Interfacing a Ultrasonic/Accelerometer to the A/D Converter Module

Objective

This project provides a simple program to convert the input analog signal into digital binary signal, and display the digit reading on a 10-bit LED display at the end of the conversion. The input analog signal can be coming from an Ultrasonic or an 3-axis Accelerometer Sensor.
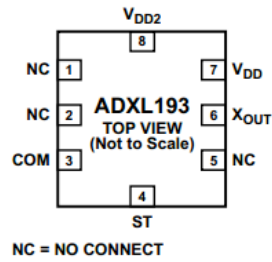
Requirements

The following hardware and software

Hardware	Software
- Breadboard - Assorted Jumper Wires - PIC18F45K20 microcontroller - PICKIT 3 programmer - Ultrasonic Sensor - Accelerometer Sensor 10 leds	- MPLAB X v2.20 - XC8(v1.33) compiler for MPLAB X - Digi-key Scheme-it

Functional Descriptions

In order to convert the analog signal from Ultrasonic/ Accelerometer Sensor into equivalent digital binary signal, we need initialize the bits in three control registers ADCON0, ADCON1, and ADCON2 to meet the specified parameters. It is also required to set the Bit1-GO/DONE-of ADCON0 to start a conversion. When GO/DONE is reset, it indicates the completion of the conversion. At the end of the conversion, the program saves the 10-bit conversion reading in registers ADRSL and ADESH. The last step is displaying the 10-bit conversion reading on LED1 to LED10 from LSB to MSB.

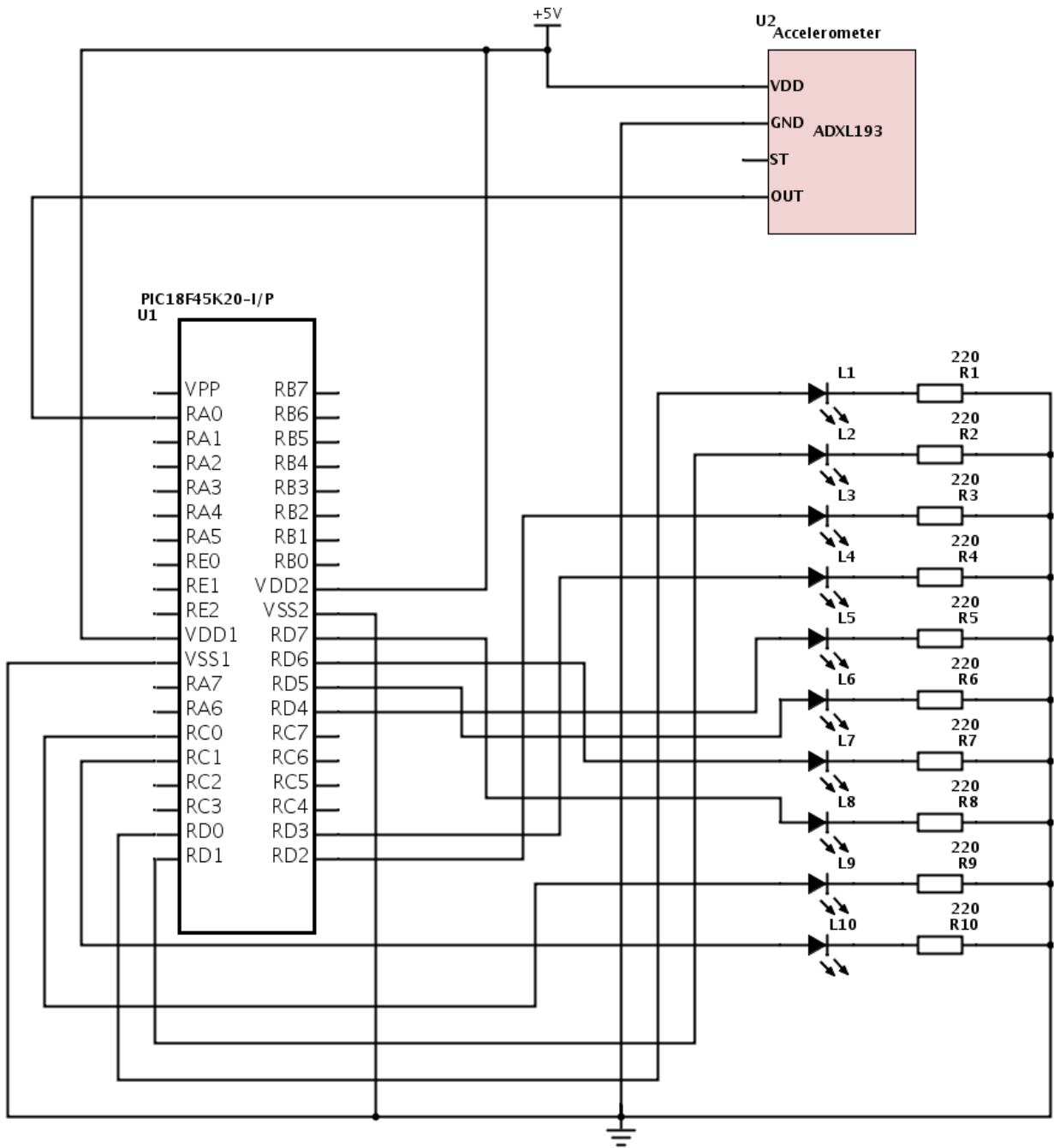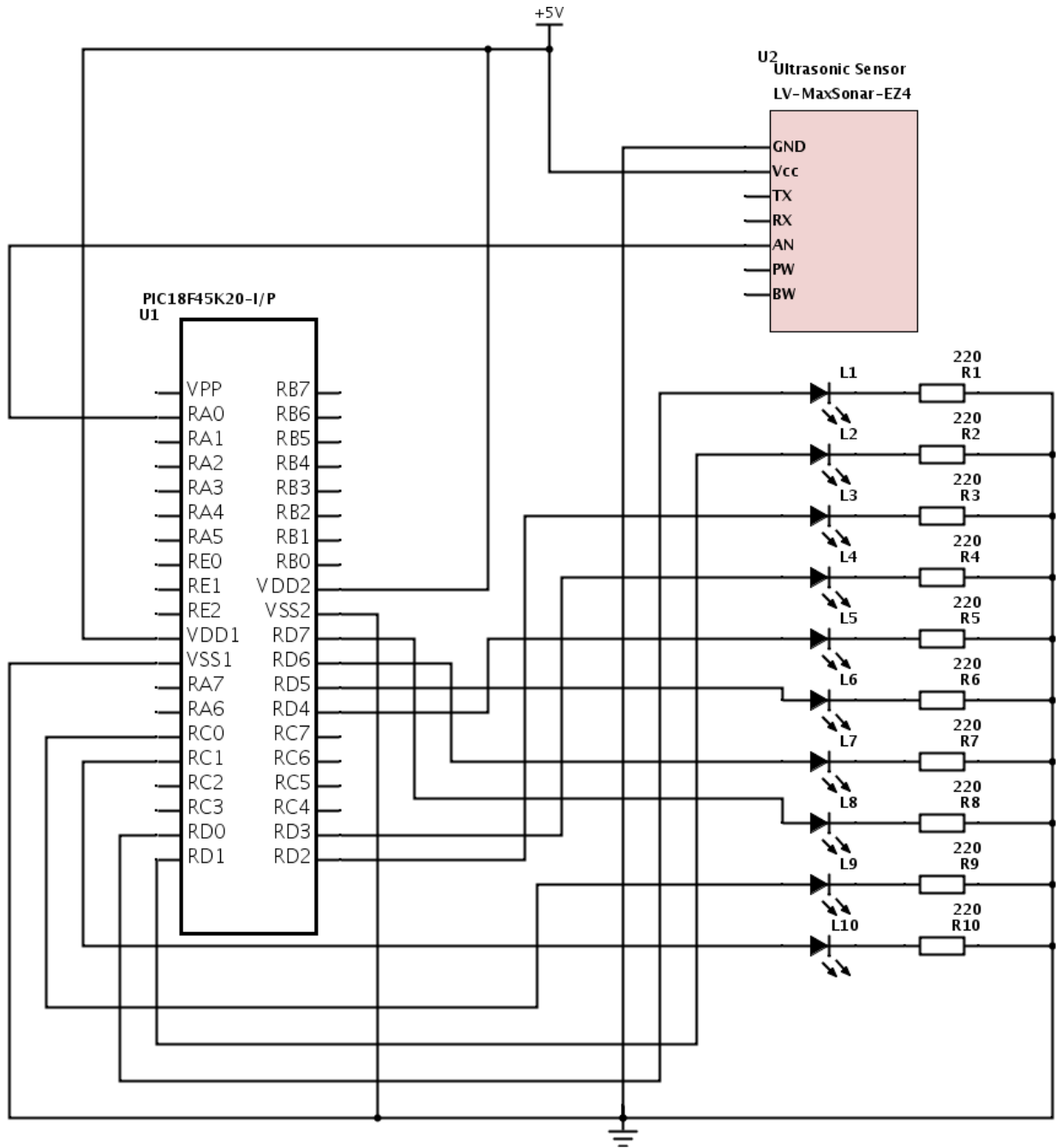## Pin configuration and function descriptions of ADXL193 Accelerometer Sensor

Pin No.	Mnemonic	Description
1	NC	Do Not Connect
2	NC	Do Not Connect
3	COM	Common
4	ST	Self-Test
5	NC	Do Not Connect
6	X_{OUT}	X Channel Output
7	V_{DD}	3.5 V to 6 V
8	V_{DD2}	3.5 V to 6 V

LV-MaxSonar -EZ4 Pin Out

- **GND** – Return for the DC power supply. GND (& Vcc) must be ripple and noise free for best operation.

- **Vcc** – Operates on 2.5V - 5.5V. Recommended current capability of 3mA for 5V, and 2mA for 3V.

- **AN** – Outputs analog voltage with a scaling factor of (Vcc/512) per inch. A supply of 5V yields ~9.8mV/in. and 3.3V yields ~6.4mV/in. The output is buffered and corresponds to the most recent range data.

Schematic

References:

1. Fundamentals of Microcontrollers and Applications in Embedded Systems with PIC Microcontrollers -- Ramesh S. Gaonkar
2. PIC18F45k20 data sheet
3. https://www.sparkfun.com/datasheets/Sensors/Accelerometer/ADXL193.pdf
4. http://maxbotix.com/documents/MB1040_Datasheet.pdf