

# Measure Water Level with a DiosPro

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**Figure 1**

While working on an article for Nuts and Volts magazine I was experimenting with detecting water levels in a container. The system I used in the article was digital and designed to detect a particular level in a water dish. The method presented here is an analog and while it is more complicated it can tell you the particular level in a container.

What's cool about the methods that I have been using is that the sensors go on the outside of the container so there is no need to insert probes or devices in the water.

What we do is create a giant capacitor of sorts. A 3.3Mhz pulse is sent out through pad a sensor pad. The water becomes a conductor and transmits the signal to a second pad. Using one of the DiosPro AtoD ports we measure the level of the signal that makes it through.

## **Sensor Construction**

Probably the most difficult aspect of this experiment is building the sensor pads.

The sensor pads are built using foil tape. This the kind of tape used in HVAC systems. One side is a conductive metal and the other side has a very strong adhesive.

The first step is to cut off an 8" section then split into two sections. Don't make the strips exactly the same. Cut one of them slightly thinner as shown in Figure 2.



**Figure 2**

Next take a section of solid wire and strip about 4" from one end. Lay the wire on the larger foil strip as shown, foil side up as shown in Figure 3.



**Figure 3**

Take the thinner strip and remove the adhesive backing and attach it to the larger foil section covering the section of wire as shown in Figure 4.



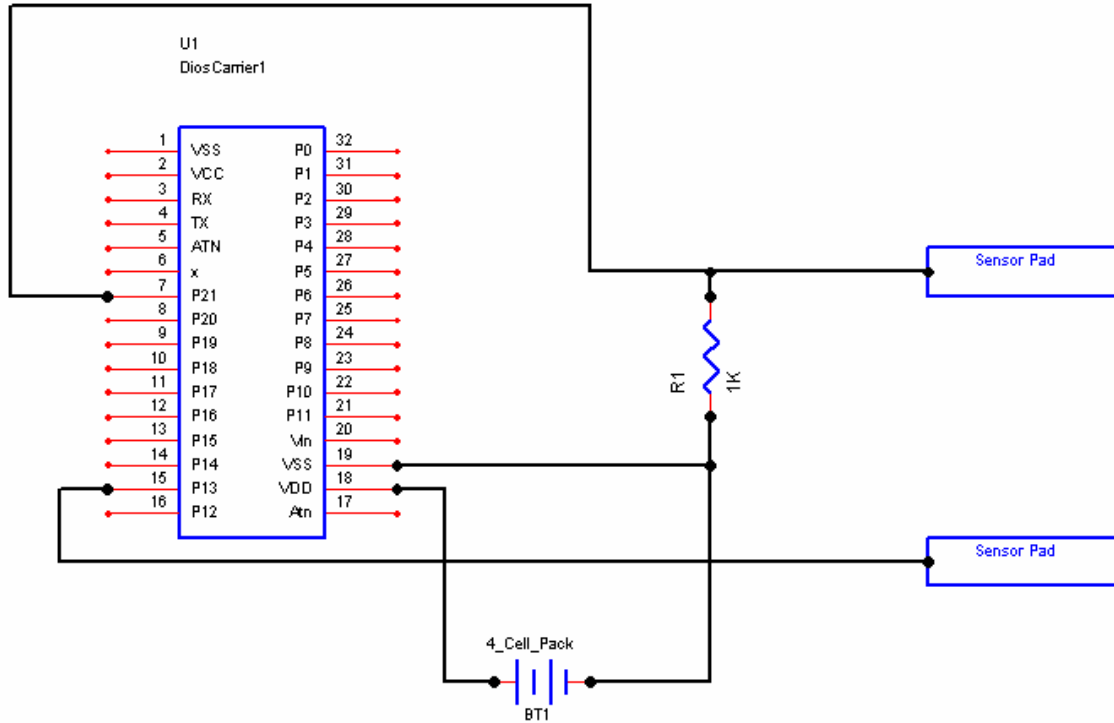
**Figure 4**

Attach the two strips to a glass or plastic container as shown in Figure 5. I recommend using some cellophane tape to hold the sensor pads in place for your experiments. If you use the adhesive on the pad you will not be able to remove them without destroying the sensor.



**Figure 5**

Schematic 1 shows how to connect the sensors to the DiosPro. While I show a Dios Carrier 1 you can use any of the Dios Boards or chips.



**Schematic 1**

## The Program

The heart of Program 1 is the GetWaterLevel function. Remember that the 3.3Mhz is a series of pulses. We need to make sure we don't take a reading at a low point in the signal.

The following line is used to make sure this does not happen.  
`if tval< 10 then goto loop2`

At the very beginning of the program I set up the hardware PWM generator to create the 3.3Mhz signal.

```

DiosPro
'-----
'Water Level Test Program
'-----
func main()

  'Set up a very high frequency pulse
  PWMinit(1)
  PWMcourse(0)
  PWMperiod(2)
  PWMlduty(1)

```

```

'Set up 1 AtoD port
AtoDinit(14)

dim x as integer
loop:
  x = GetWaterLevel()
  print "---->",x

  goto loop

endfunc

'-----
func GetWaterLevel() as integer
  dim tval as integer
  dim vals(6) as integer
  dim x as integer

loop2:
  tval=AtoD(0)
  'print tval
  if tval< 10 then goto loop2
  exit tval

endfunc

include \lib\DiosAtoD.lib
include \lib\DiosHWPWM.lib

```

### Program 1

## Final Thoughts

Keep in mind that placing your hand near the pads will skew the reading. Reducing the size of the pads will elevate some of this but also reduce sensitivity. The best thing to do is to experiment

## Links

Kronos Robotics

<http://www.kronosrobotics.com/xcart/customer/home.php>

Dios Carrier 1

<http://www.kronosrobotics.com/xcart/customer/product.php?productid=16170>

DiosPro 28

<http://www.kronosrobotics.com/xcart/customer/product.php?productid=16429>

EZRS232 Driver

<http://www.kronosrobotics.com/xcart/customer/product.php?productid=16167>

Dios WorkBoard Deluxe

<http://www.kronosrobotics.com/xcart/customer/product.php?productid=16452>

DiosPro 40

<http://www.kronosrobotics.com/xcart/customer/product.php?productid=16168>