COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

(COMPUTER STREAM)

Microprocessors and Interfacing (ECEg 4102)

Project – 2

➢ **Microprocessors and Interfacing:** Interfacing Infra-red sensor and a Dc motor with PIC16 microcontroller

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## 2. <u>Interfacing Infra-red sensor and a Dc motor with PIC16 microcontroller</u>

❖ This project involves using an infrared (IR) sensor to control a motor through an external interrupt mechanism. When the IR sensor detects an object (yielding a logical "1"), it triggers the motor to run. Conversely, when the IR sensor doesn't detect any object (yielding a logical "0"), it signals the motor to stop. This setup allows for automated motor control based on the presence or absence of objects in the sensor's range.

<u>Description of used components</u>

❖ **<u>DC MOTOR</u>**: a DC motor that can rotate in both forward and reverse directions in this case stop based on the applied voltage and current.

❖ **<u>LOGIC TOGGLE</u>**: This is a switch or a digital input that is used to toggle the motor between forward (1) and stop (0) modes. It is typically connected to a digital input pin on the micro controller.

❖ **<u>RESISTOR 10K</u>**: This is a 10 kilo-ohm (10K) resistor, which is a common value used for various purposes in electronic circuits, such as pull-up or pull-down resistors, current-limiting resistors, it helps to prevent false or unpredictable readings on the input.

❖ **<u>CAPACITOR</u>**: Capacitors are used for various purposes in electronic circuits, such as filtering, decoupling, timing, or energy storage. The specific type and value of the capacitor would depend on its intended use in circuit, the PIC datasheet will specify the recommended load capacitance value for the crystal being used, typically in the range of 10-33 pF(we used 22pf).two capacitors, one connected from each crystal terminal to ground, provide the necessary load capacitance for the crystal. they along with crystals form a bandpass filter that helps to remove unwanted high-frequency noise and harmonics from the clock signal

❖ **<u>CRYSTAL</u>**: This is a quartz crystal oscillator, which is used to provide a stable clock signal to the micro controller (PIC16F877A) to synchronize its internal operations.

❖ **<u>PIC 16F877A</u>**: This is the micro controller that used to control the motor based on the input from the IR obstacle sensor and the logic toggle. It is a popular 8-bit micro controller from Microchip Technology.

❖ **<u>IR OBSTACLE SENSOR</u>**: This is a sensor that uses infrared (IR) light to detect the presence of an obstacle or object in its field of view. It provides an analog input to the micro controller, which can be used to determine the motor's direction.

❖ **L293D**: The L293D is a popular motor driver IC that is used to control the direction and speed of DC motors. It typically contains an H-bridge circuit that allows the motor to be driven in both forward and reverse directions

Circuit diagram using proteus software
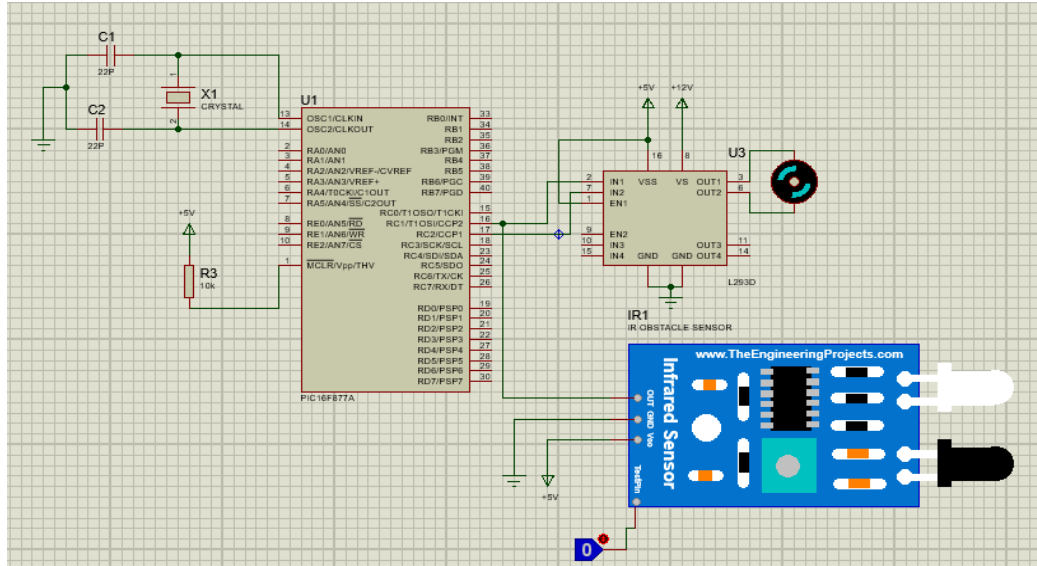
Code for the pic16F877A using CCS C Compiler for pic compiler

```
/*
 * File:   Source File.c
 * Project Name: IR-Motor-PIC16
 */
```

➢ Located in the zip folder
➢ The code sets up the PIC16F877A micro controller, configures the ADC (Analog-to-Digital Converter) for reading the IR sensor and toggle switch values, and then uses Pulse Width Modulation (PWM) to control the direction and speed of the motor. The main loop continuously reads the sensor and switch values, determines the desired motor direction, and updates the PWM signals accordingly. The delay at the end of the loop ensures that the CPU isn't overloaded by the program.

Simulation result

➢ Result is known during simulation