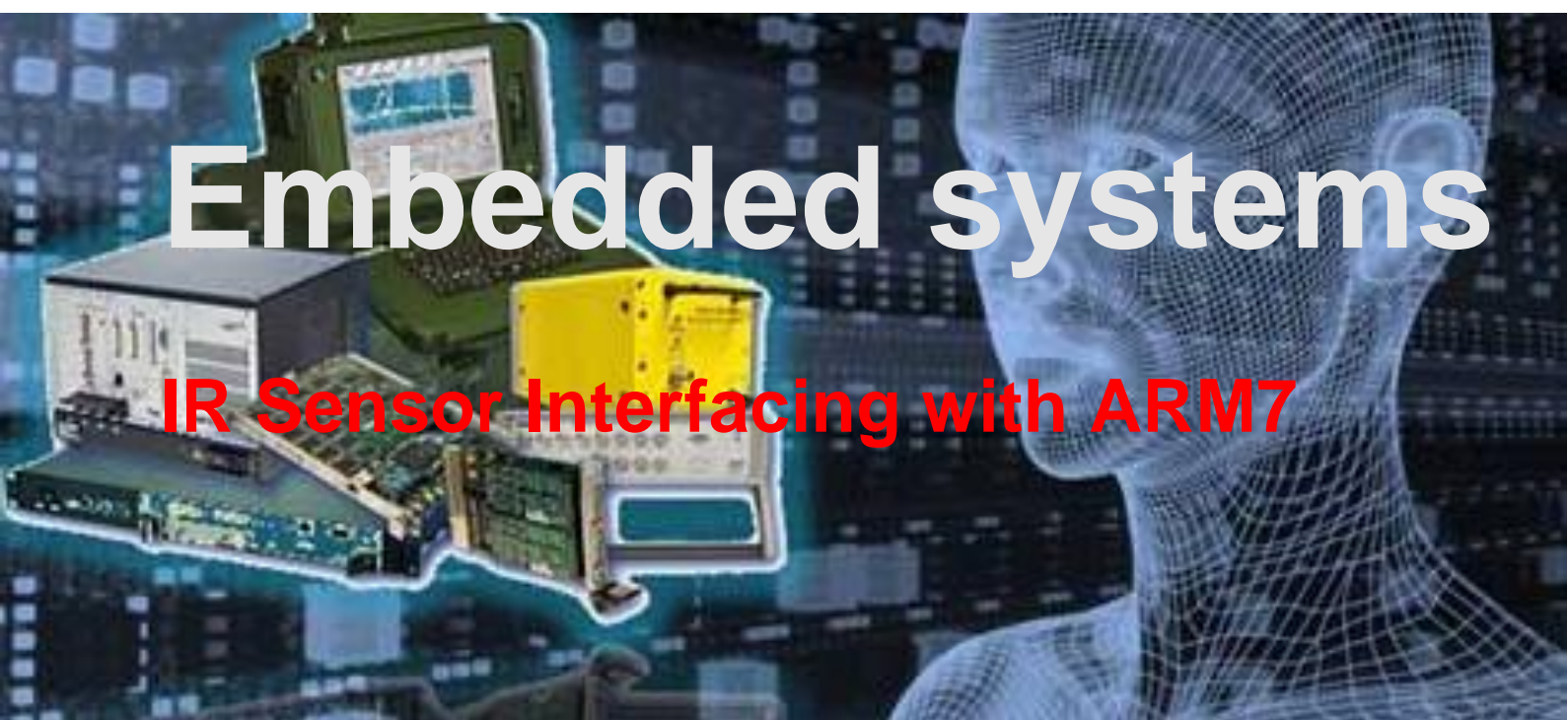




Andhra Pradesh State Skill Development Corporation



Embedded systems

IR Sensor Interfacing with ARM7

IR Sensor Interfacing with ARM7

AIM: Control led by detecting any obstacles or persons.

Software Required: Keil IDE and Bluetooth mobile App

Components Required:

1. System -1
2. ARM7 development board -1
3. USB to RS-232 cable -1
4. 9V Adapter -1
5. LED -1
6. IR sensor
7. Resistor 330 ohms-1
8. Breadboard-1
9. Connecting Wires -Required

Theory:

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.

Infrared Obstacle Sensor Module has builtin IR transmitter and IR receiver that sends out IR energy and looks for reflected IR energy to detect presence of any obstacle in front of the sensor module. The module has on board potentiometer that lets user adjust detection range. The sensor has very good and stable response even in ambient light or in complete darkness.



Specifications

Operating Voltage: 3.0V – 5.0V

Detection range: 2cm – 30cm (Adjustable using potentiometer)

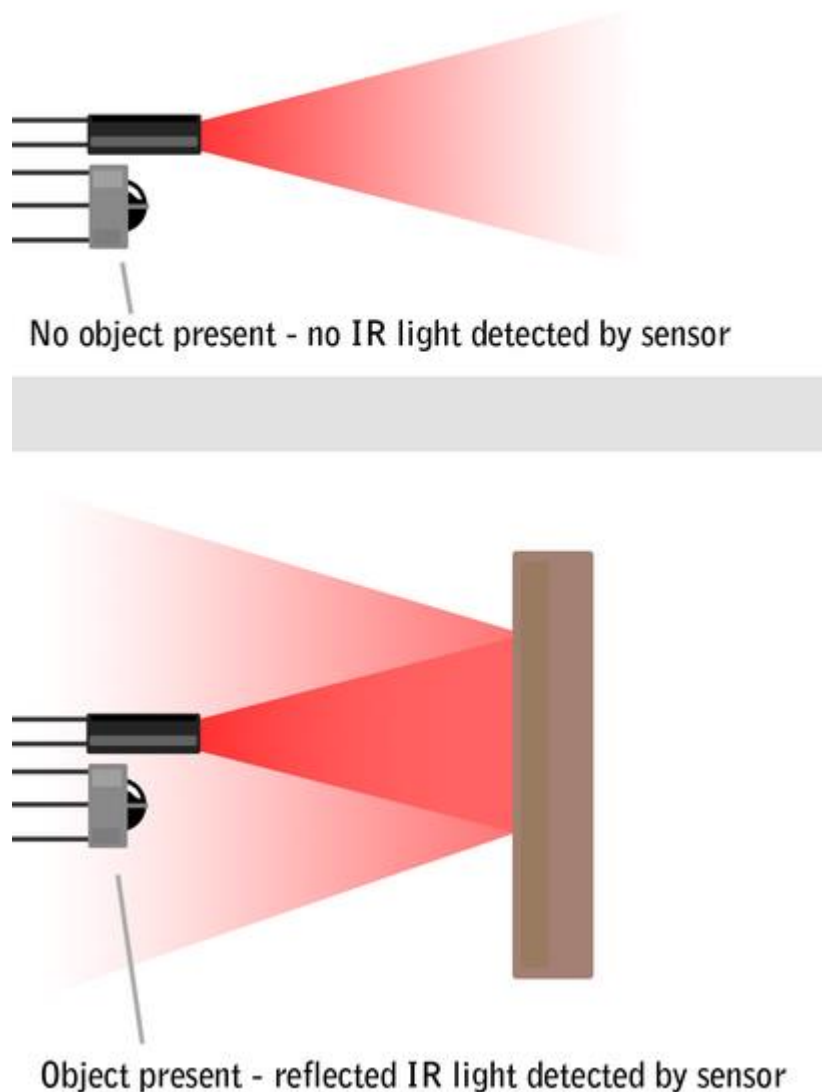
Current Consumption: at 3.3V : ~23 mA, at 5.0V: ~43 mA

Active output level: Outputs Low logic level when obstacle is detected

On board Obstacle Detection LED indicator

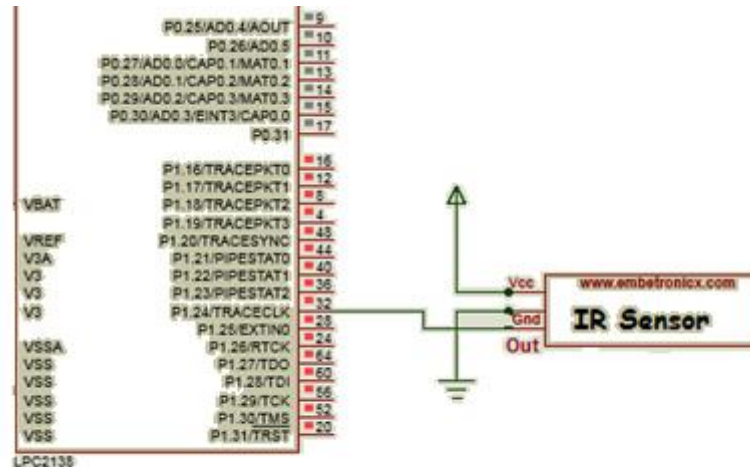
Working Principle of IR Obstacle Sensor

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. Infrared Transmitter is a light emitting diode (LED) which emits infrared radiations. Hence, they are called IR LED's. 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 photo diodes 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 LPC2148



Processor: -

1. Open Keil μ Vision from the icon created on your desktop.
2. Create a new project on Kiel with the appropriate name and destination.
3. Take a new text file and write the code in a text editor.
4. Save the text file with ".c" extension.
5. add ".c" file to source group and check errors and warnings.
6. change the target options and create a hex file.
7. Now open flash magic to burn hex file into the development board.
8. Connect the hardware circuit and Connect your development Board to the USB port of your computer.
9. In the flash-magic window select the target device, serial port, board rate, and hex file.
10. Click on the start button to burn the hex file to the development board.
11. after uploading press the reset button and check the output.

Source Code:

/* object available \rightarrow ir output is logic 0 no object \rightarrow ir output is logic 1
 turn on lamp for logic 0 turn off lamp for login 1
 if object is available turn on lamp other wise turn off lamp*/

```
#include<lpc21xx.h>
#define lamp 0x00000001 //P0.0
#define ir_pin 0x00000002 //P0.1
int main(){
    IODIR0|=lamp;
    while(1){
        if(((IOPIN0) & (ir_pin)) ==0){
            IOCLR0|=lamp;
        }
        else
            IOSET0|=lamp;
    }
}
```

Result: - When detecting any object in front of this sensor the led should be on. Otherwise led should be turn off.