IR sensor for motion detection. Whenever motion is detected by the sensor, The following actions will be implemented:

- ❖ Blink a red LED: Upon motion detection, a red LED connected to the microcontroller will be blinked to provide a visual indication of the detected motion.
- ❖ Notify "Motion Detected" message: In addition to the LED blinking, a notification or a message such as "Motion Detected" will be sent to provide an alert about the presence of motion.

Design:



Peripherals and its pins:

Peripherals	Pins
LED – GPIO output mode	P2.0(Port 2)
IR Sensor – GPIO input mode	P1.6(Port 1)
Universal Asynchronous Rx/Tx (UART)	P1.2 ,P1.3(Port 1)

Code:

```
#include <msp432.h>

void ir_init(void);
void led_init(void);
void uart_init(void);

char message[] = "Motion Detected";

int i;
char c;
char s;

int main() {
    ir_init(); // Calling PIR sensor initialization function
    led_init(); // Calling LED initialization function
    uart_init(); // Calling UART initialization function

    while (1) {
        if (P1->IN & 0x40) { // 0x40 = 0100 0000
            P2->OUT &= ~0x01; // 0x01 = 0000 0001

        } else {
            P2->OUT |= 1;
            for (i = 0; i < 19; i++) { // Number of characters = 19
                while (!(EUSCI_A0->IFG & 0x02)) {} // Wait until transmitter buffer is empty
                EUSCI_A0->TXBUF = message[i]; // Display the character
            }
        }
    }

    return 0;
}

void ir_init(void) {
    P1->SEL0 &= ~0x40; // Configuring in GPIO mode
    P1->SEL1 &= ~0x40;
    P1->DIR &= ~0x40; // Input mode
    P1->REN |= 0x40; // REN - Resistor Enable
    P1->OUT &= ~0x40; // Pull-Down Resistor
}
```

```

void led_init(void) {
    P2->SEL0 &= ~1;    // Configuring in GPIO mode
    P2->SEL1 &= ~1;
    P2->DIR |= 1;      // Output mode
}

void uart_init(void) {
    EUSCI_A0->CTLW0 |= 1;    // In reset mode to configure UART
    EUSCI_A0->MCTLW = 0;
    EUSCI_A0->CTLW0 = 0x0081; // 1000 0001 - 1 stop bit, No Parity, 8-bits data, Asynchronous Mode,
First LSB Then MSB, SMCLK
    EUSCI_A0->BRW = 26;      // BRW = SMCLK/Baud Rate
    P1->SEL0 |= 0x0C;        // 0000 1100
    P1->SEL1 &= ~0x0C;      // 1111 0011
    EUSCI_A0->CTLW0 &= ~1;  // Disabling Reset Mode
}

```

Implementation Status:

The implementation status of our project has been marked as "COMPLETED."

Inference:

The system successfully detects motion, provides real-time feedback through UART communication, and controls an LED for visual indication. The project showcases the versatility and processing power of the MSP432 microcontroller and its potential for various applications in security, automation, and occupancy monitoring.

Conclusion:

In conclusion, the motion detection system implemented with a IR sensor and MSP432 microcontroller provides a reliable and efficient solution for detecting motion in a given environment. The IR sensor detects changes in infrared radiation caused by motion, allowing the system to identify the presence of a moving object.

By utilizing the capabilities of the MSP432 microcontroller, the system can process the sensor output and make decisions based on the detected motion. In this case, the system uses UART communication to print a message ("Motion detected") when motion is detected, and it controls an LED to provide a visual indication.