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2018년 1학기

IDE programming

The Arduino Software (IDE) allows you to write programs and upload them to your board.

1. If you have a reliable Internet connection, you should use the online IDE (Arduino Web Editor). It will allow you to save your sketches in the cloud.
2. If you would rather work offline, you should use the latest version of the desktop IDE.

https://www.arduino.cc/en/Guide/HomePage

Download the Arduino IDE

ARDUINO 1.8.5
The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.
This software can be used with any Arduino board. Refer to the Getting Started page for Installation instructions.

Windows Installer
Windows ZIP file for non admin install

Windows app Requires Win 8.1 or 10
Get ⊞

Mac OS X 10.7 Lion or newer

Linux 32 bits
Linux 64 bits
Linux ARM

Release Notes
Source Code
Checksums (sha512)

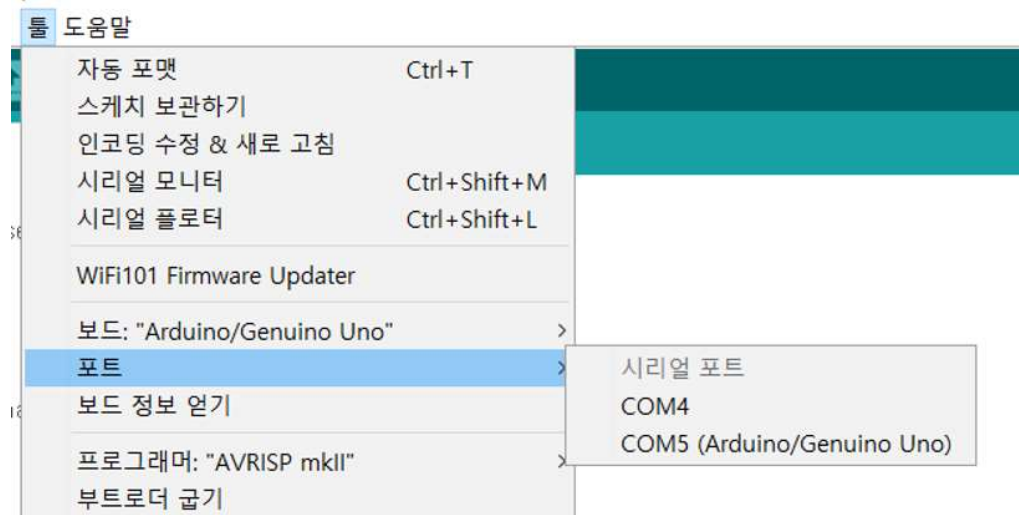https://www.arduino.cc/en/Main/Software

IDE programming

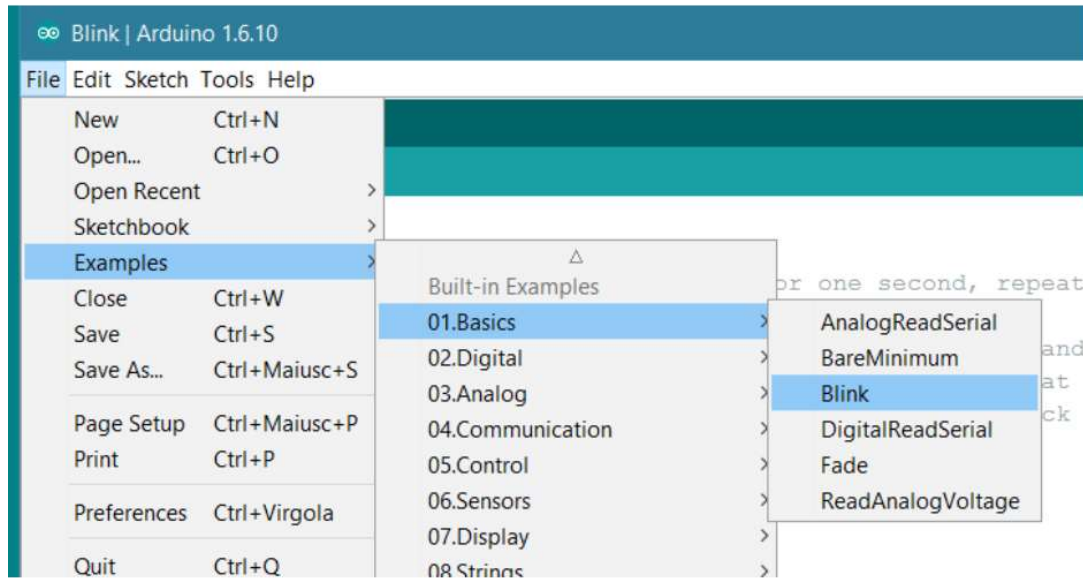- Connect Arduino to PC using USB cablE
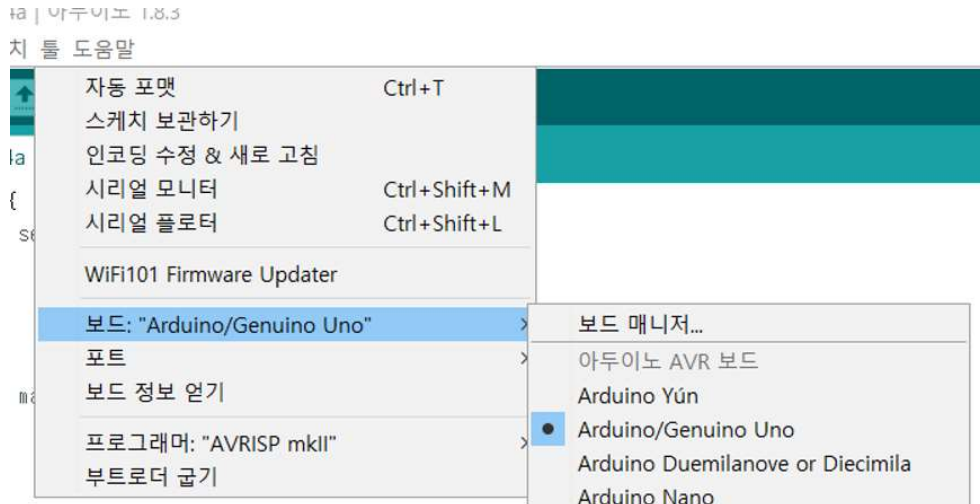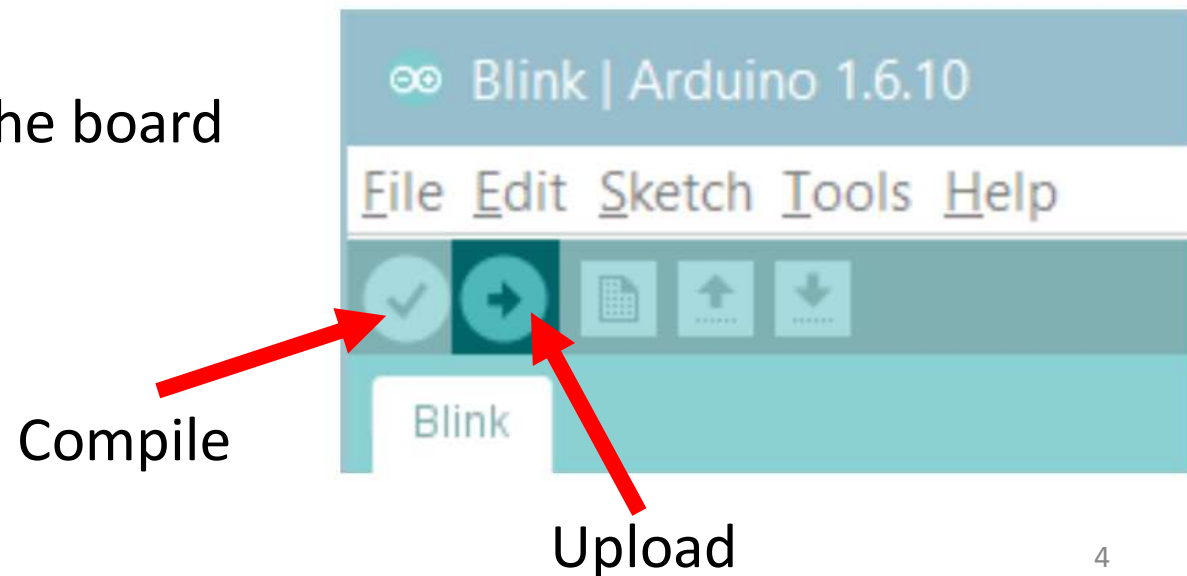

- USB 케이블을 끝까지 밀어서 연결해야함

You must choose a right COM to make connection

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Blink exmaple

- Blink built-in LED
- Upload sketch to the board

Compile

Upload

Blink exmaple

Run once at
the beginning

Repeat this
loop function

```
// the setup function runs once when you press reset or power the board
void setup() {
    // initialize digital pin LED_BUILTIN as an output.
    pinMode(LED_BUILTIN, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
    digitalWrite(LED_BUILTIN, HIGH);   // turn the LED on (HIGH is the voltage level)
    delay(1000);                       // wait for a second
    digitalWrite(LED_BUILTIN, LOW);    // turn the LED off by making the voltage LOW
    delay(1000);                       // wait for a second
}
```
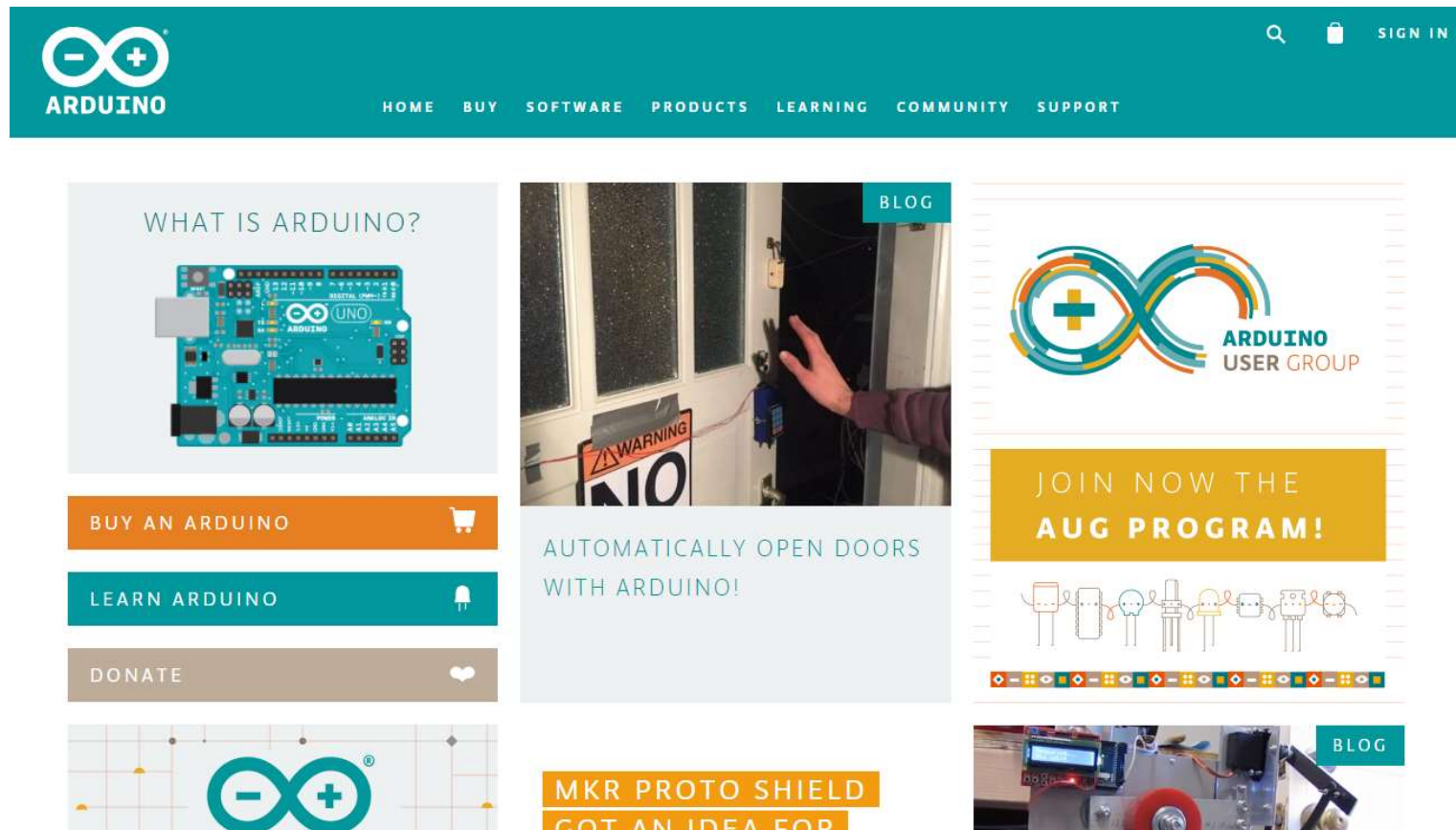
pinMode(LED_BUILTIN, OUTPUT);

digitalWrite(LED_BUILTIN, HIGH);

delay(1000);

More information

- You can find more information from the official webpage

https://www.arduino.cc/

How to destroy Arduino

https://www.rugged-circuits.com/10-ways-to-destroy-an-arduino/

Do not make a short circuit!

10 Ways to Destroy An Arduino

Introduction

Use a sledgehammer, fire a bullet at it, throw it into a pool....that's not what we're talking about. We're going to show you how to electrically destroy your Arduino, though many of you seem to already know how to do that through unfortunate experience. You know what we mean....that funny smell, the scorch mark on a component, or the dreaded "programmer not in sync" error message -- all signs that you've just learned a lesson the hard way.

Why are we doing this? If you own an Arduino, it's good to know what is and what isn't OK to do with it. We also want you to consider buying our Ruggeduino, which will survive all of the tortures described below.
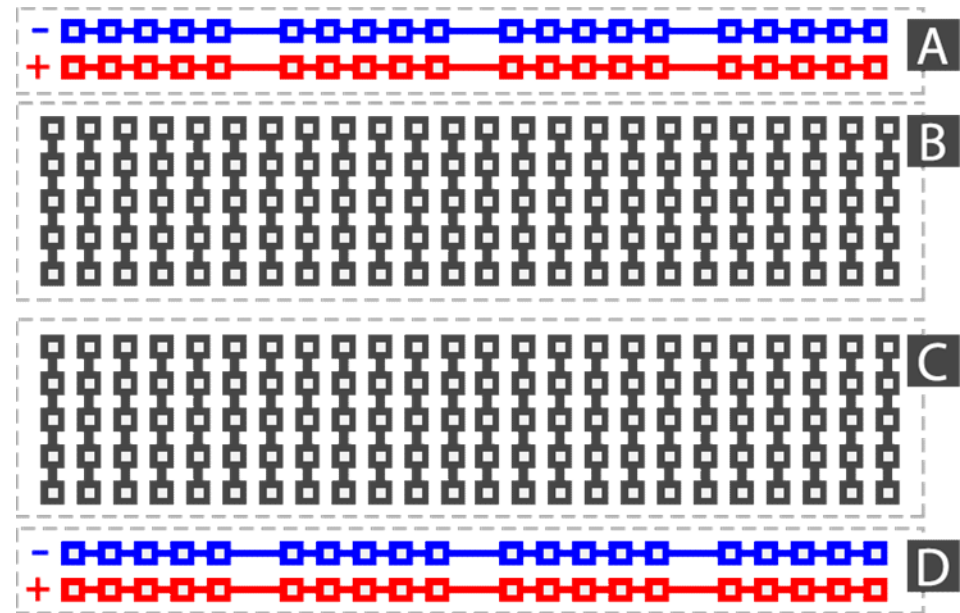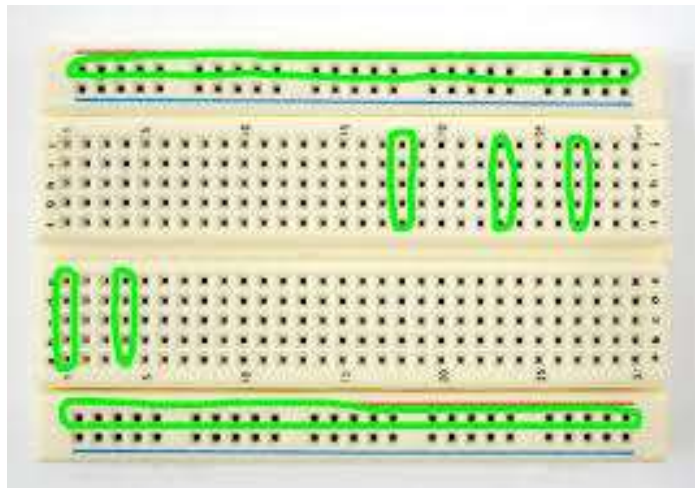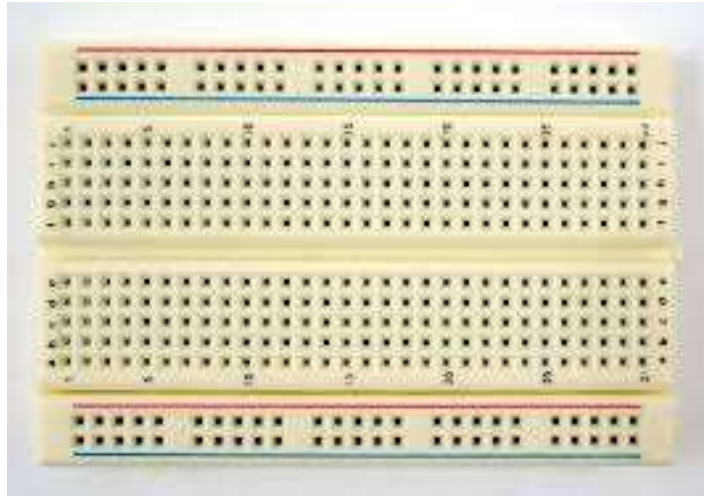
Method #1: Shorting I/O Pins to Ground

HOW

Configure an I/O pin to be an output then set it high. Short the pin to ground. You have now created an overcurrent condition on the I/O pin and it will be destroyed.
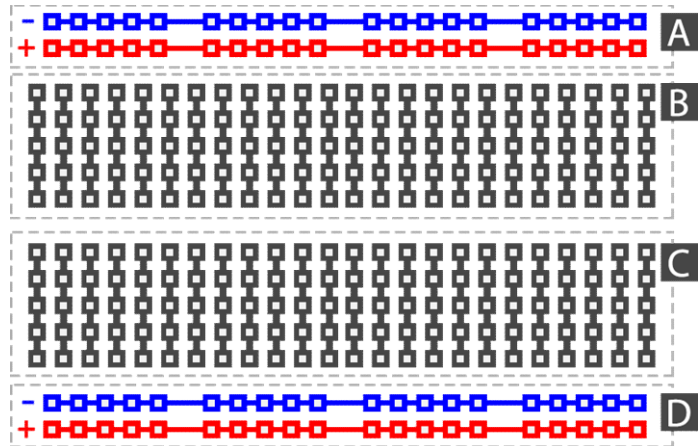
Breadboard

https://www.tweaking4all.com/wp-content/uploads/2013/12/basic_breadboard_layout.png

https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcS_JK1WV9iT070i5hwivskrwTGbMfHu_ek0lMEpNUADmWSsEkvx

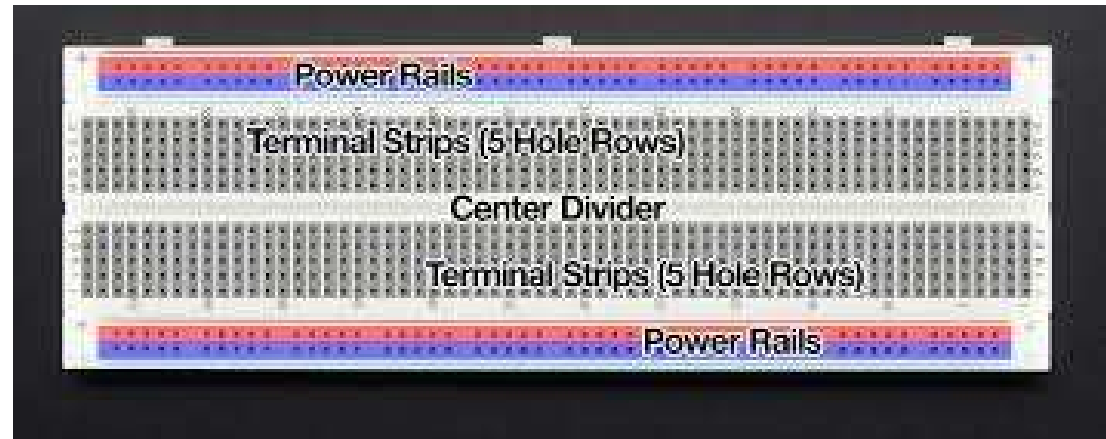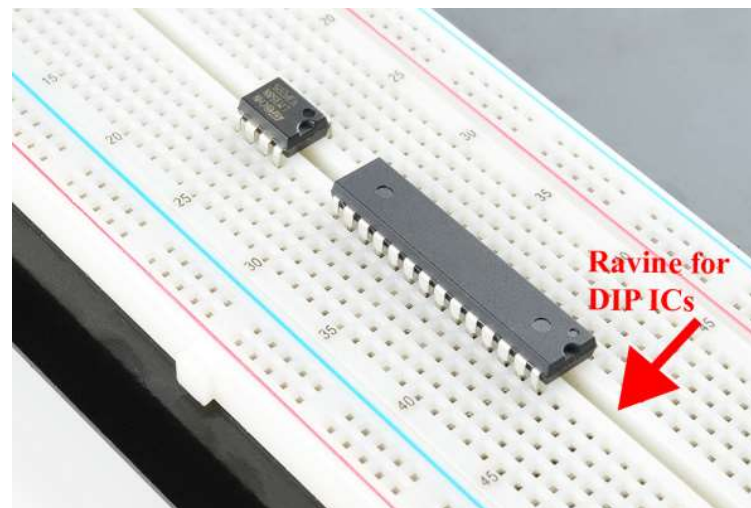https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcQcgUGl233OVpO_Y1o2a1uEuWJb1TyzT_XAb69mQ2eeS_WcJ2xy

Breadboard
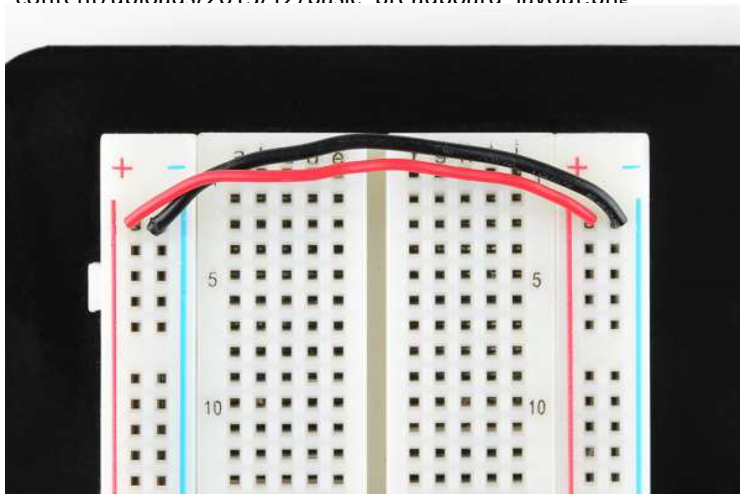
Power Rails

Terminal Strips (5 Hole Rows)

Center Divider

Terminal Strips (5 Hole Rows)
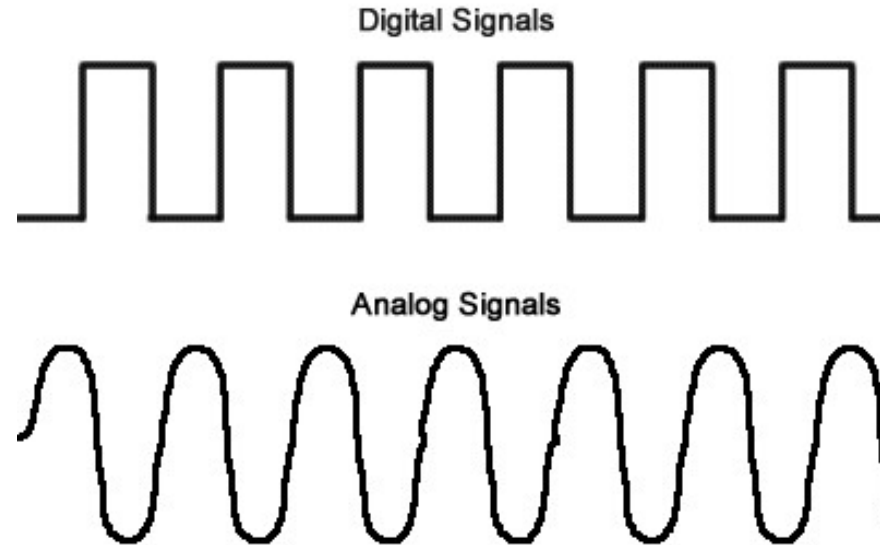
Power Rails

Ravine for DIP ICs
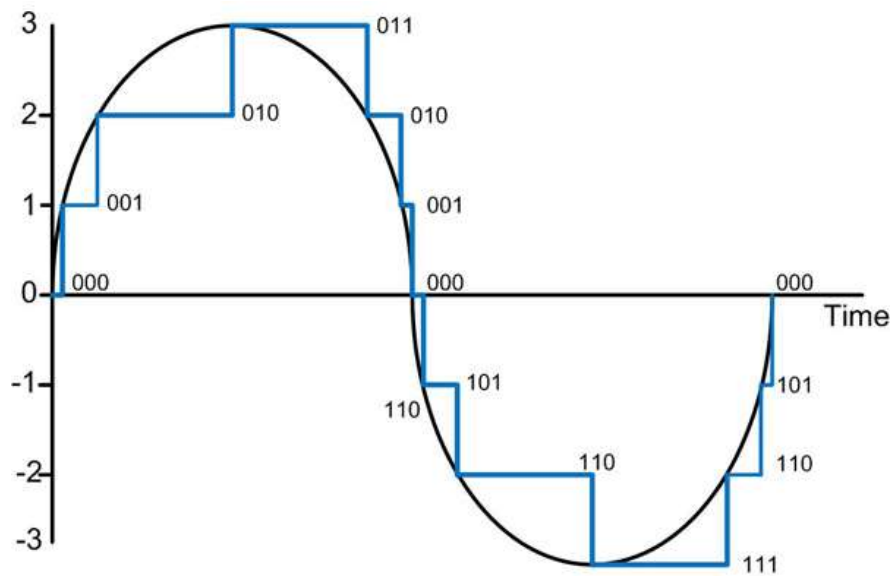
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Analog vs Digital

- 아날로그 신호 vs 디지털 신호

- 신호, signal
  - Time-varying "quantities" which convey some sort of information. In electrical engineering the quantity that's time-varying is usually voltage.

    https://learn.sparkfun.com/tutorials/analog-vs-digital

- 차이점: 변화량이 가질 수 있는 값의 범위

Analog vs Digital

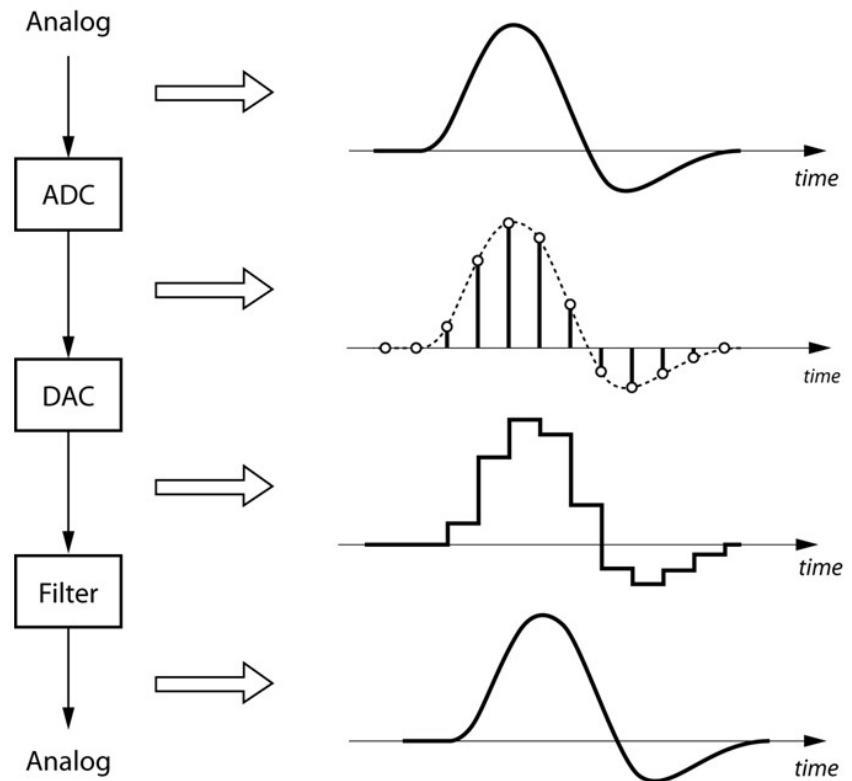- Digital signal: only 0 and 1 exist
  - On / off button, switch
- Analog signal: continuous value
  - Analog sensors: light sensor

Digital Signals

Analog Signals

ADC (analog to digital converter)

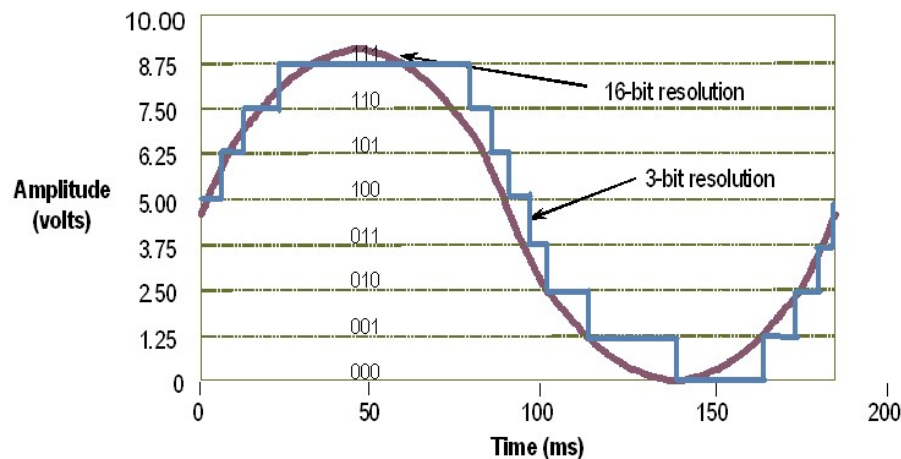http://screaminfx.com/images/tech-images/what-is-analog-verse-digital-explanation.jpg

https://www.nutaq.com/sites/default/files/images/blog-images/Process%20of%20digitizing%20and%20converting%20a%20signal%20with%20an%20infinite%20precision%20ADC-DAC_0.png

ADC (analog to digital converter)

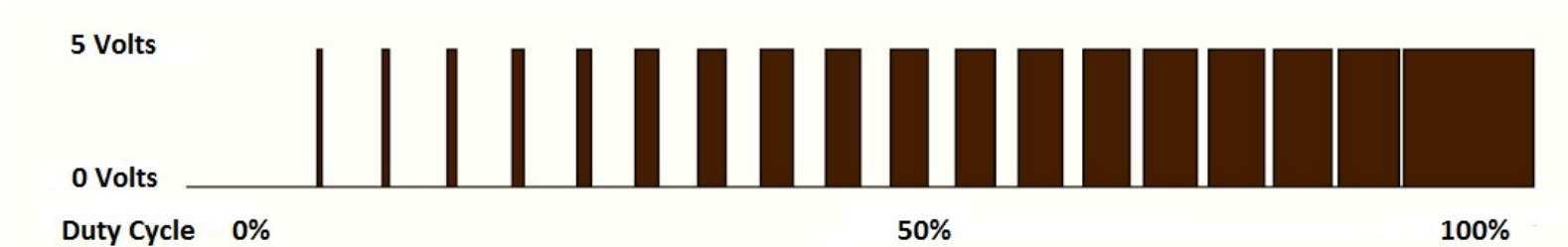What is "resolution"? For example, 10-bit resolution.

Resolution: Examples

	Formula	4-bit DAC
Number of bits	n	4
Number of output codes	2^n	16
Number of steps in the output	$2^n - 1$	15
Percentage resolution	$1 / (2^n - 1)$	1/15
Step size (assuming 5 V reference voltage)	$V_{ref} / 2^n - 1$	$V_{ref} / 15$

http://www.globalspec.com/learnmore/data_acquisition_signal_conditioning/signal_converting/digital_to_analog_converters
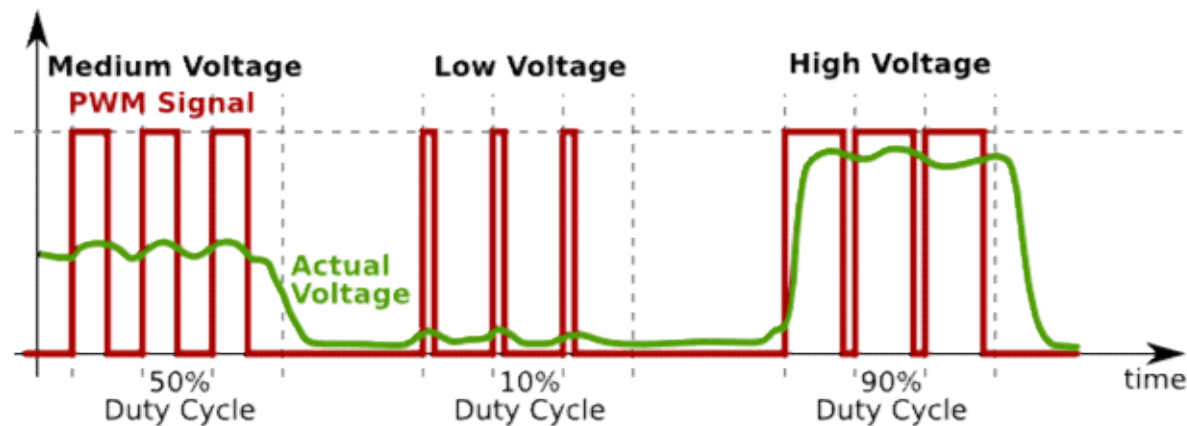
https://image.slidesharecdn.com/group1-141018102550-conversion-gate01/95/dacdigital-to-analog-converter-11-638.jpg?cb=1486790152

PWM

- Control duty cycle → control average voltage

https://electrosome.com/pwm-pulse-width-modulation/

https://www.wayneandlayne.com/projects/video-game-shield/design/