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Javelin Application Note

Using the Devantech SRF04 Ultrasonic Range Finder

Introduction

The Devantech SRF04 ultrasonic range finder provides precise, non-contact distance measurements from about 3 cm (1.2 inches) to 3 meters (3.3 yards). It is very easy to connect to the Javelin, requiring only two I/O pins. The SRF04 library makes this device very simple to use and is an ideal component for Javelin robotics applications.

Library Classes Used

- SRF04.java

Background

The SRF04 works by transmitting an ultrasonic (well above human hearing range) pulse and measuring the time it takes to "hear" the pulse echo. Output from the SRF04 is in the form of a variable-width pulse that corresponds to the distance to the target.

Program Explanation

This program is very simple. It starts by creating an SRF04 object with the trigger output on pin 0 and the echo input on pin 1. A string buffer is created that will be used to display distance measurements in the Javelin message window and an integer variable is used to hold measurements from the SRF04.

The program then loops, requesting and displaying the data (about twice per second) from the five methods available in the SRF04 class: getRaw(), getIn(), getIn10(), getCm and getMm. The getIn10() method returns a value that is expressed in tenths of inches.

Each measurement is checked to make sure it is in range (greater than zero). If so, the value is displayed; otherwise an "Out of Range" message will be displayed. The process is straightforward for each measurement. The getIn10() method requires an extra step because the value is in tenths of inches. The tenths value is divided by ten to get the whole part, then the modulus operator is used to extract the fractional part. A decimal point is inserted between for clarity.

Code Listing

```
// Devantech SRF04 Ultrasonic Range Finder demonstration program
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// -- Updated: 21 July 2002

/*  SRF04 connections:
 *
 *  Trigger --> Javelin.P0
 *  Echo    --> Javelin.P1
 */

import stamp.core.*;
import stamp.peripheral.devantech.SRF04;

public class demoSRF04 {

  final static char CLR_SCR = '\u0010';

  public static void main() {

    // create SRF04 object (trigger on P0, echo on P1)
    SRF04 range = new SRF04(CPU.pin0, CPU.pin1);
    // create message buffer for screen display
    StringBuffer msg = new StringBuffer();
    // measurement from SRF04
    int distance;

    while (true) {
      // create and display measurement message
      msg.clear();
      msg.append(CLR SCR);
      msg.append("SRF04 Demo\n\n");

      // display raw return
      distance = range.getRaw();
      msg.append("Raw  = ");
      if (distance > 0)
        msg.append(distance);
      else
        msg.append("Out of Range");
      msg.append("\n");

      // display whole inches
      distance = range.getIn();
      msg.append("In   = ");
      if (distance > 0)
        msg.append(distance);
      else
        msg.append("Out of Range");
      msg.append("\n");

      // display fractional inches
      distance = range.getIn10();
```
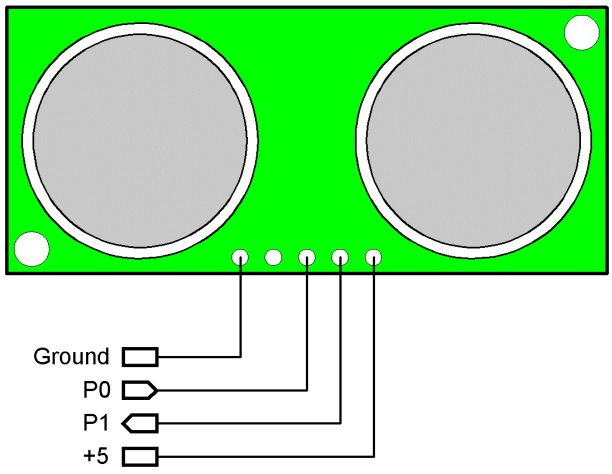

```
      msg.append("In10 = ");
      if (distance > 0) {
        msg.append(distance / 10);    // whole part
        msg.append( ".");
        msg.append(distance % 10);    // fractional part
      }
      else
        msg.append("Out of Range");
      msg.append("\n");

      // display centimeters
      distance = range.getCm();
      msg.append("cm   = ");
      if (distance > 0)
        msg.append(distance);
      else
        msg.append("Out of Range");
      msg.append("\n");

      // display millimeters
      distance = range.getMm();
      msg.append("mm   = ");
      if (distance > 0)
        msg.append(distance);
      else
        msg.append("Out of Range");
      msg.append("\n");

      System.out.print(msg.toString());

      // wait 0.5 seconds between readings
      CPU.delay(5000);
    }
  }
}
```

Schematic



Sources

- Acroname (North America)
  http://www.acroname.com

- Devantech (Europe)
  http://www.robot-electronics.co.uk

Reference Documents and Information

- Acroname SRF04 user manual

- Devantech
  http://www.robot-electronics.co.uk

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