Robotics

Arduino Resources & Programming

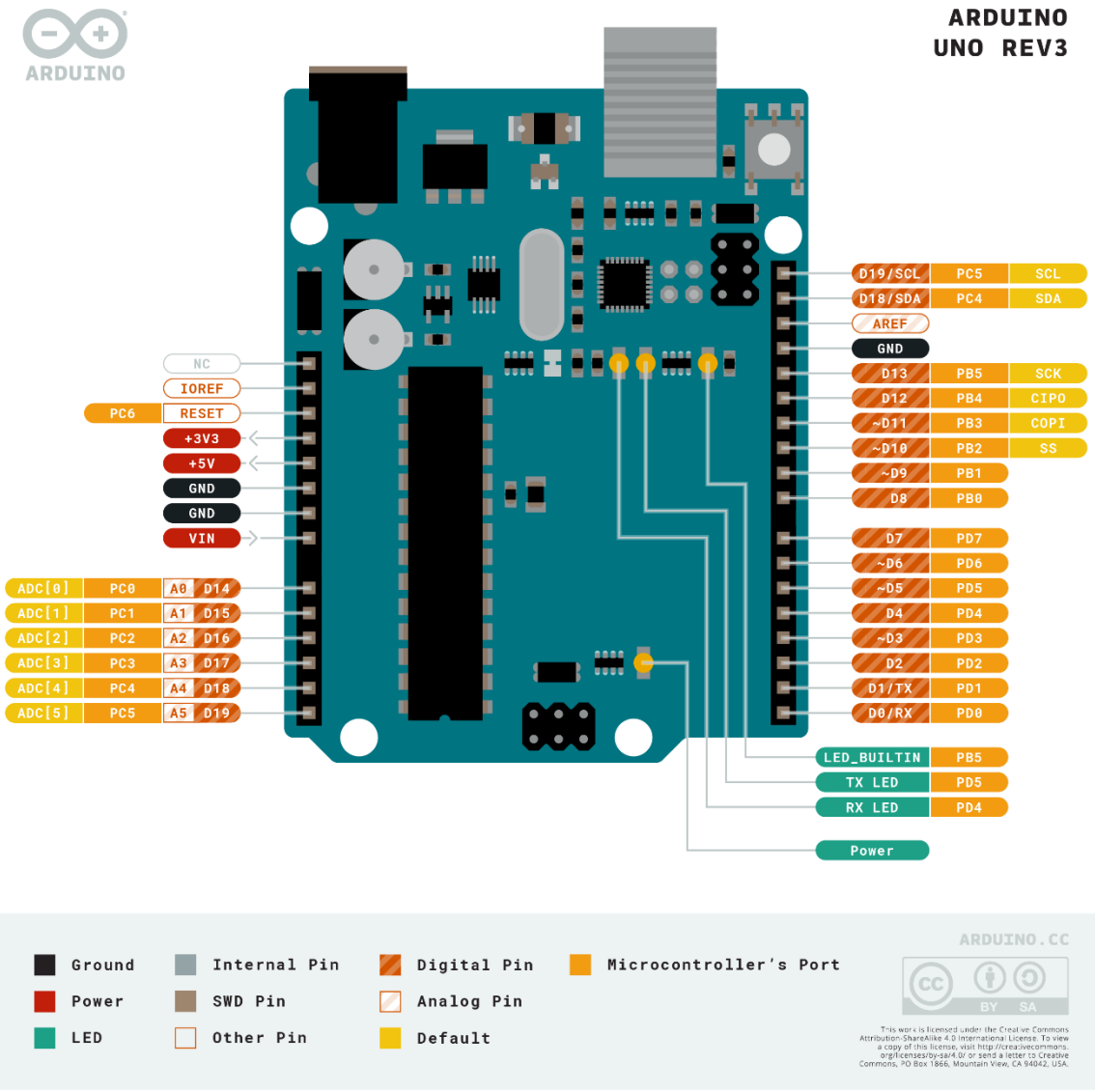
School of Computing, Gachon University

Youngmin Oh

Arduino UNO

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

Arduino UNO Rev3 Pinout Diagram

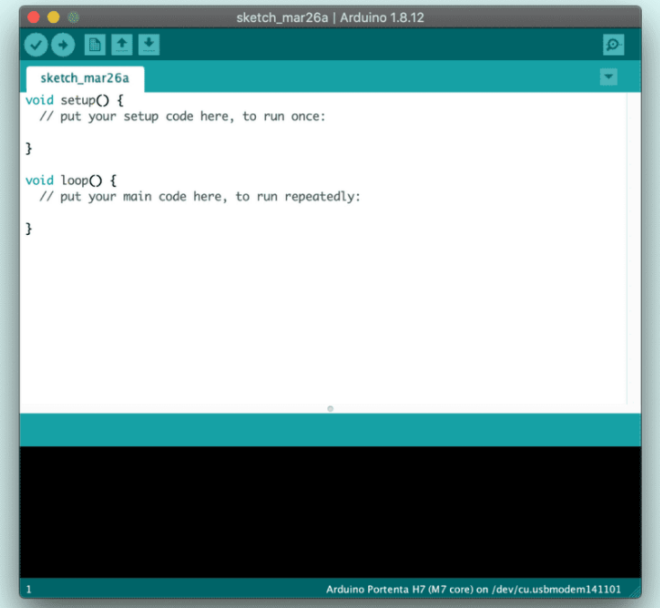


https://content.arduino.cc/assets/Pinout-UNOrev3_latest.pdf

Arduino Software: Sketch

Arduino Software (IDE)

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.



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

Arduino Language Reference

Find anything that can be improved? Suggest corrections and new documentation via GitHub.

Doubts on how to use Github? Learn everything you need to know in this tutorial.

Language Reference

Arduino programming language can be divided in three main parts: functions, values (variables and constants), and structure.

Functions

For controlling the Arduino board and performing computations.

Digital I/O
digitalRead()
digitalWrite()
pinMode()

Analog I/O
analogRead()
analogReference()
analogWrite()

Zero, Due & MKR Family
analogReadResolution()
analogWriteResolution()

Advanced I/O
noTone()

Math
abs()
constrain()
map()
max()
min()
pow()
sq()
sqrt()

Trigonometry
cos()
sin()
tan()

Characters
isAlpha()

Random Numbers
random()
randomSeed()

Bits and Bytes
bit()
bitClear()
bitRead()
bitSet()
bitWrite()
highByte()
lowByte()

External Interrupts
attachInterrupt()
detachInterrupt()

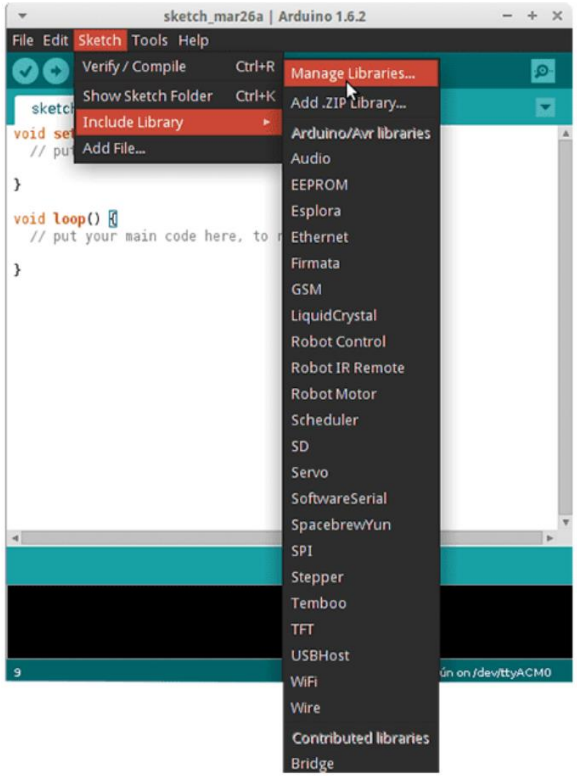
https://www.arduino.cc/reference/en/

Installing Additional Arduino Libraries

How to Install a Library

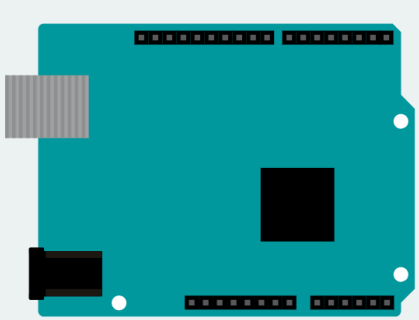
Using the Library Manager

To install a new library into your Arduino IDE you can use the Library Manager (available from IDE version 1.6.2). Open the IDE and click to the "Sketch" menu and then *Include Library* > *Manage Libraries*.



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

Arduino Foundations



```
void setup() {
}

void loop() {
}
```

The Foundations section gives you some specific knowledge about the principles and techniques that are behind the Arduino platform, its whole family of boards and the software you use to tell your boards what to do.

If you want to get some knowledge before you start using things, this is the right place. If you want to jump on tinkering with your board visit the Getting Started page.

Basics

- An introduction on what is Arduino and what I can use it for?
- The Arduino Uno Board anatomy.
- What is the Arduino Software (IDE) and how to change the default language? What is a Sketch and how does it work?

Microcontrollers

- Digital Pins: How the pins work and what it means for them to be configured as inputs or outputs.

https://www.arduino.cc/en/Tutorial/Foundations

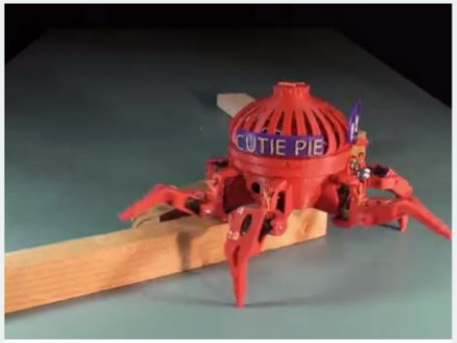
Arduino Project Hub

PROJECT HUB

ADD PROJECT

robot

1,099 projects for *robot*



Robot: Vorpal the Hexapod

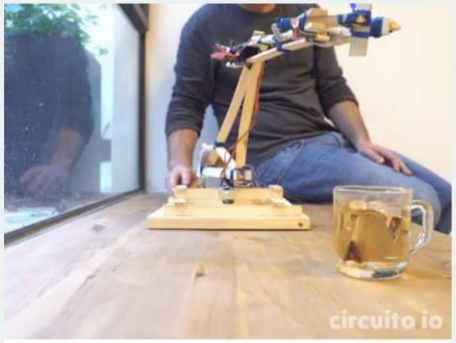
Project showcase by **Vorpal Robotics, LLC**

29,341 VIEWS **4** COMMENTS **138** RESPECTS

Robot Cheerleader Arduino

Project showcase by **victruino**

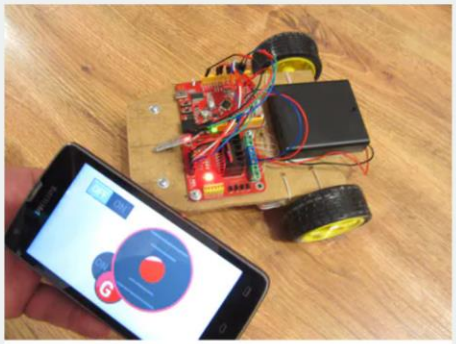
3,882 VIEWS **1** COMMENT **10** RESPECTS



Robotic Arm from Recycled Materials

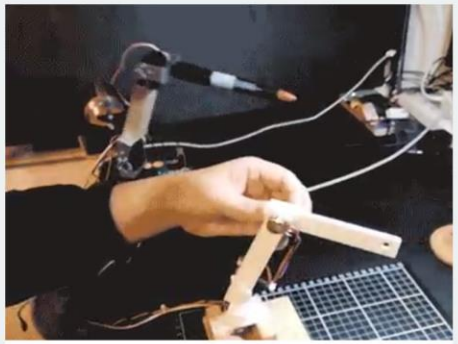
Project tutorial by **circuito.io team**

63,048 VIEWS **31** COMMENTS **180** RESPECTS



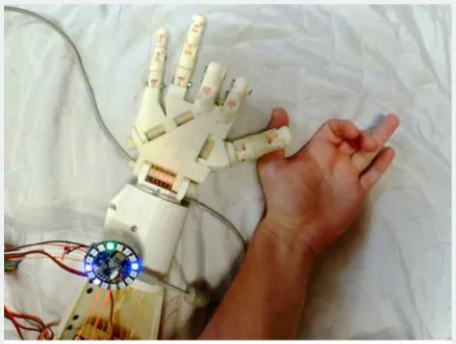
Robotcar Controlled Using G-Sensor Smartphone

Project tutorial by **Evgeny Shemanuev**



Robot Arm with Controller

Project tutorial by **HomeMadeGarbage**



Robotic Hand Control Using EMG

Project tutorial by **Dmitry Dziuba**

https://create.arduino.cc/projecthub/search?q=robot

Term Project

The most important activity in the course.

Make a team of 3-4 students using a board on Cyber Campus (This will also be your lab team).

Two presentations in the semester:

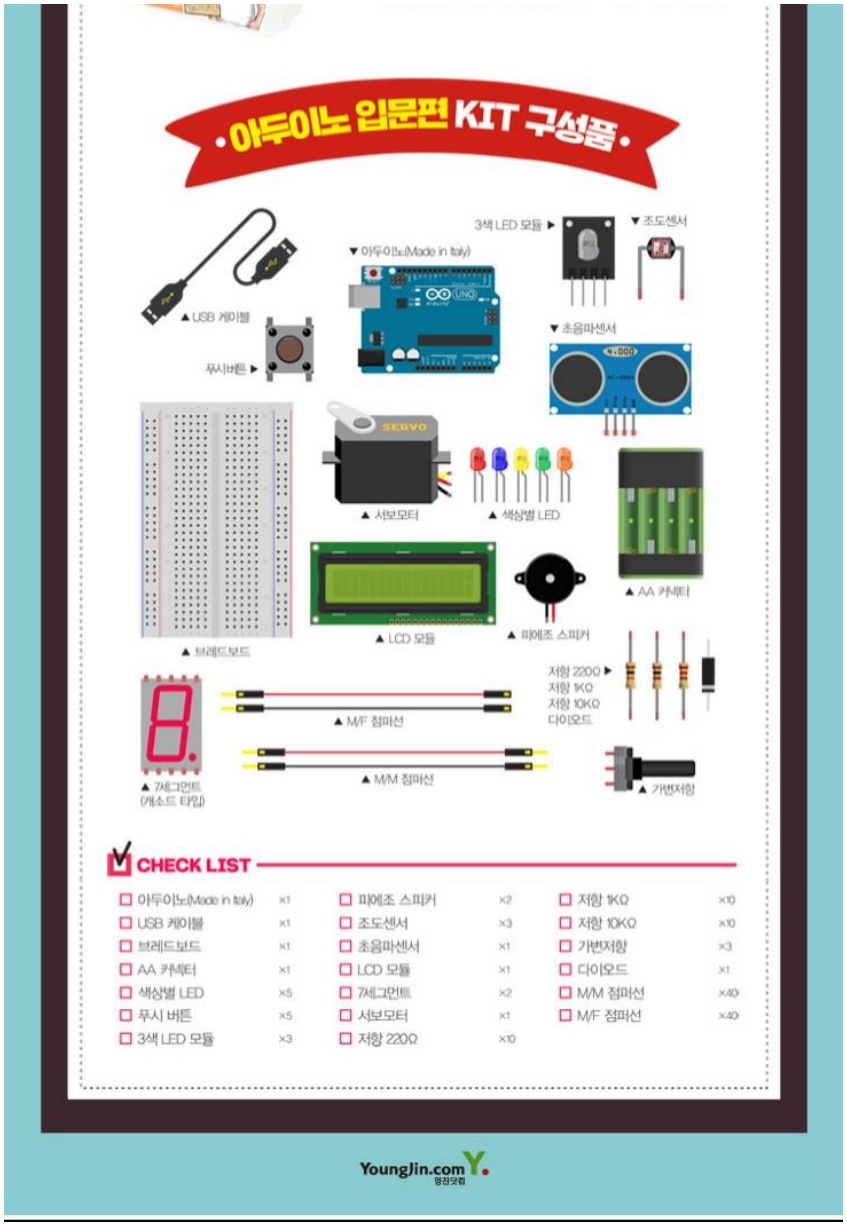
- Proposal: Before (or replacing) Midterm
- Final Presentation: Before the final exam

No limitation in either hardware (Arduino must be used), or software, but work with the real hardware.

Recommendation:

- Start EARLY!!!
- More emphasis on software coding than hardware assembly
- Robot-like: sensors, actuators (not necessarily motors), and autonomy
- Be creative and have fun! ☺

Take your Arduino Kit!



AUTODESK TINKERCAD

AUTODESK TINKERCAD

youngminoh

Search designs...

3D Designs

Circuits

Codeblocks NEW

Lessons

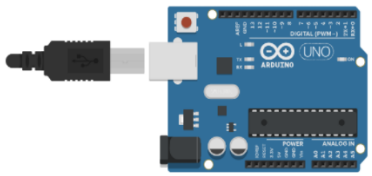
Your Classes

Collections

Create collection

Circuits

Create new Circuit



ArduinoUNO
29 minutes ago
Private ♡0

https://www.tinkercad.com/dashboard?type=circuits&collection=designs

Tutorial: Programming with Arduino

https://www.halvorsen.blog

|Programming with Arduino|

|Hans-Petter Halvorsen |

https://www.halvorsen.blog/documents/technology/resources/resources/Arduino/Programming%20with%20Arduino%20-%20Slides.pdf

Basics of Sketch

Arduino Programming Notebook
by Brain W. Evans

http://engineering.nyu.edu/gk12/amps-cbri/pdf/ArduinoBooks/Arduino%20Programming%20Notebook.pdf