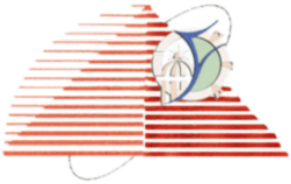
Fayoum University
Faculty of Engineering



Computer and Systems Department
3rd year
Course :
Lab and Measurements **ECE310**

AVR multimeter

By:

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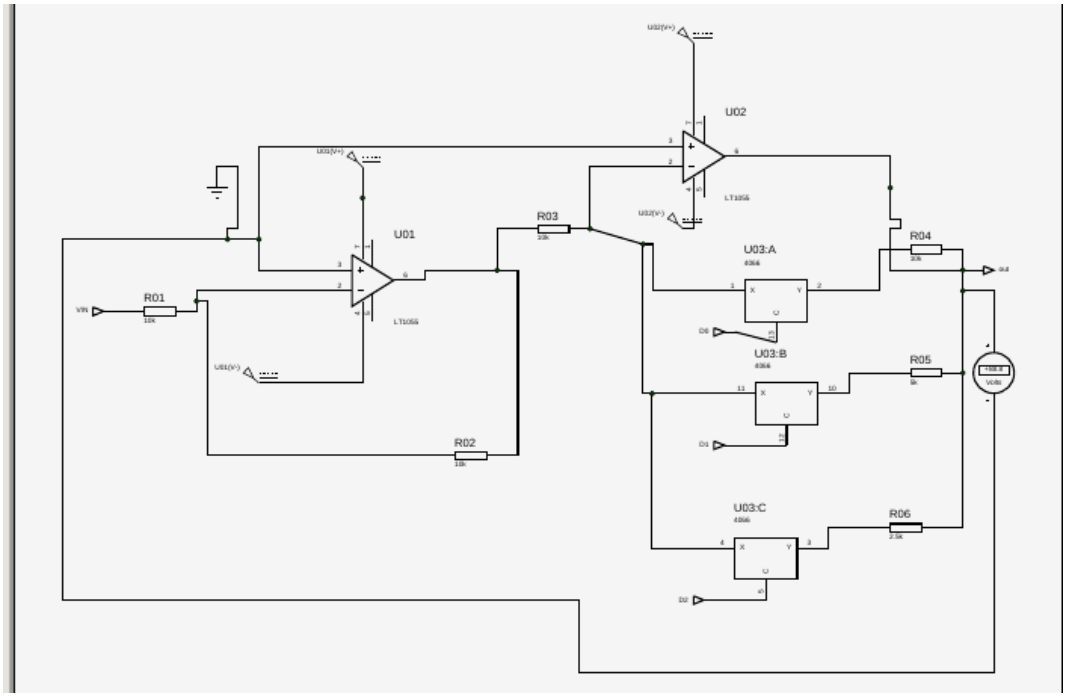
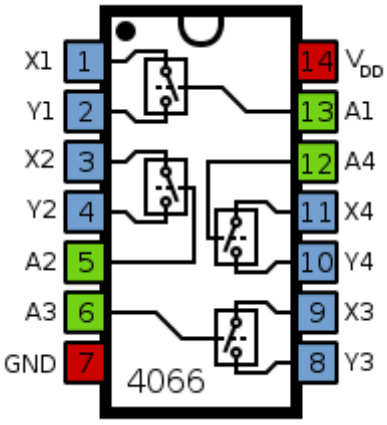
Supervisor: Dr. Ahmed Mostafa

multimeter with AVR

Theory

- to measure current shunt resistor connected to convert current to voltage
  - Current=VOLTAGE/100(shunt resistor)
- to measure higher than 5 volts we used that circuit
  - voltage is minimized by using op amp with selecting right gain (rf/rin)
    - gain =1 for signal between (0:5)V
    - gain =0.5 for signal between (5:10)V
    - gain =0.25 for signal between (0:20)V
  - selecting gain done with **cd4066 ic**





  - start looping around pins of VOLTAGE_GAIN block from one that gives smallest to largest gain

- if measured voltage larger than the value that can be measured by next pin loop exits to save ADC pin from damage

Application

- using ADC pin 0 voltage can be measured
- PB0,PB1 are configured to pull up
- if pin PB0 pulled to low (pressed switch current is measured
- if pin PB0 pulled to high (not pressed switch voltage is measured
- if pin PB1 pulled to low (pressed switch) DC is measured
- if pin PB1 pulled to high (not pressed switch)RMS is measured

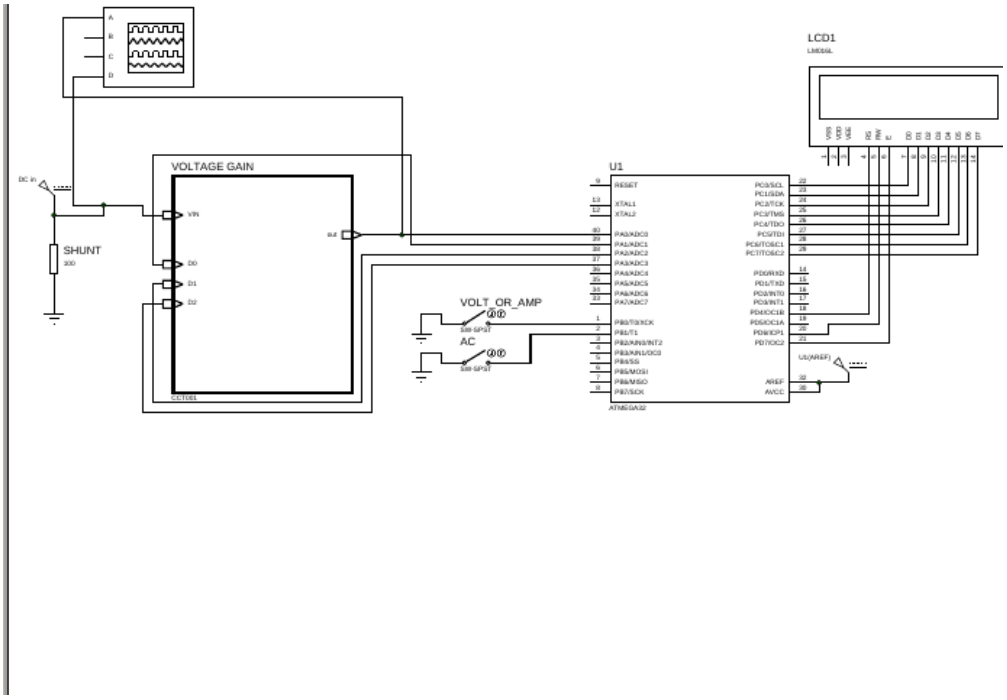
RMS:

first method(failed)

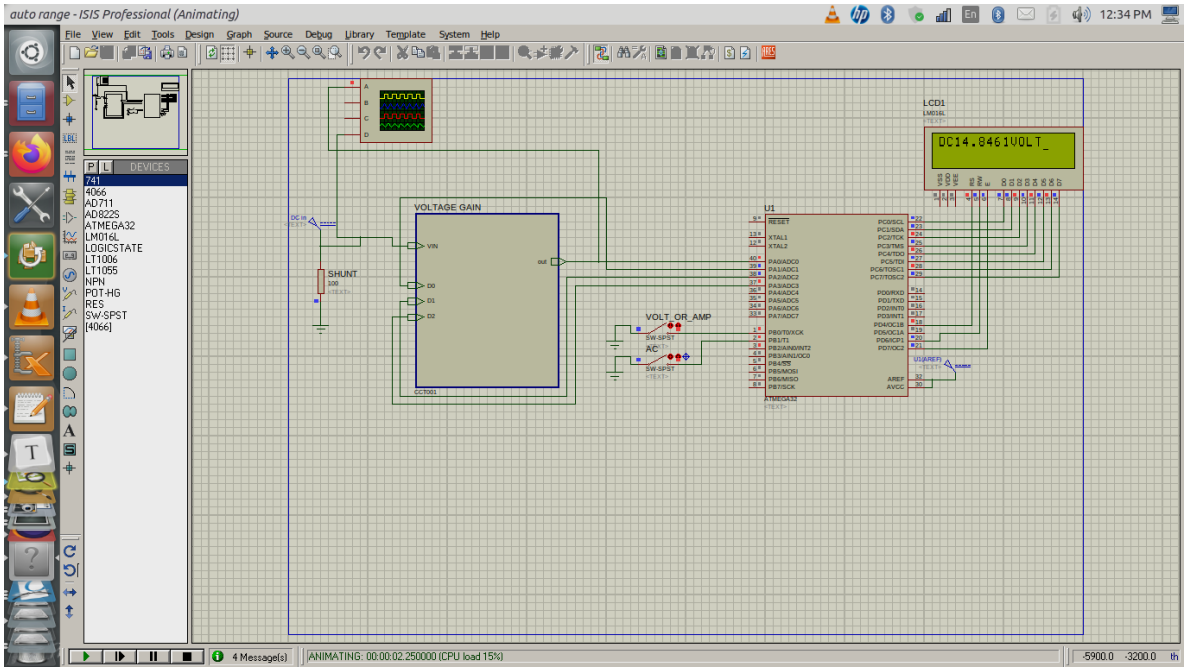
- make timer 1 at CTC mode and sample at suitable frequency like 1000 HZ
- calculate RMS=SUM(voltage^2/samples_number)

second method (succeed):

- use software loop to calculate RMS without using timer (suspend the program for a while)



Demo :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12:34 PM
File View Edit Tools Design Graph Source Debug Library Template System Help
DEVICES
741
4066
AD711
AD822S
ATMEGA32
LM016L
LOGICSTATE
LT1006
LT1055
NPN
POT-HG
RES
SW-SPST
[4066]
LCD1
LM016L
DC14.8461VOLT_
VOLTAGE GAIN
SHUNT
VOLT_OR_AMP
AC
U1
4 Message(s)
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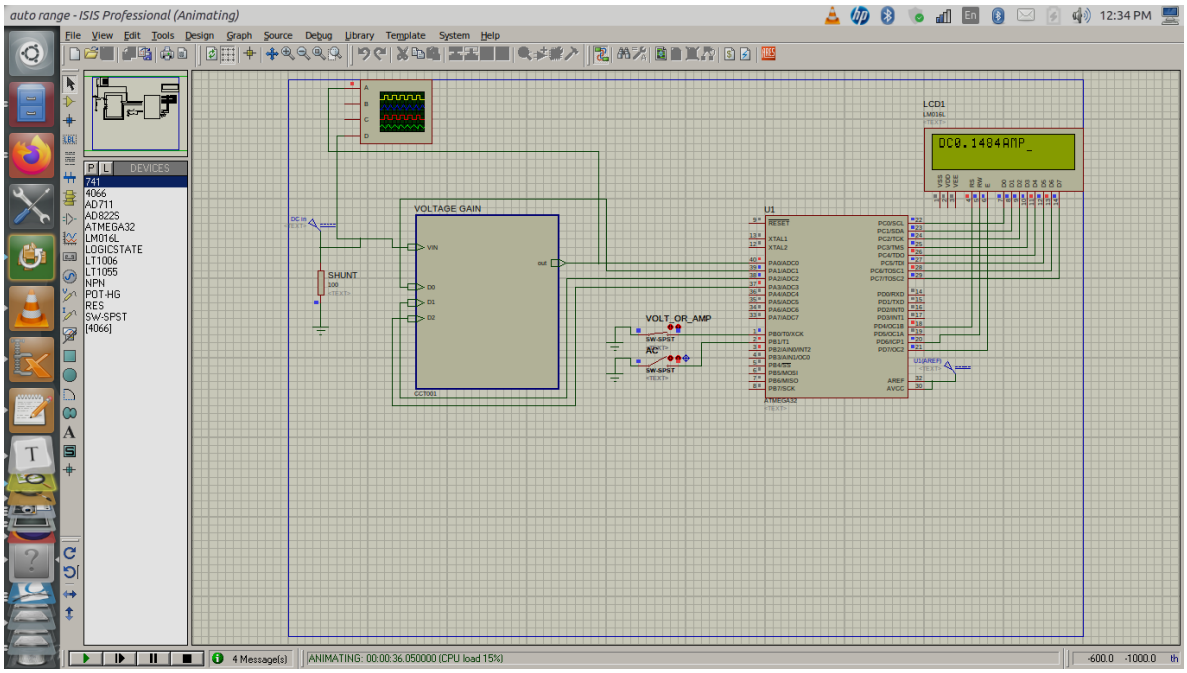
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RES
SW-SPST
[4066]
LCD1
LM016L
DC0.1404AMP_
VOLTAGE GAIN
SHUNT
VOLT_OR_AMP
AC
U1
4 Message(s)
ANIMATING: 00:00:36.050000 (CPU load 15%)