# ECSESS RoboElectronics

ADC and IR Distance sensor build

# Goals for Today

- Add the adc.lpp and adc.h files to your MPLab X project
- Connect the SHARP distance sensor to power and the PIC16F88
- Write a function to read the distance sensor using the ADC and return a value
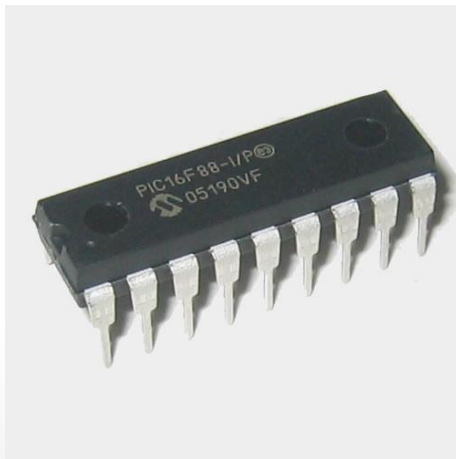- Use the debugger function on MPLab X to find the value of the distance sensor

# Next Week

- Motor control using H-Bridges

# Required Material

- Circuit
  - PIC16F88
  - PicKit3
  - Yellow LED
  - Blue LED
  - 100, 150 ohm resistor
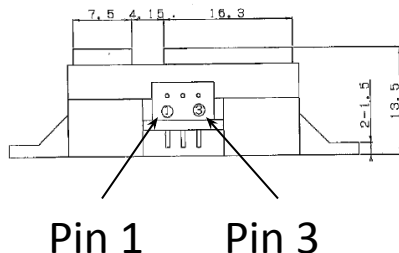  - a capacitor

- Robot
  - IR Sensor

# SHARP Distance Sensor



- The SHARP distance sensor uses an infrared beam to determine if an object is in its field of view
  - The sensor can measure a distance between 4cm and 30cm
  - It does this by varying a voltage on a pin
  - The device also needs to be powered

Connector signal

| | Signal name |
|---|---|
| ① | V o |
| ② | G N D |
| ③ | V c c |



Pin 1    Pin 3

Absolute maximum ratings

| Parameter | Symbol | Ratings |
|---|---|---|
| Supply voltage | Vcc | -0.3 to +7 |
| Output terminal voltage | Vo | -0.3 to Vcc+0.3 |

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# Computing distance from bits

- Once you convert the bit value of the ADC to a voltage, you will need to convert it to a distance
- The SHARP datasheet gives a curve that relates distance to voltage
- There is also a curve that gives the inverse relationship between distance and voltage
- You will have to decide what factor and math to use to get a distance
  - Note, only use **integer** math. Do not use floats
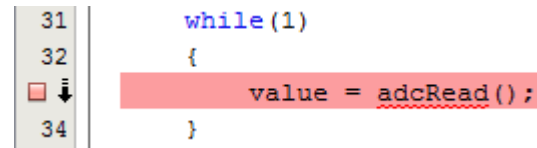  - Avoid divides at all costs
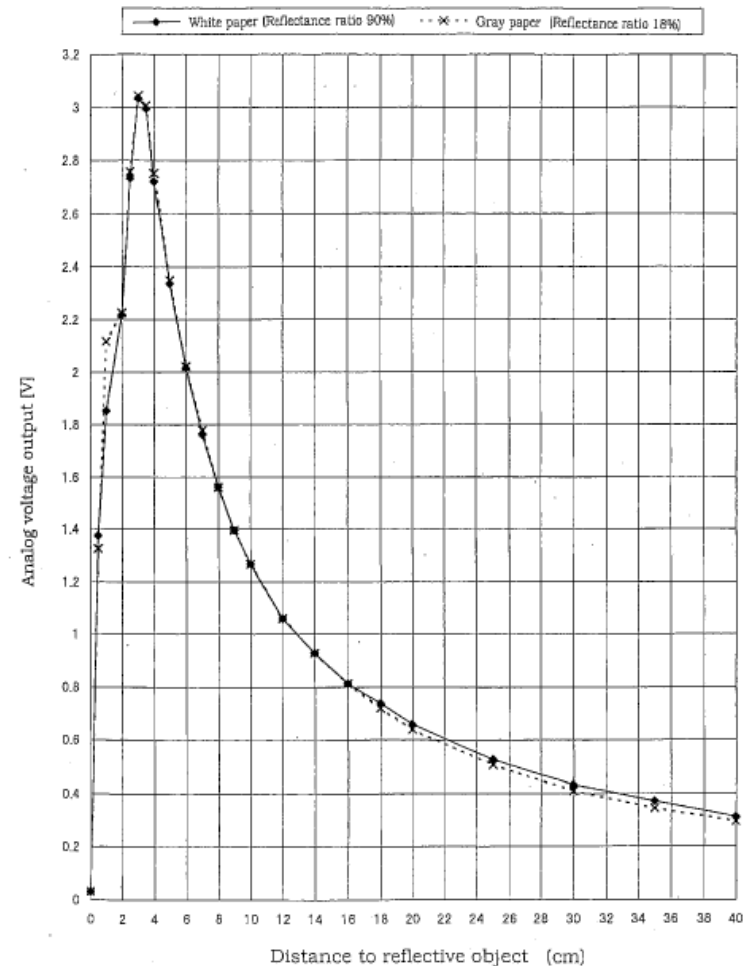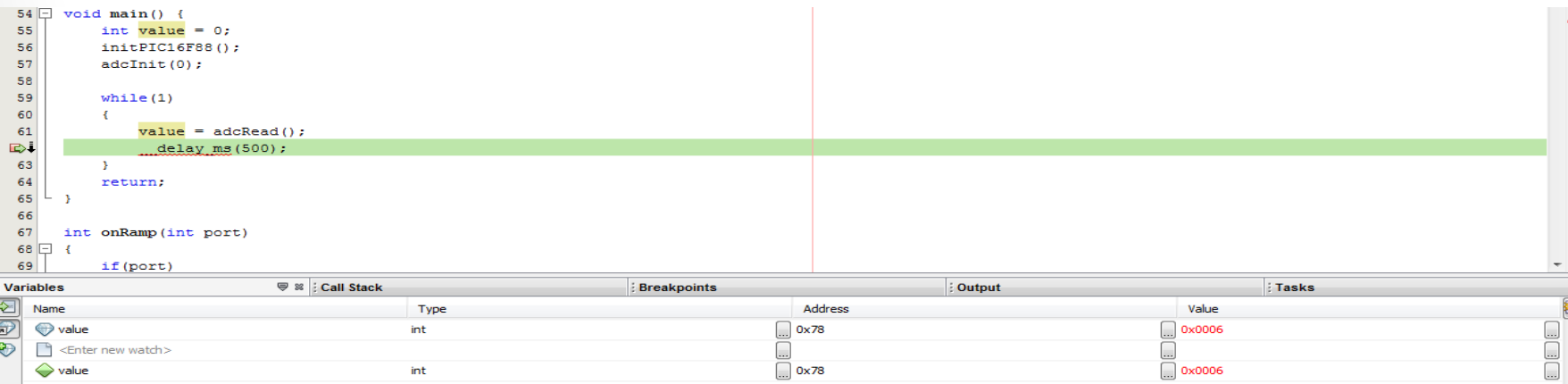
# Debugging in MPLabX IDE

- Debugging allows us to see what values have been returned by an operation.
- We insert a breakpoint at a specific point in our code where we want to stop the program and look at a specific value.
- You can use the watch window to see the value of variable you are debugging



Debug Button on far right



Breakpoint in red on left

```
54  void main() {
55      int value = 0;
56      initPIC16F88();
57      adcInit(0);
58
59      while(1)
60      {
61          value = adcRead();
            delay_ms(500);
63      }
64      return;
65  }
66
67  int onRamp(int port)
68  {
69      if(port)
```

| Variables | | Call Stack | | Breakpoints | | Output | | Tasks | |
|---|---|---|---|---|---|---|---|---|---|
| Name | | Type | | Address | | | | Value | |
| value | | int | | 0x78 | | | | 0x0006 | |
| <Enter new watch> | | | | | | | | | |
| value | | int | | 0x78 | | | | 0x0006 | |

# Circuit to Build