# Description and photos of the control

A pressure sensor couldn't be considered a tangible control within itself, it needs to receive a certain input in order to be able to provide output that can then be harnessed into controlling components.

For this control I will use a project that measures the amount of water in a vessel:

<http://www.practicalarduino.com/projects/water-tank-depth-sensor>

In order to create changes the pressure given to the sensor must change.

There is a large variety of pressure sensors (http://www.mouser.com/search/refine.aspx?N=10834212). They vary regarding

* Its use (industrial or otherwise)
* The amount of pressure they have to resist
* The sensibility (a lot of them are used for safety applications)
* The way they are mounted and their size
* The materials they are made of (a lot of them are required to resist corrosion)

For this control I will be using the MPX2010DP sensor since online documentation shows there is a considerable ease of use with the Arduino microcontroller.

"The MPX2010 silicon piezoresistive pressure sensors provide a very accurate and linear voltage output directly proportional to the applied pressure. These sensors house a single monolithic silicon die with the strain gauge and thin film resistor network integrated. The sensor is laser trimmed for precise span, offset calibration and temperature compensation.

Features

• Temperature Compensated over 0°C to +85°C

• Ratiometric to Supply Voltage

• Differential and Gauge Options

• Available in Easy-to-Use Tape & Reel" (<http://www.nxp.com/assets/documents/data/en/data-sheets/MPX2010.pdf>)

Other components in the control are:

* LM324 op-amp
* 100nF capacitor
* 1k ohm resistor
* 22k ohm resistor
* Arduino Uno

# Link to source for purchase

Both the sensor and the LM324 I got from mouser electronics <http://www.mouser.com/ProductDetail/NXP/MPX2010DP/?qs=N2XN0KY4UWUZAyVjnqwQiQ%3D%3D&gclid=CLvDoru0pNICFdlXDQod17oACA> , they also provide other pressure sensors in the MPX2010 line, as well as other pressure sensors from different lines.

They have a next day delivery option, but do not guaratee delivery (a problem I had with them)

# Link to data sheet

http://www.mouser.com/ds/2/302/MPX2010-783435.pdf

<http://www.ti.com/lit/ds/symlink/lm324.pdf>

http://pdf.datasheetcatalog.net/datasheet2/9/0oa8seftq8d6peigox0lrx6e9wwy.pdf

# Description of example uses

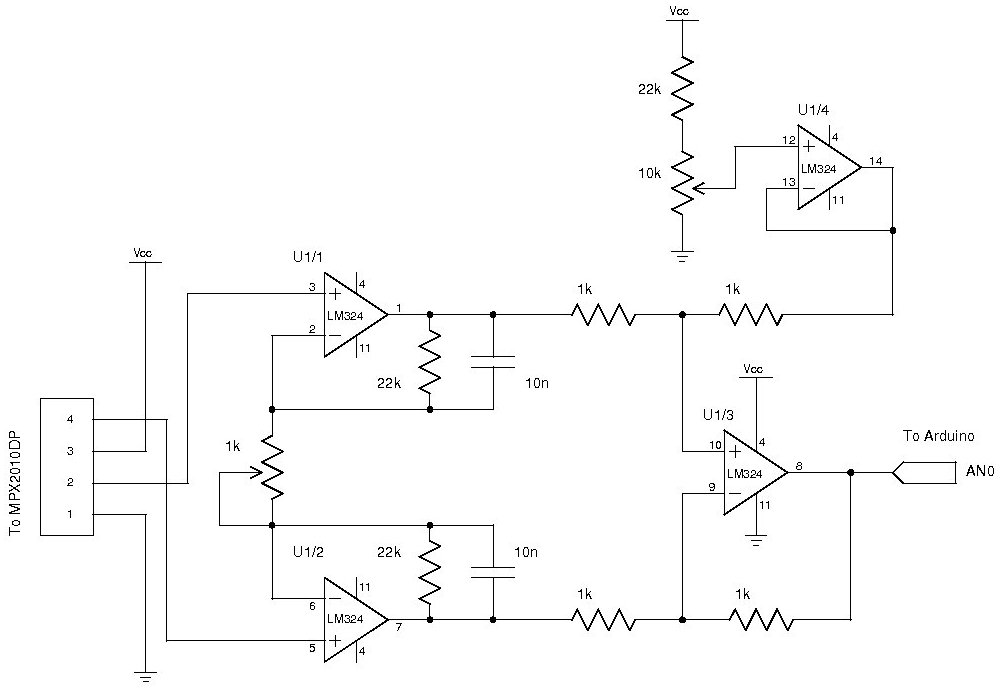
The control’s readings need to be perfect in order to understand its possibilities. (ongoing)

# Analysis of strengths or weaknesses

Weaknesses

* The sensor I picked is the one with two nozzles because it is a differential pressure sensor[[1]](#footnote-1), this made it really hard to install
* Like any other sensor its readings need to be calibrated to the environment in which it is working, and that proves to be a very tricky task in this sensor
* Since the tension is also controlled by the LM324, the complexity of calibration grows

# Example circuit schematic to use the control



# Example microcontroller code to use the control

/\*\*

\* WaterTankDepthSensor

\*

\* Uses an analog input to read the level of water in a tank using a

\* differential pressure transducer, with the result displayed in serial line

\*

\* Copyright 2009 Jonathan Oxer <jon@oxer.com.au>

\* Copyright 2009 Hugh Blemings <hugh@blemings.org>

\* http://www.practicalarduino.com/projects/water-tank-depth-sensor

\*/

int sensorValue = 0;

int constrainedValue = 0;

int tankLevel = 0;

int TANK\_SENSOR;

#define TANK\_EMPTY 0

#define TANK\_FULL 1023

void setup() {

// Enable Serial output and ask WiServer to generate log messages (optional)

Serial.begin( 9600 );

}

/\*\*

\* Main program loop. everything is handled by callbacks

\* in the object itself. Nothing much happens

\*/

void loop(){

sensorValue = analogRead(A0);

constrainedValue = constrain( sensorValue, TANK\_EMPTY, TANK\_FULL );

tankLevel = map( constrainedValue, TANK\_EMPTY, TANK\_FULL, 0, 100 );

Serial.print ("Tank Value");

Serial.println (sensorValue);

}

# Any construction drawings you made for laser cutting, CNC, etc.

# Citation of all example code or example drawings or documentation that you learned from or used

1. This sensor measures the difference between two pressures, one connected to each side of the sensor. Differential pressure sensors are used to measure many properties, such as pressure drops across [oil filters](https://en.wikipedia.org/wiki/Oil_filter) or [air filters](https://en.wikipedia.org/wiki/Air_filter), fluid levels (by comparing the pressure above and below the liquid) or flow rates (by measuring the change in pressure across a restriction). Technically speaking, most pressure sensors are really differential pressure sensors; for example a gauge pressure sensor is merely a differential pressure sensor in which one side is open to the ambient atmosphere.( https://en.wikipedia.org/wiki/Pressure\_sensor) [↑](#footnote-ref-1)