Lab Manual for Embedded System Design

Lab No. 10

Inter- Integrated Circuit (I2C) Interfacing

Objectives

Understanding the basic concept of Inter integrated Circuit Interfacing and implementation of concepts on Arduino UNO and IDE

LAB # 10
Inter- Integrated Circuit (I2C) Interfacing

Introduction

As the name suggests, Inter-IC (or the Inter-Integrated Circuit), often shortened as I2C (pronounced eye-two-see), I2C (pronounced eye-squared-see), or IIC, was developed as a communication protocol to interact between different ICs on a motherboard, a simple internal bus system. It is a revolutionary technology developed by Philips Semiconductor (now NXP Semiconductors) in 1982, and is used to connect low speed peripherals (like keyboard, mouse, memory, IO/serial/parallel ports, etc.) to the motherboard (containing the CPU) operating at much higher speed.

These days you can find a lot of devices which are I2C compatible manufactured by a variety of companies (like Intel, TI, Freescale, STMicroelectronics, etc). Somewhere around the mid-1990s, Intel devised the SMBus protocol, a subset of I2C with strict protocols. Most modern day I2C devices support both, I2C and SMBus with little reconfiguration.

Time Boxing

Activity Name	Activity Time	Total Time
Login Systems + Arduino & Proteus	3 mints + 5 mints	8 mints
Walk through Theory & Tasks	60 mints	60 mints
Implement Tasks	80 mints	80 mints
Evaluation Time	30 mints	30 mints
	Total Duration	178 mints

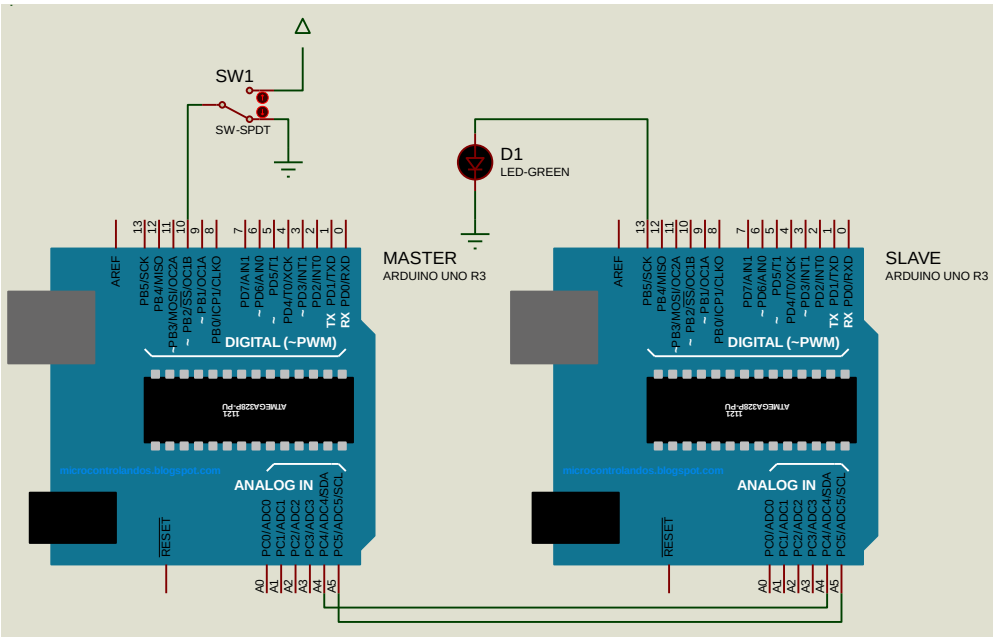
Objectives

This Lab exercise delivers the idea/concept of:

- Understand the purpose/ advantage of using Arduino UNO
- Understand use of inter integrated Interfacing.

Lab Tasks/Practical Work

1. In this task we will control the LED on Slave Arduino using SPDT switch on Master Arduino through I2C communication.



Coding (Master Arduino)

```
#include <Wire.h>
int x = 0;
void setup() {
  // Start the I2C Bus as Master
  Wire.begin();
  pinMode(10,INPUT);
}
void loop() {
  x = digitalRead(10);
  Wire.beginTransmission(2); // transmit to device #2
  Wire.write(x);              // sends x
  Wire.endTransmission();    // stop transmitting
}
```

Coding (Slave Arduino)

```
#include <Wire.h>
int LED = 13;
int x = 0;
void setup() {
  // Define the LED pin as Output
  pinMode (LED, OUTPUT);
  // Start the I2C Bus as Slave on address 2
  Wire.begin(2);
  // Attach a function to trigger when something is received.
  Wire.onReceive(receiveEvent);
}
void receiveEvent(int bytes) {
  x = Wire.read();    // read one character from the I2C
}
void loop() {
  //If value received is 0 blink LED for 200 ms
  if (x == 1) {
    digitalWrite(LED, HIGH);
  }
  Else
{
  digitalWrite(LED,LOW);
}
}
```

2. Develop a Program which provide the use of Inter integrated 12C Interface programming.