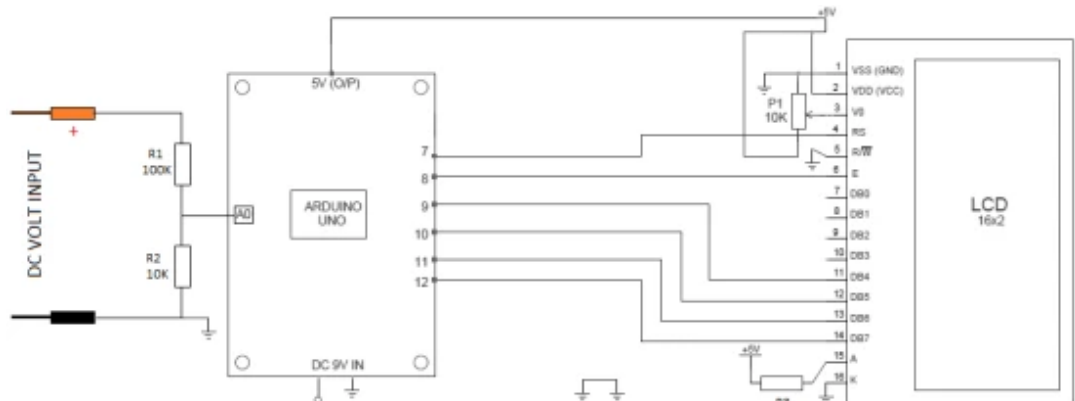



```
/*
DC Voltmeter
An Arduino DVM based on voltage divider concept
T.K.Hareendran
*/
#include
LiquidCrystal lcd(7, 8, 9, 10, 11, 12);
int analogInput = 0;
float vout = 0.0;
float vin = 0.0;
float R1 = 100000.0; // resistance of R1 (100K) -see text!
float R2 = 10000.0; // resistance of R2 (10K) - see text!
int value = 0;
void setup(){
  pinMode(analogInput, INPUT);
  lcd.begin(16, 2);
  lcd.print("DC VOLTMETER");
}
void loop(){
  // read the value at analog input
  value = analogRead(analogInput);
  vout = (value * 5.0) / 1024.0; // see text
  vin = vout / (R2/(R1+R2));
  if (vin<0.09) {
    vin=0.0;//statement to quash undesired reading !
  }
  lcd.setCursor(0, 1);
  lcd.print("INPUT V= ");
  lcd.print(vin);
  delay(500);
}
```

Schematic of the Arduino DVM Circuit



(<https://www.electroschematics.com/wp-content/uploads/2013/12/arduino-digital-voltmeter-diagram.png>)

Parts

- Arduino Uno Board
- 100K Resistor
- 10K Resistor
- 100R Resistor
- 10K Preset Pot
- 16×2 Parallel LCD (Hitachi HD44780 driver compatible)

Share this:

Tweet Share 2 Share More

Previous
DIY Operational Amplifier
(<https://www.electroschematics.com/diy-operational-amplifier/>)

Next
Arduino Self Timer
(<https://www.electroschematics.com/arduino-self-timer/>)

Related Tutorials

No related posts.

Recent posts

- Arduino Ethernet (<https://www.electroschematics.com/arduino-ethernet/>)
- Laptop Battery Secrets – Part 1 (<https://www.electroschematics.com/laptop-battery-secrets-part-1/>)
- Musical Enuresis Alarm (<https://www.electroschematics.com/enuresis-alarm/>)
- Arduino LED Fader (<https://www.electroschematics.com/arduino-led/>)
- Workbench Li-ion Battery Charger (<https://www.electroschematics.com/li-ion-battery-charger/>)

65 Comments

Join the conversation!

You must be logged in (<https://www.electroschematics.com/log-in/>) to post a comment.

coltoncub3d

Sorry if the answer to this question is completely obvious, I am new to arduino and coding in general. So, the equation used to “decode” the input voltage to the Ao port on the arduino results in 0.0959 (about) from running it through a calculator with value = 1.8v (from 12v source) and R1 + R2 at the default values. Now, being that I don’t plan to use this code hooked up to an LCD display, I can’t really test this code for myself (though I assume it would work as advertised), though if it’s outputting variable vin, I would assume it would display “Input V = 0.0959.” How does it convert that number to the input voltage as shown in the pictures instead of the above value?

The reason I ask this is because I would like vin to equal the output voltage after the calculations as I plan to break the given number into 3 separate digits (using modulo). Would just multiplying the value variable by about 6.67 work instead, as this would essentially equal the input variable? (6.67 because the input to the Ao port = 1.8v, which 1.8*6.67 = the initial input voltage of 12)

Posted on January 24th 2017 | 2:27 am
(<https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-5/#comment-1902468>)

Log in to Reply
(https://www.electroschematics.com/wp-login.php?redirect_to=https%3A%2F%2Fwww.electroschematics.com/arduino-digital-voltmeter%2F)

T.K.Hareendran

@Coltoncub3d:

Please refer these lines in the loop
” value = analogRead(analogInput);
vout = (value * 5.0) / 1024.0; // see text
vin = vout / (R2/(R1+R2));
if (vin<0.09) {
 vin=0.0; ”

Roughly assume that the dc input voltage is 12V. Then output from the potential divider(R1–R2) is 1.09V, so that Ao can see 223.232. This results in a final display (vin) around 12.11V (1.09/0.09).

Since this is a quick maths, check it and feel free to revert with your comments. Sorry for my delayed response. Thanks!

Posted on February 21st 2019 | 3:03 am
(<https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-5/#comment-1903278>)

Log in to Reply
(<https://www.electroschematics.com/wp-login.php>)

hemanth7787

Precision voltage measuremt is still an issue if we dont have a precise voltage reference
<http://www.skillbank.co.uk/arduino/measure.htm>
(<http://www.skillbank.co.uk/arduino/measure.htm>)

Posted on September 29th 2016 | 6:10 pm
(<https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-5/#comment-1901280>)

Log in to Reply
(<https://www.electroschematics.com/wp-login.php>)

T.K.Hareendran

@hemanth7787: Not everything you’ll see on here will be polished final designs. Some of them are done quickly to solve an immediate demand, thus calls for some refinements. BTW thanks for the link!

Posted on February 21st 2019 | 3:09 am
(https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-5/#comment-1903279)

Log in to Reply
(https://www.electroschematics.com/wp-login.php?redirect_to=https%3A%2F%2Fwww.electroschematics.co
digital-voltmeter%2F)

goran-gustafssongmail-com

An extension of this project would be to divide the measuring range into smaller segments to better use the resolution in Arduino ADC. One can use a number of FET switches to automatically connect different resistances in the voltage divider. Starting with the largest area, eg 0–30 V. If this shows a very low measured value indicating, for example a voltage <3V, you can activate a smaller resistance in the voltage divider. The FET switches are controlled by Arduino's digital I / O pins.

Posted on August 18th 2016 | 10:35 am
(https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-5/#comment-1901211)

Log in to Reply
(https://www.electroschematics.com/wp-login.php?redirect_to=https%3A%2F%2Fwww.electroschematics.co
digital-voltmeter%2F)

TCPMeta

Here is the modified code for the Voltmeter to give your project a nice analog retro feel. I used the TVoutBeta1 library. All you need is are two resistors for the video and sync. I used 1K and 470ohm resistors like what the library examples on.

```
/*
DC Voltmeter
An Arduino DVM based on voltage divider concept
T.K.Hareendran
TVout port code by TCPMeta
Use a 1K resistor on pin 7
Use a 470 ohm resistor on Pin 9
Just follow the typical pinout for the TVout Library found everywhere on the net.
*/
#include
#include

TVout TV;
int analogInput = 0;
float vout = 0.0;
float vin = 0.0;
float R1 = 100000.0; // resistance of R1 (100K) –see text!
float R2 = 10000.0; // resistance of R2 (10K) – see text!
int value = 0;
void setup(){
  pinMode(analogInput, INPUT);
  TV.begin(NTSC,120,96);
  TV.select_font(font6x8);
  TV.println("////////////////");
  TV.println("// DC VOLTMETER //");
  TV.println("////////////////");
}
void loop(){
  // read the value at analog input
  value = analogRead(analogInput);
  vout = (value * 5.0) / 1024.0; // see text
  vin = vout / (R2/(R1+R2));
  if (vin<0.09) {
    vin=0.0;//statement to quash undesired reading !
  }
  TV.select_font(font8x8);
  TV.print(9,40,"Volts=");
  TV.println(vin);
  TV.select_font(font4x6);
  TV.println(9,85,"TVOut Port By TCPMeta");
  delay(500);
}
```

Posted on July 26th 2016 | 4:11 pm
(https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-5/#comment-1901165)

Log in to Reply
(https://www.electroschematics.com/wp-login.php?redirect_to=https%3A%2F%2Fwww.electroschematics.co
digital-voltmeter%2F)

TCPMeta

I modified the code to use the TVOut library since I don’t have a extra Liquid Crystal Display handy. Kinda tempted just for giggles to go buy one of those small portable B&W TVs from goodwill and slap the Arduino in it for a retro looking bench voltmeter.

Posted on July 23rd 2016 | 2:35 am
(https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-5/#comment-1901158)

Log in to Reply
(https://www.electroschematics.com/wp-login.php?redirect_to=https%3A%2F%2Fwww.electroschematics.co
digital-voltmeter%2F)

cmdgr

Great job! I am facing a great problem, so any advice or answer is needed. My project is almost identical with this one, however I need my results to be shown on the serial monitor. And if is it possible to have two voltmeter on one Arduino. I failed to have my results on the serial monitor and that's the most important for me. Please anyone who has an idea answer me!!!!

Posted on July 17th 2016 | 1:27 am
(https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-5/#comment-1901140)

Log in to Reply
(https://www.electroschematics.com/wp-login.php?redirect_to=https%3A%2F%2Fwww.electroschematics.co
digital-voltmeter%2F)

More

Mike Dodd

secondcitysaintsamigmail,

I don't think that this is a 328 offset issue. I'm wondering if you have ripple on your power supply that's confusing the ADC and the sample/hold circuitry inside the 328.

What's the reading with the input tied to ground (i.e. 0V) If that's 0, or as close as makes no difference, then it's not an offset.

What's the reading with a new(ish) 9V battery connected to the input? Let's take the power source out of the equation as a currently unknown (to me, at least) entity.

Alternative, you can connect the +5V supply on the Arduino to the input/R1 – you should get a value of 5/(25+5) = 1/6th of 5V, or 0.83V.

Do you have a DMM to verify the input voltage to the analogue inputs to the Uno?

Posted on April 25th 2016 | 3:07 pm
(https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-5/#comment-1899935)

Log in to Reply
(https://www.electroschematics.com/wp-login.php?redirect_to=https%3A%2F%2Fwww.electroschematics.co
digital-voltmeter%2F)

secondcitysaintsamigmail-com

I'm sorry. I should have explained my problem in details.

I am trying to make my Arduino to work as an online multimeter. At the beginning, I'm trying to make it a voltmeter.

I've done exactly the same as the tutorial, with three exceptions:

- 1) I'm not using an LCD monitor.
- 2) I'm using R1 = 25 kilo-ohms and R2 = 5 kilo-ohms.
- 3) I'm trying to make it an online voltmeter, so there is an Ethernet shield attached to it.

The problem is, whenever I'm giving about 3-4 volts DC input to the circuit, I'm watching on the serial monitor that the Arduino has measured 10-11 volts! When the input voltage is 10-11 volts, the serial monitor shows 16-17 volts. Whenever I give the maximum input of 27 volts (my power source is old, so does not reach the 30 volts maximum), the serial monitor is showing 28 volts!

So, I think that there is an offset in the ATmega328 which I need to remove.

Could you please help?

Thanks in advance.

Posted on April 25th 2016 | 2:34 pm
(https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-5/#comment-1899933)

Log in to Reply
(https://www.electroschematics.com/wp-login.php?redirect_to=https%3A%2F%2Fwww.electroschematics.co-digital-voltmeter%2F)

Mike Dodd

The Arduinio ground should be tied to the analogue ground of the circuit under test. If it is, then you shouldn't have any significant offset.

Your question, related to 10k is a bit ambiguous, I'm assuming you've got a 10k potentiometer between AREF and GND, with the wiper connected to an analogue input?, if so, then measure with an accurate meter the wiper voltage – you might well find that it doesn't sweep completely between GND and AREF (most pots should do – a few specialist ones won't) – just make sure you're not chasing a ghost. But, if the wiper hits 0V, and the analogue ground is connected to Arduino GND, then you should be able to read 0 (+/- a couple of bits).

“exact voltage”. Define exact?, lets save +/-1 lsb at 5VDC nominal AREF, then with 10 bit ADC that's +/- 5/1024 or around +/-5mV resolution / accuracy – that's the limit you can expect, but parasitic effects on the circuitry will degrade that. you should expect to get within +/-20mV with no difficulty.

If you have an offset voltage (resulting in an offset reading) then you could simply remove the Arduino ADC reading at “0” position, from the actual reading – that would remove the offset in software.

Posted on April 23rd 2016 | 4:49 pm
(https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-5/#comment-1899877)

Log in to Reply
(https://www.electroschematics.com/wp-login.php?redirect_to=https%3A%2F%2Fwww.electroschematics.co-digital-voltmeter%2F)

secondcitysaintsamigmail-com

Hello.

Thanks a lot for this useful post.

I have one question.

When 0 volt is applied on an analog pin of Arduino, still we get a value.

For this, I can't get the exact voltage across 10K resistance.

What is the technique to remove this offset voltage?

Any help would really be highly appreciated.

Posted on April 23rd 2016 | 4:38 pm
(https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-4/#comment-1899876)

Log in to Reply
(https://www.electroschematics.com/wp-login.php?redirect_to=https%3A%2F%2Fwww.electroschematics.co-digital-voltmeter%2F)

View More
(https://www.electroschematics.com/arduino-digital-voltmeter/comment-page-2/#comments)

ASPCORE NETWORK

PRODUCTS:	NEWS & ANALYSIS:	DESIGN:	TOOLS:	GLOBAL NETWORK	FOR ADVERTISERS
Electronic Products (https://www.electronicproducts.com/)	EE Times (https://www.eetimes.com/)	EDN (https://www.edn.com/)	EEWEB (https://www.eeweb.com/)	EE Times Asia (https://www.eetasia.com/)	Contact Sales (https://aspencore.com/contact-us/)
Datasheets.com (https://www.datasheets.com/)	EE Times Europe (https://www.eetimes.eu/)	Electronics-Tutorials (https://www.electronics-tutorials.ws/)	PartSim (https://www.partsim.com/)	EE Times China (http://www.eet-china.com/)	Media Guide Request (https://aspencore.com/media-guide-request/)
EEM.com (https://www.eem.com)	Power Electronic News (https://www.powerelectronicsnews.com/)	Planet Analog (https://www.planetanalog.com/)	Product Advisor (http://www.transim.com/iot/)	EE Times India (https://www.eetindia.co.in/)	
TechOnline (https://www.techonline.com/)	EBN (https://www.ebnonline.com/)	Embedded (https://www.embedded.com/)	Schematics.com (https://www.schematics.com/)	EE Times Taiwan (https://www.eettaiwan.com/)	
	Elektroda.pl (https://www.elektroda.pl/)	Embedded Know How (http://www.embedded-know-how.com/)	Engage (https://www.transim.com/Products/Engage)	EE Times Japan (http://eetimes.jp/)	
		Electronics Know How (http://electronics-know-how.com/)		EDN Asia (https://www.ednasia.com/)	
		Embedded Central Europe (http://www.embedded-control-europe.com/)		EDN Taiwan (https://www.edntaiwan.com/)	CONNECT WITH US
		Embedded News (http://embedded-news.tv/)		ESM China (http://www.esmchina.com/)	Facebook (https://www.facebook.com/aspencoregroup)
		IOT Design Zone (http://iot-design-zone.com)		EDN China (http://www.ednchina.com/)	Twitter (https://twitter.com/AspenCoreGroup)
		Motor Control Design (http://motor-control-design.com/)		EDN Japan (http://ednjapan.com/)	

(https://aspencore.com/)