Ultrasonic Range Sensor Module Interfacing

Embedded Real-Time Systems Lab
Indian Institute of Technology-Bombay

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Agenda for Discussion

1. Introduction to Ultrasonic Sensor
2. MB 1310 Sensor Module
   - About MB 1310 Sensor Module
3. Mounting and Interfacing Ultrasonic Sensor
   - Procedure for mounting
   - Servo pod connections
4. Calibration
   - Calculating scaling factor
5. C Code

What is an Ultrasonic Sensor

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- ✓ These sensors are mostly used for applications that include object detection and ranging. They are used in applications such as humidifiers, sonar, medical ultra sonography, burglar alarms, park assist technology, etc.

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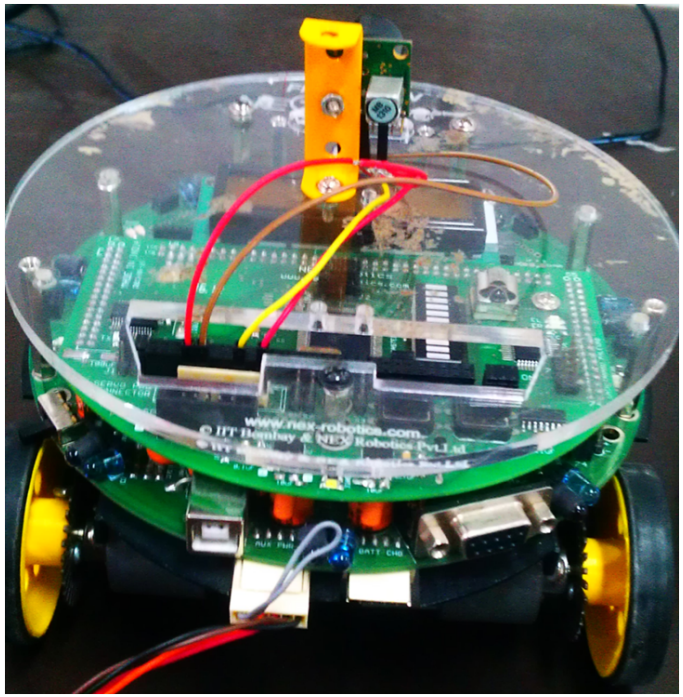
8. The Vcc and GND pins are respectively connected to the supply voltage 5V and ground.

Mounting of Ultrasonic sensor



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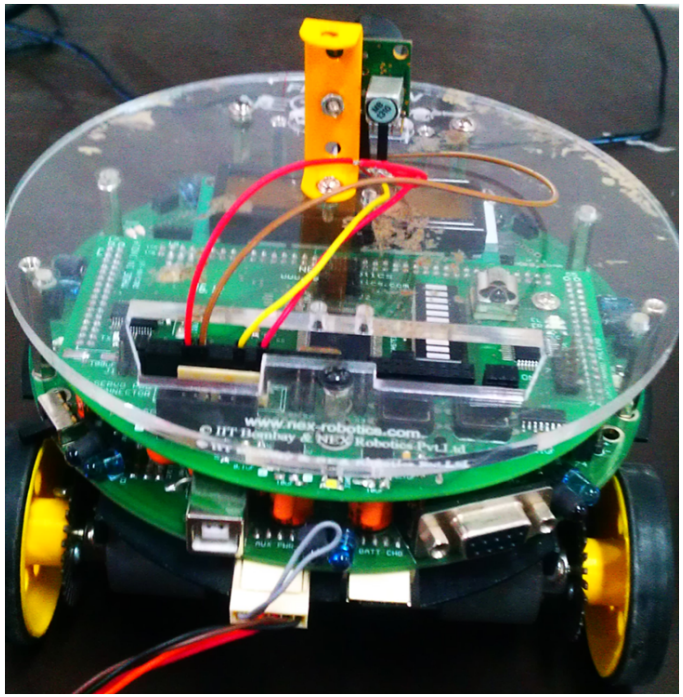

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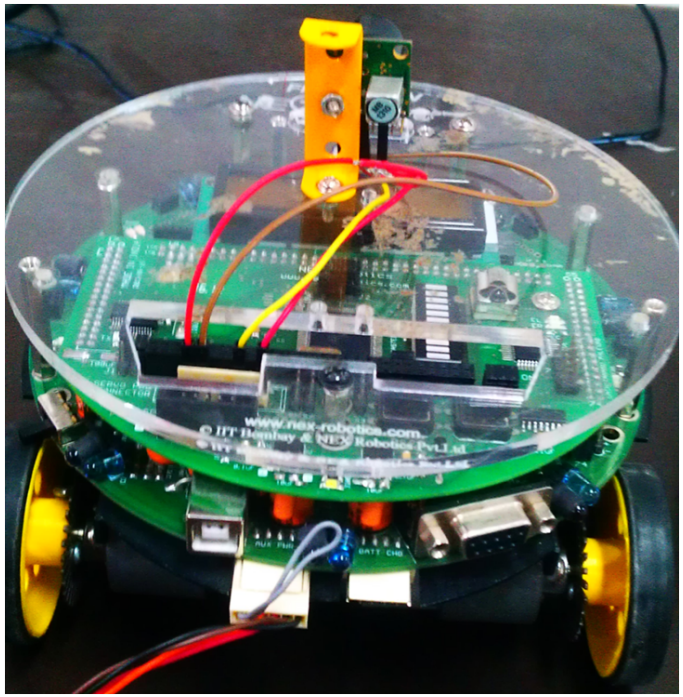

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2. The pin-out connections are then given to the servo pod pins given on our FireBird V.

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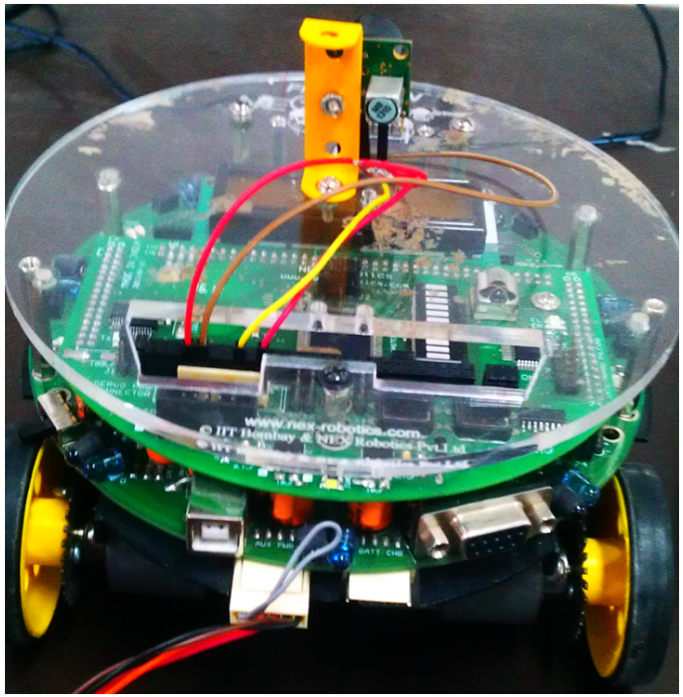

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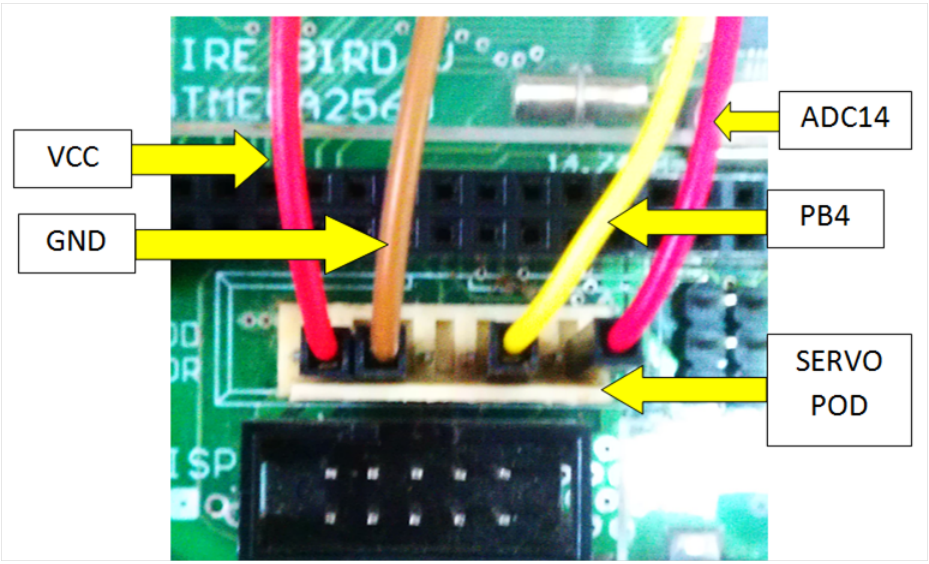
3. The interfacing connections are given in the picture next slide.

Servo pod connections



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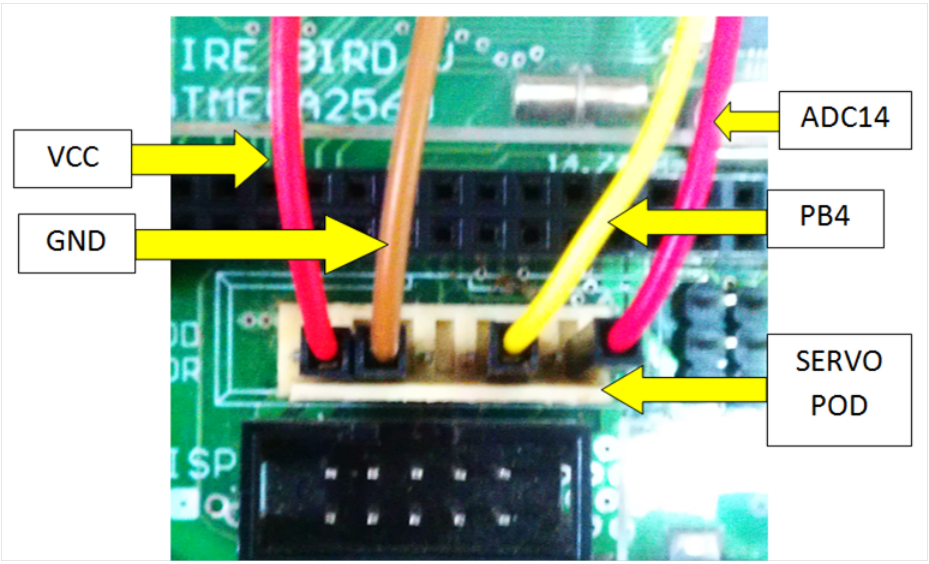

1. Pin 1: ADC14 connected to analog input (pin 3) of ultrasonic sensor.

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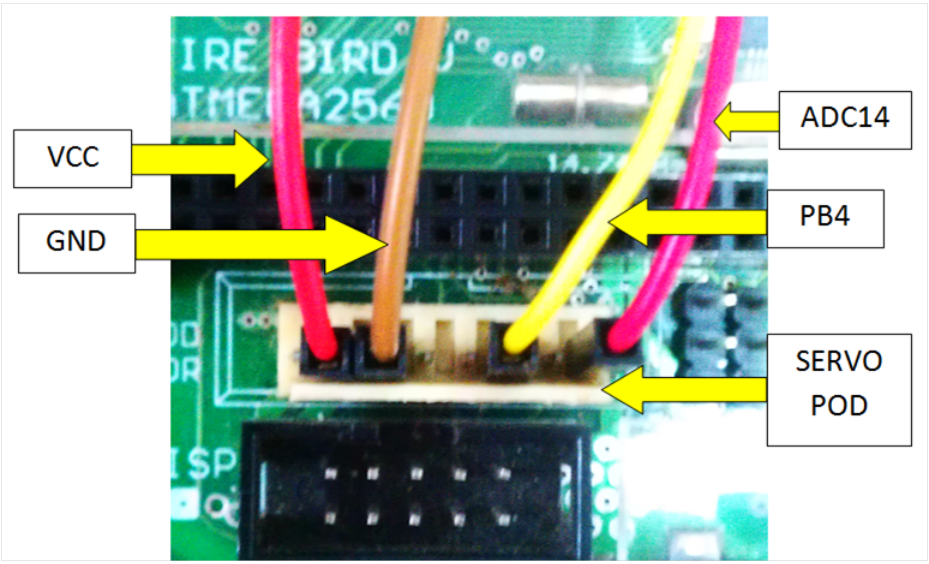

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2. Pin 6: GND of the ultrasonic sensor.

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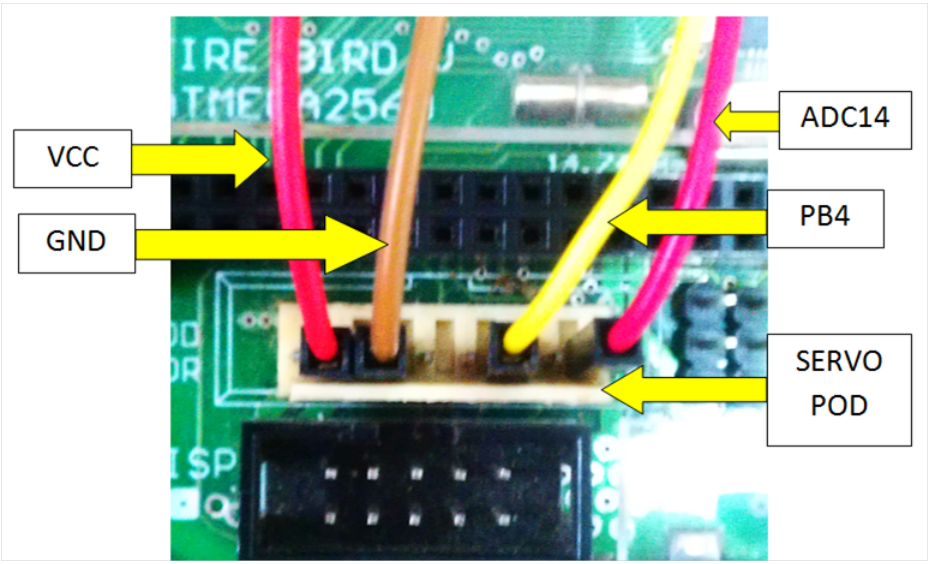

1. Pin 1: ADC14 connected to analog input (pin 3) of ultrasonic sensor.
2. Pin 6: GND of the ultrasonic sensor.
3. Pin 7: Supply Voltage Vcc of the ultrasonic sensor.

Calibration

MB 1310 outputs analog voltage with a scaling factor of $(Vcc/1024)/cm$.

$$Supply\ Voltage = 5V$$

$$Scaling\ factor = 5/1024 = 4.88mV/cm$$

ATMEGA 2560 ADC resolution for the 10 bit ADC it uses

$$Resolution = Vcc/(2^n) = 5/1024$$

$$= 4.88mV/ADCStep$$

$$Distance\ in\ cm = ADCSteps * (4.88/4.88)$$

$$= ADC * 1$$

$$Scaling\ Factor = 1$$

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