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Introduction To Microcontrollers Electronics – Lesson 5: Analog to Digital

FORMULAS

The following formulas and information are meant to go with the online lesson found here:
http://www.pyroelectro.com/edu/microcontrollers/analog_to_digital/

EXAMPLE ARDUINO PROGRAM

In Lesson 5 we learned how to use analog to digital converters with Arduino.

To do that we built a short program that read input from the analog 0 and then turned an LED on with a brightness that closely correlated to the analog input value.

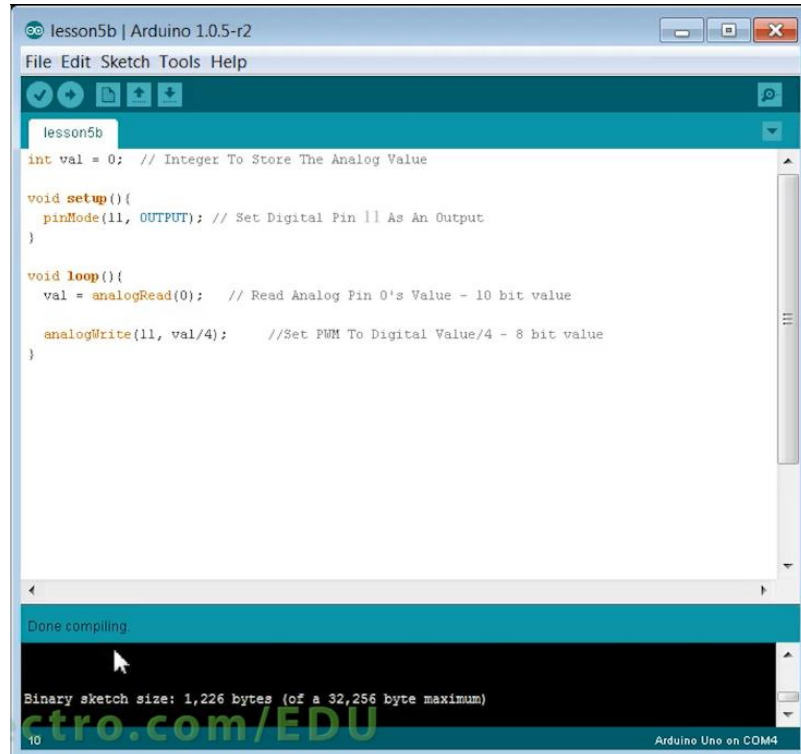
```
lesson5 | Arduino 1.0.5-r2
File Edit Sketch Tools Help
lesson5
pinMode(11, OUTPUT); // Set Digital Pin 11 As An Output
}

void loop(){
  val = analogRead(0); // Read Analog Pin 0's Value

  //Set Pin 13's Output Using The Stored Analog Value
  if(val > 1000) //If Analog Val Is Greater Than 1000
    analogWrite(11, 250); //Set PWM To Digital Pin 13 at 100%
  else if(val > 800) //Otherwise If Val Is Greater Than 800
    analogWrite(11, 175); //Set PWM To Digital Pin 13 at 80%
  else if(val > 600) //etc..
    analogWrite(11, 100); //etc..
  else if(val > 400) //etc..
    analogWrite(11, 66); //etc..
  else if(val > 200) //etc..
    analogWrite(11, 33); //etc..
  else if(val > 0) //Otherwise If Val Is Greater Than 0
    analogWrite(11, 3); //Set PWM To Digital Pin 13 at 1%
}

Done compiling
Binary sketch size: 1,232 bytes (of a 32,256 byte maximum)
pyro.com/EDU
Arduino Uno on COM4
```

The second program that we wrote was short and simple but might take a little longer to understand. It used the analog conversion directly inside of the analogwrite() function. This meant the LED would be directly controlled by the analog input, limited only by the 256 possible values that analogwrite() can accept.



```
lesson5b
int val = 0; // Integer To Store The Analog Value

void setup(){
  pinMode(11, OUTPUT); // Set Digital Pin 11 As An Output
}

void loop(){
  val = analogRead(0); // Read Analog Pin 0's Value - 10 bit value
  analogWrite(11, val/4); //Set PWM To Digital Value/4 - 8 bit value
}
```

Done compiling

Binary sketch size: 1,226 bytes (of a 32,256 byte maximum)

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ADDITIONAL INFORMATION

If you have any questions about the formulas or information found in this document, please feel free to head on over to the forums and ask us some questions!

<http://www.pyroelectro.com/forums/viewforum.php?f=25>