SENSOR INTERFACING AND SIGNAL CONDITIONING

Components Required:

- PIC16F877A Development Board
- IR Sensor
- LCD Module (To print the Sensor output)

Introduction:

Infrared is light that has a wavelength longer than visible red light. The ranges of infrared include near-infrared, mid-infrared, and far-infrared, spanning wavelengths from about 710 nanometers (near-infrared) to 100 micrometers (far infrared).

All objects emit light according to their temperature–this is called "black body radiation." The hotter the object, the shorter wavelength of light it emits. The Earth emits infrared light at a peak of about nine to 10 micrometers–and so do warm-blooded animals like humans. This light can be used to detect motion or warmth.

IR Sensor:

The infrared Obstacle Sensor Module has a built-in **IR transmitter** and **IR receiver** that sends out IR energy and looks for reflected IR energy to detect the presence of any obstacle in front of the sensor module.

The PCB of this electronic circuit has a potentiometer. That potentiometer lets users adjust the detection range. The sensor has a very good and stable response even in ambient light or in complete darkness.

Working Principle of IR Obstacle Sensor

An IR sensor consists of an IR LED and an IR Photodiode; together they are called as Photo–Coupler or Opto–Coupler. As said before, the Infrared Obstacle Sensor has a built-in IR transmitter and IR receiver. **An infrared Transmitter** is a light-emitting diode (LED) that emits infrared radiations. Hence, they are called IR LEDs. Even though an IR LED looks like a normal LED, the radiation emitted by it is invisible to the human eye.

Infrared receivers are also called as infrared sensors as they detect the radiation from an IR transmitter. IR receivers come in the form of photodiodes and phototransistors. Infrared Photodiodes are different from normal photodiodes as they detect only infrared radiation. When the IR transmitter emits radiation, it reaches the object and some of the radiation reflects back to the IR receiver. Based on the intensity of the reception by the IR receiver, the output of the sensor is defined.

IR Sensor Interfacing with PIC16F877A

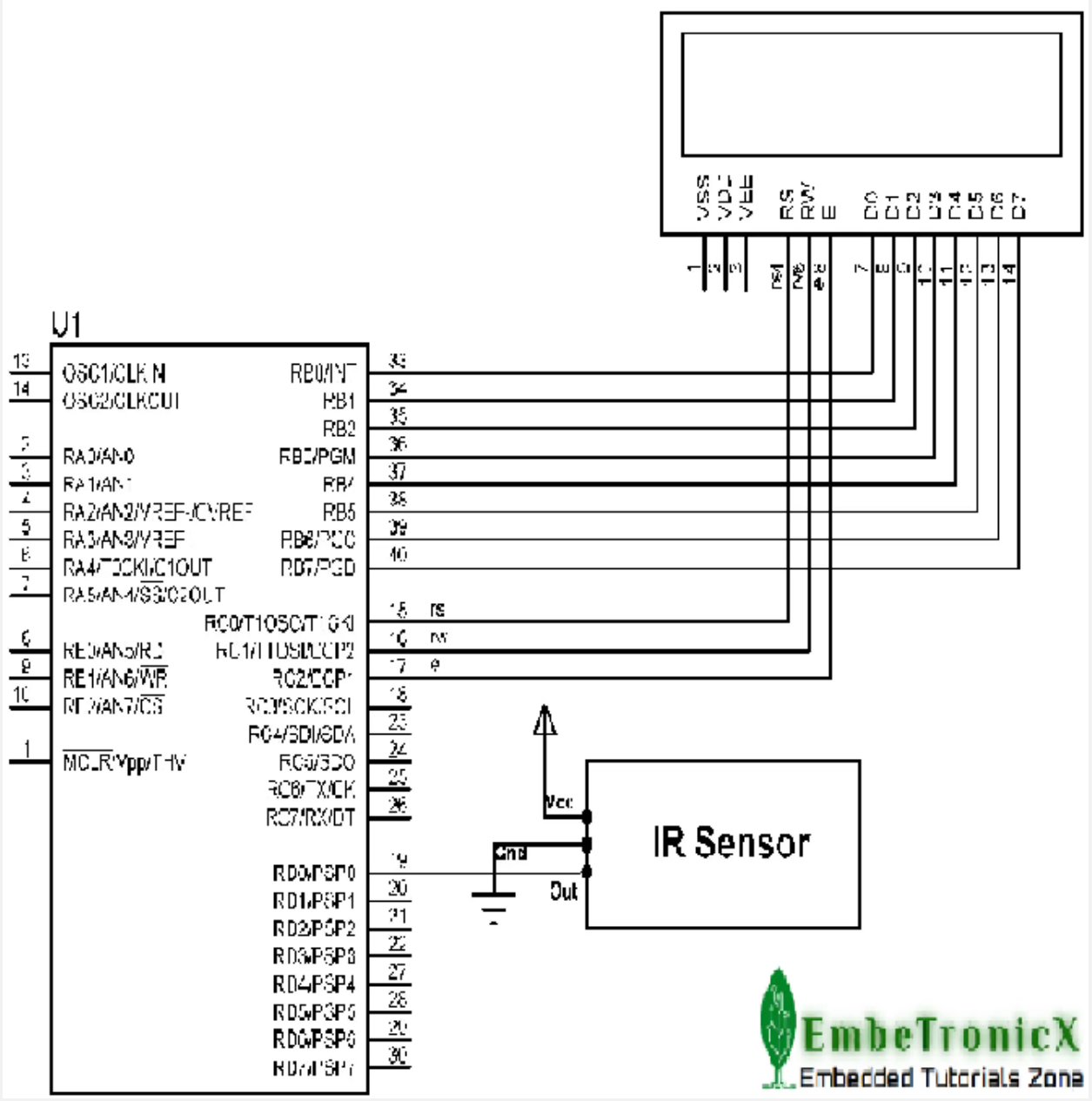
Connection

IR Sensor

- Vcc – 5v
- GND – Ground
- Out – RD0 (PORTD.0)

LCD

- RS – RC0
- RW – RC1
- EN –RC2
- Data Lines – PORTB



Source Code

If it is detecting an object in front of this sensor, LCD will display “Obstacle Detected”.

```
#include<htc.h>

__CONFIG( FOSC_HS & WDTE_OFF & PWRTE_OFF & CP_OFF & BOREN_ON &
LVP_OFF & CPD_OFF & WRT_OFF & DEBUG_OFF);
```

```
#define IR RD0 //IR Output is connected at PORTD.0
#define rs RC0
#define rw RC1
#define en RC2
#define delay for(i=0;i<1000;i++)
int i;
void lcd_init();
void cmd(unsigned char a);
void dat(unsigned char b);
void show(unsigned char *s);
void main()
{
TRISB=TRISC0=TRISC1=TRISC2=0;
TRISD=0xff; //Port D act as Input
lcd_init();
cmd(0x80);
show(" EmbeTronicX ");
while(1) {
if(IR == 0) {
cmd(0xc0);
show("Obstacle Detcted");
delay;delay;
```

```
} else {
cmd(0xc0);
show(" ");
}
}
}
void lcd_init()
{
cmd(0x38);
cmd(0x0c);
cmd(0x06);
cmd(0x80);
}
void cmd(unsigned char a)
{
PORTB=a;
rs=0;
rw=0;
en=1;
delay;
en=0;
}
```

```
void dat(unsigned char b)
{
PORTB=b;
rs=1;
rw=0;
en=1;
delay;
en=0;
}
void show(unsigned char *s)
{
while(*s)
{
dat(*s++);
}
}
```

If you want to sense more distance you can use below IR sensor. You can also adjust the distance using this.  This is an Infrared Transmitter and receiver which together make up a photoelectric sensor. The sensor has a long detection distance

and has less interference by visible light because it uses modulated Infrared light. This sensor has a screwdriver adjustment to set the detected distance, then gives a digital output when it senses something within that range. This sensor does not return a distance VALUE.