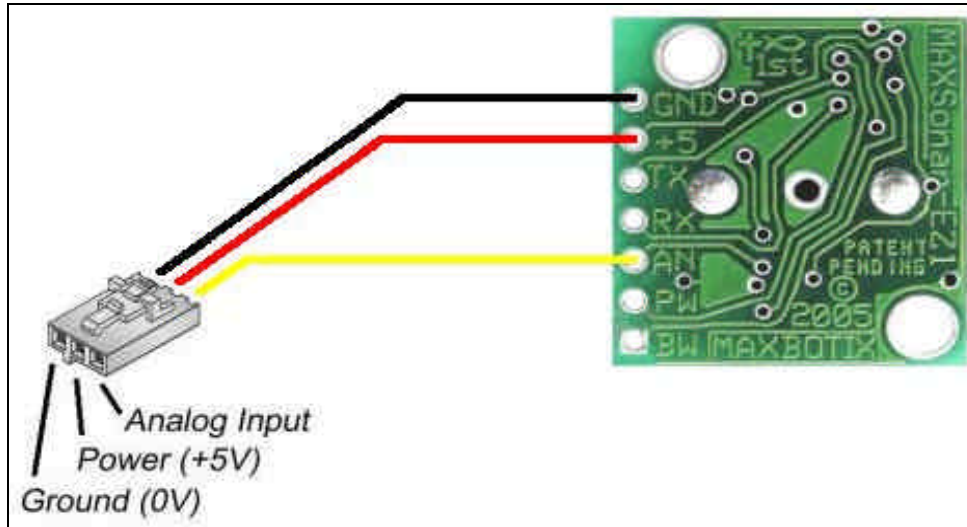


# Tutorial:

## Using the MaxSonar-EZ1 and LV-MaxSonar-EZ1 with the Phidgets 8/8/8 Interface Kit

The MaxSonar-EZ1 is a very compact and versatile ultrasonic distance sensor. It outputs range information in three forms: TTL serial, PWM, and 0V-2.5V analog. This tutorial will concentrate on using the Phidgets 8/8/8 Interface Kit to read the analog output of one EZ1 sensor and multiple EZ1 sensors.

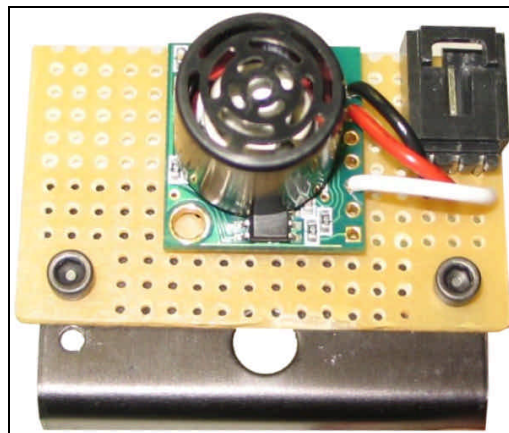
### Connecting One Sensor



Basic connections between EZ1 and analog connector

When using only one EZ1 sensor, you can connect the three wires of a Phidgets analog sensor cable directly to the ground, power, and analog terminals on the sensor. See the above graphic for details.

We went a step further by mounting the sensor and a female connector on a piece of prototype board, which in turn was bolted to a sensor bracket.



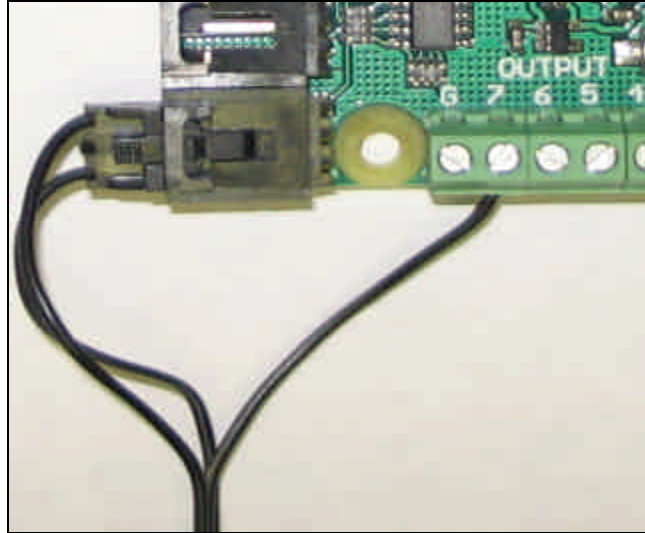
Our prototype sensor assembly

When the sensor's serial lines are not in use, the sensor goes into a continuous run mode in which it senses the range every 49 ms and outputs a continuous analog signal representing the distance on a scale of 10 mV per inch. This works great if you're only using one sensor.

## Connecting Multiple Sensors

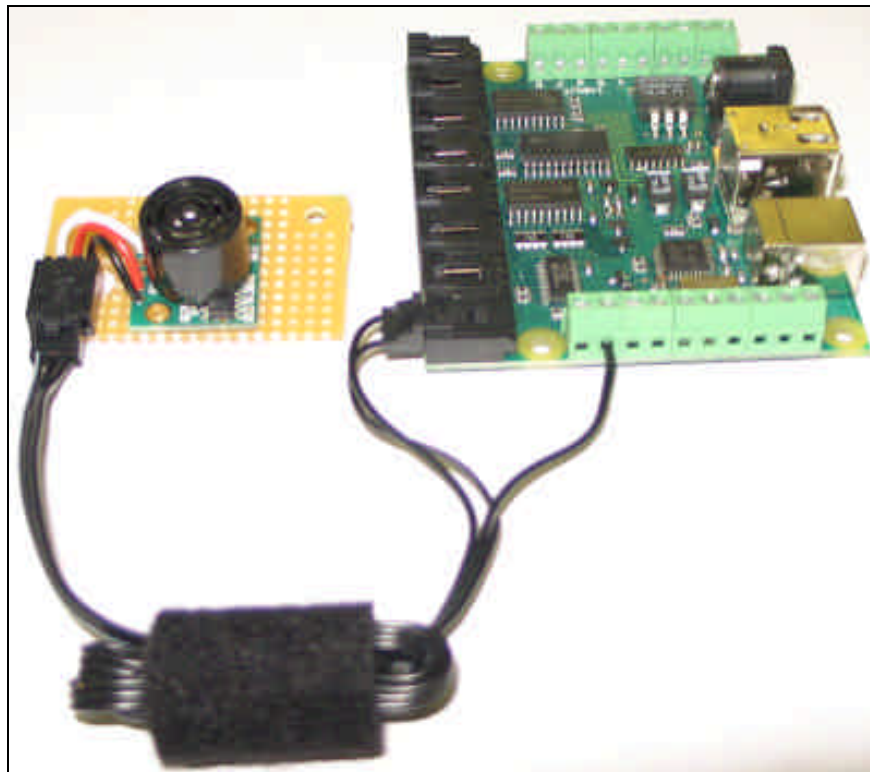
Multiple sensors firing simultaneously will suffer from cross-talk (even if they're pointing in different directions, sometimes). It all depends on the acoustics of the area you're working in, so the sensors have to be pulsed on and off in sequence so that only one is running at a time.

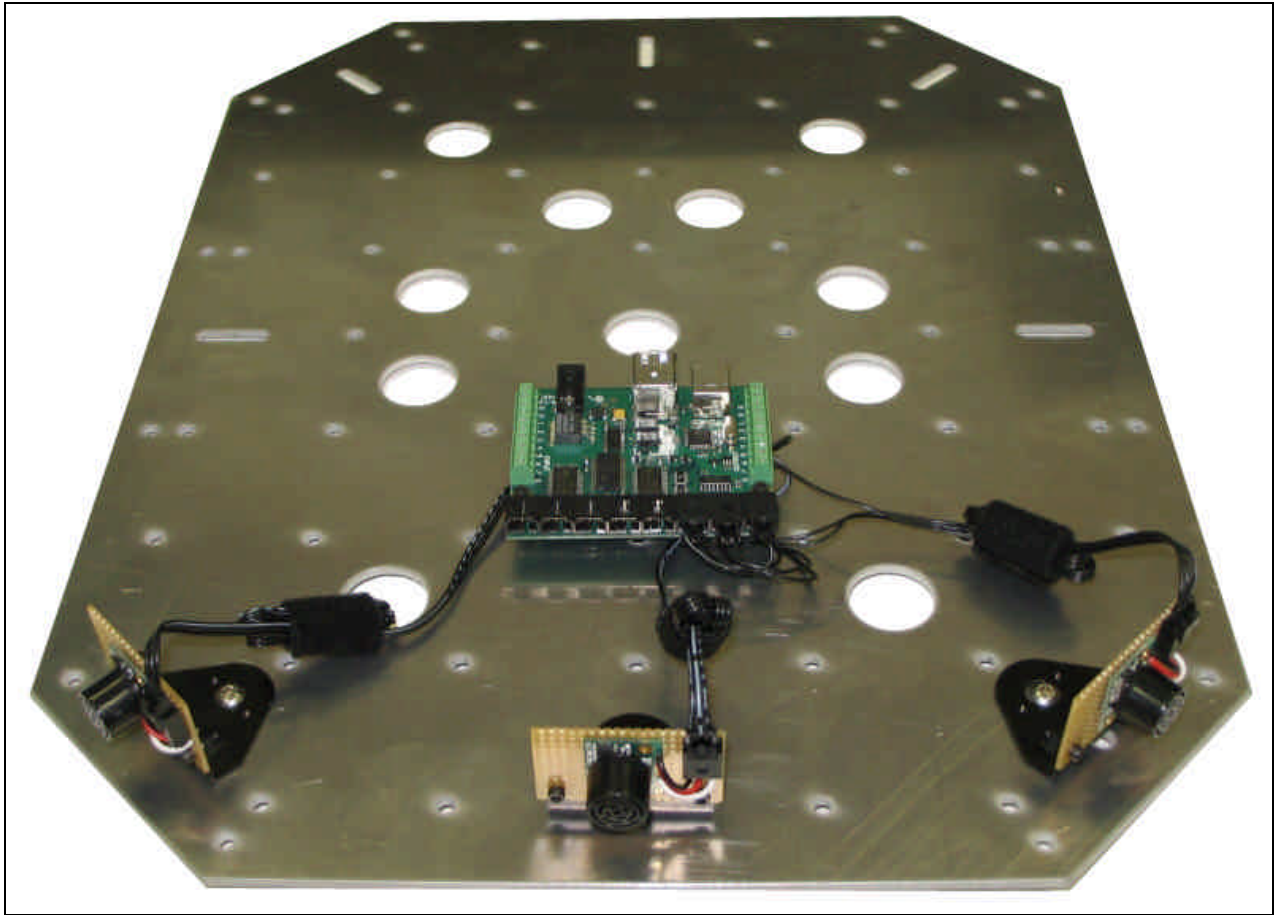
There is no way to turn sensors on and off using only the analog ports on the 8/8/8. Fortunately, the sensors can be driven by the 8/8/8's 5V digital outputs. By cutting the center wire in the sensor cable and running that wire to a digital output, you now have an analog sensor with full on/off control.



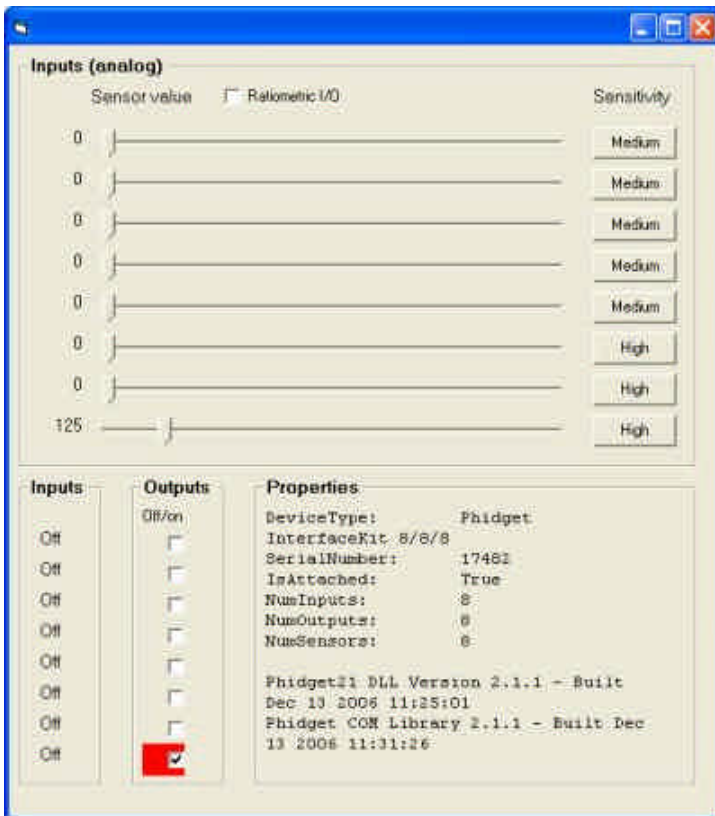
Analog connector with rerouted power lead

As you can see in the above picture, the power lead has been severed and rerouted to digital output #7. This technique could also come in handy for saving energy in a battery-powered system by switching off sensors when they aren't being used.





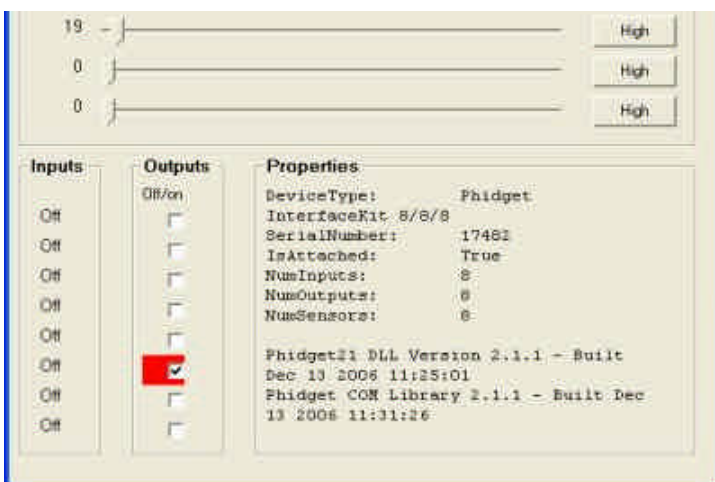
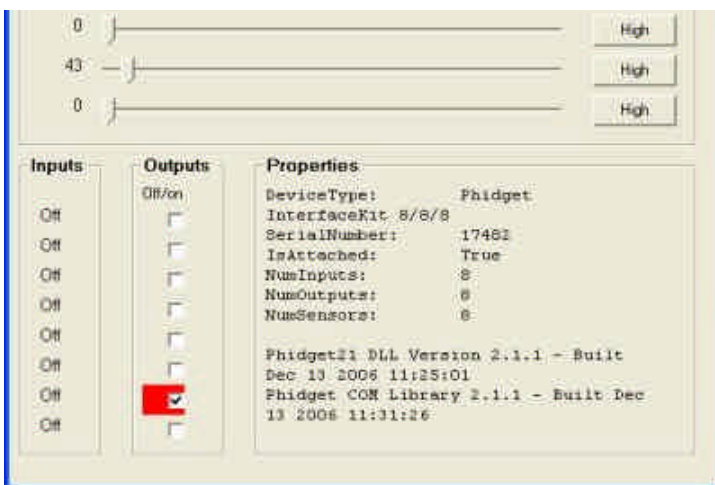
A 3-sensor array mounted on a Trossen Robotics prototype deck.



The switching action, though not automated in this example, can be demonstrated using the Phidget Interface Kit example software (interfacekit-controller.exe). Sensors are connected to analog inputs 5, 6, and 7; and they are driven by digital outputs 5, 6, and 7.

Knowing that the sensors are pointed straight forward and 45 degrees to the left and right, you can get a rough idea of the robot's surroundings. There is an object about a foot away from the front right sensor, and enough room to the front and front left to maneuver around it.

Up to eight sensors can be connected to an 8/8/8, and the interface boards can be daisy-chained using the USB hubs built into each board.



## Parts List



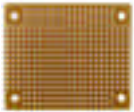
8/8/8 Interface Kit

<http://www.trossenrobotics.com/store/p/3202-InterfaceKit-8-8-8.aspx>



LV-MaxSonar-EZ1

<http://www.trossenrobotics.com/store/p/4871-LV-MaxSonar-EZ1.aspx>



Medium Perf Board

<http://www.trossenrobotics.com/store/p/3518-Medium-Solderable-Perf-Board.aspx>



Board Mounting Analog Jack

<http://www.trossenrobotics.com/store/p/3464-Board-Mounting-Analog-Jack.aspx>



24" Sensor Cable

<http://www.trossenrobotics.com/store/p/3260-24-Inch-Sensor-Cable.aspx>



Sensor Bracket

<http://www.trossenrobotics.com/store/p/3263-Servo-IR-Sensor-Bracket.aspx>