



OpenCV YOLO v4

Pre-trained Object Detection

ESP32 Display Dot Matrix +Relay

Ajang Rahmat
Founder Kelas Robot



Salam Kenal_



Nama : Ajang Rahmat
Kesibukan : Author **KelasRobot.com**
: Admin di Komunitas **ArduMeka**
: Mahasiswa PJJ Informatika **UNSIA**
Domisili : Sumedang, Jawa Barat
Hobi : Microcontroller (2014)
: Internet of Things (2016)
: Web App Programming (2009)
: Computer Vision (2021)

Riwayat Pendidikan_



1. **SDN Karangpawulang** Kec.Cimalaka (Lulusan 2007)
2. **SMPN 3 Cimalaka** (Lulusan 2010)
3. **SMKN 1 Sumedang** - TKJ (Lulusan 2013)
4. **Universitas Siber Asia** - PJJ Informatika (2020 - Sekarang)

Riwayat Pekerjaan_



1. **PT. Daya Anugerah Mandiri**, Sumedang - Marketing Trainee
Juni 2013 - Juli 2013
2. **PT. Indokemas Sukses Makmur**, Bandung - Operator Mesin
Agustus 2013 - September 2013
3. **PT. Graha Seribu Satu Jaya**, Cimahi - Operator Mesin
September 2013 - Desember 2013
4. **Robotic Explorer**, Bekasi & Jakarta - Staf Pengajar, RnD, Des. Grafis, dll
Januari 2014 - Juni 2016
5. **Kelas Robot**, Sumedang - Founder
Juli 2016 - Sekarang

Pengalaman Berorganisasi_



1. **PT. Daya Anugerah Mandiri**, Sumedang - Marketing Trainee
Juni 2013 - Juli 2013
2. **PT. Indokemas Sukses Makmur**, Bandung - Operator Mesin
Agustus 2013 - September 2013
3. **PT. Graha Seribu Satu Jaya**, Cimahi - Operator Mesin
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Juli 2016 - Sekarang

ArduMeka_

Komunitas **Belajar Arduino dan Mekatronika**, yang rutin mengadakan **Webinar / Workshop Online GRATIS** di akhir Pekan.

Sejak **20 Februari 2021**.

Website: <https://ardumeka.com/>

Youtube: <https://www.youtube.com/ardumeka>

Instagram: <https://www.instagram.com/ardumeka/>

ArduMeka Public MQTT Broker_

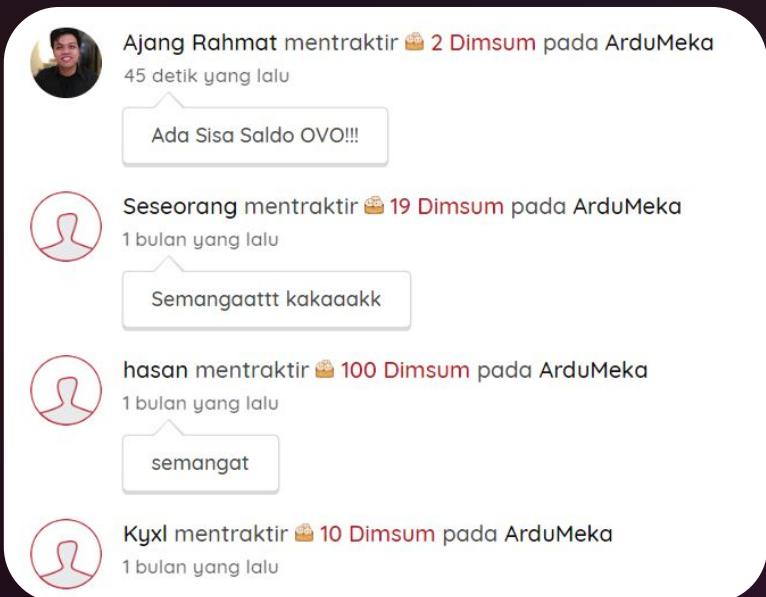
Info: <https://www.mqtt.ardumeka.com/>

EMQX x Nat VPS

Domain Broker	mqtt.ardumeka.com
IP Broker	202.145.2.100
TCP Port	11219
SSL/TLS TCP Port	11218
WebSocket Port	11217
SSL/TLS WebSocket Port	11216

ArduMeka Trakteer_

Info: <https://trakteer.id/ardumeka>



Pembahasan_

**Microcontroller
Microprocessor**

**Internet of
Things**

**Machine
Learning**

**Sensor
Actuator**

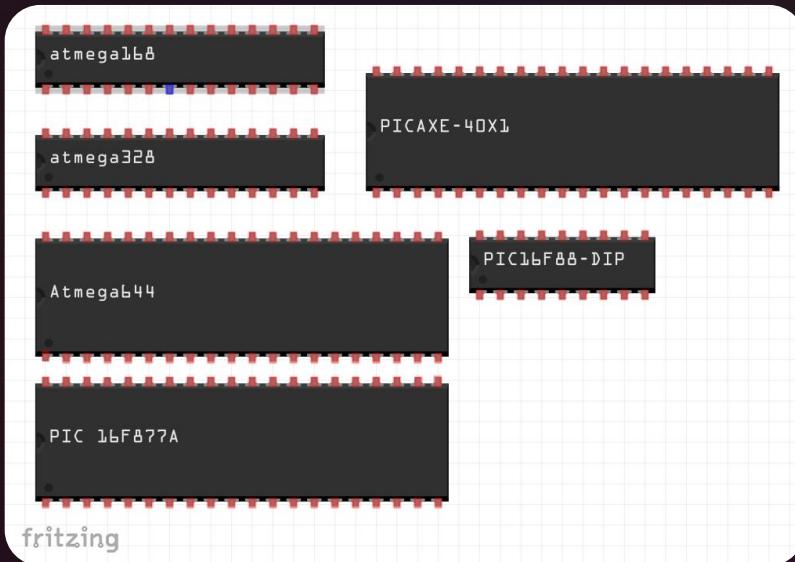
**Artificial
Intelligence**

**Deep
Learning**

**Computer
Vision**

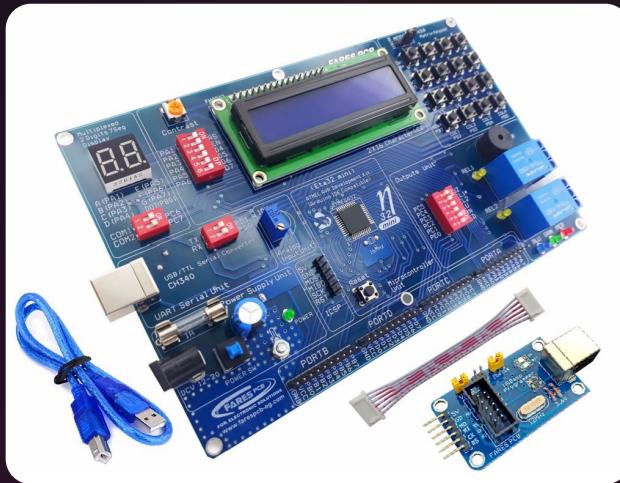
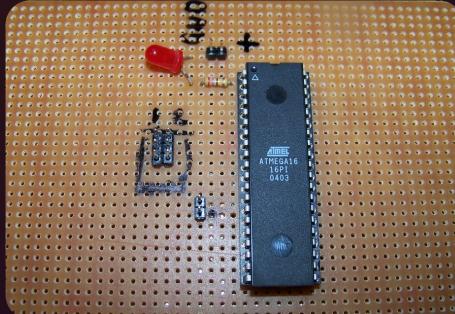
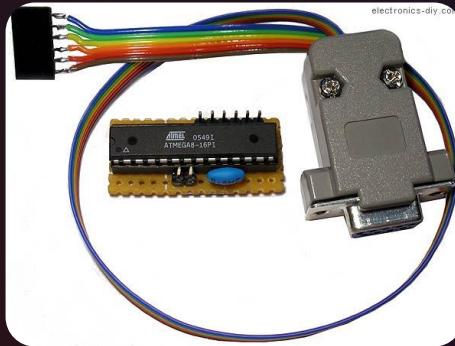
MICROCONTROLLER MICROPROCESSOR

Microcontroller_



- ATmega328
- ATmega168
- ATmega8
- ATmega16
- PIC
- dll

AVR Hardware_



Source Image:

<https://sites.google.com/site/ahmedabdien89/Embedded-Systems/avrprogrammer>
<https://www.flickr.com/photos/geekphotos/492235606/in/photostream/>
<https://fares-pcb.com/product/avr-development-kit-eta32mini/#&gid=1&pid=1>

AVR Coding

AVR Studio - [C:\Atmel\Projects\lab0.asm]

File Project Build Edit View Tools Debug Window Help

Trace Disabled

Project: lab0

- Source Files: lab0.asm
- Included Files
- Labels
- Output
- Object File

```

; Assignment: Lab 0
; Author: t a y l o r@msoe.edu
; Date: 11-26-2007

.nolist
.include "m32def.inc"
.list

.def temp = r16 ; Use R16 as a temp register

.cseg
.org 0
rjmp init ; Initialize restart vector

.org 0x2a

; Initializes PORTB and PORTD.
; Requires LEDs be connected to PORTD and keypad to PORTB.

init:
    ldi temp, 0x0f ; Set keypad cols as output, rows as input
    out DDRB, temp
    ldi temp, 0xf0 ; Enable pull-up resistors on PORTB4-7
    out PORTB, temp
    ldi temp, 0xff ; Configure PORTD as an output port
    out DDRD, temp

; main - Continually scans keypad and sends results to LEDs.
; Requires LEDs be connected to PORTD and keypad to PORTB.

main:
    in temp, PINB ; Read rows of keypad from PORTB
    out PORTD, temp ; Display results on LEDs 5-8
    rjmp main ; Repeat main

```

I/O View

Name
EEPROM
WATCHD
EXTERNAL
TIMER_C
TIMER_C
TIMER_C
SPI
USART
ANALOG
AD_CONV
PORTA
PORTB
PORTC
PORTD
CPU
BOOT_LC
TWI

Source Image:
<https://avr-studio.informer.com/>

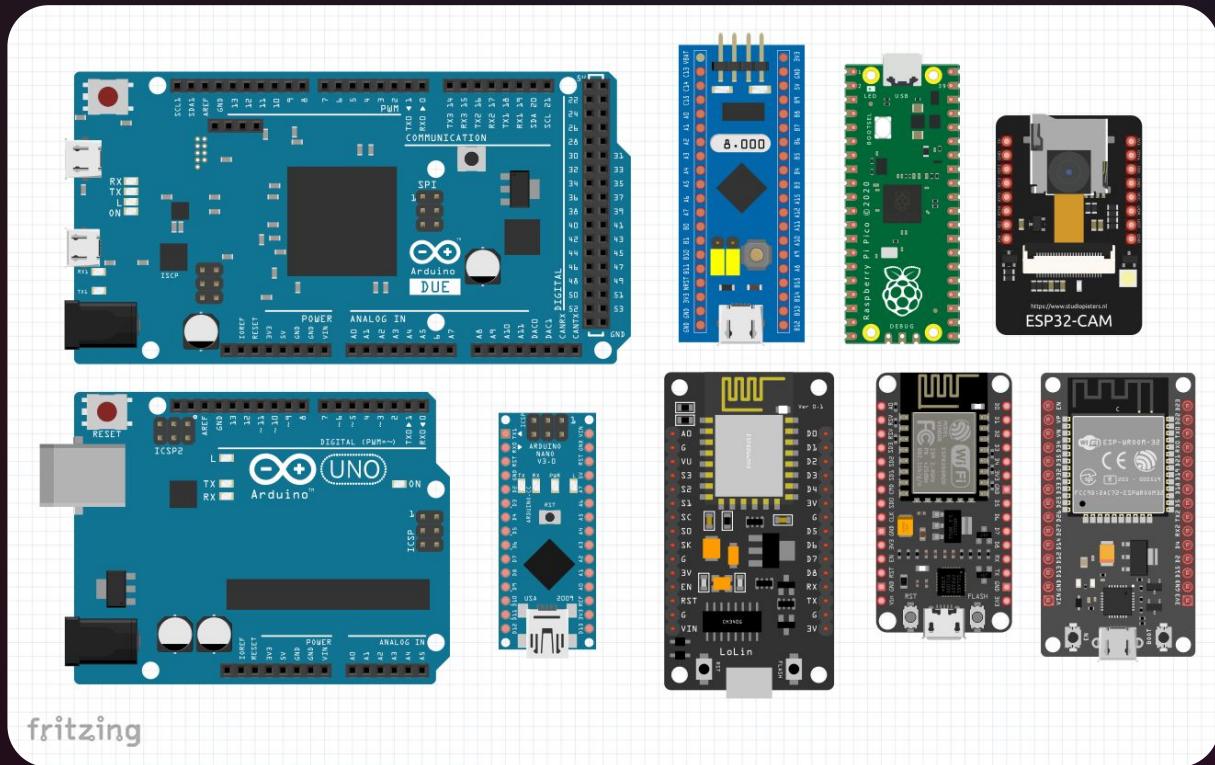
AVR Studio - [hello_world.c]

#include <avr/io.h>
int main(void)
{
 unsigned char value;

 DDRB = 0xFF;
 value = 0xFF;
 while(1){
 PORTB = value;
 value++;
 }
}

hello_world.c *

ARDUINO_



fritzing

**Open-source
electronic
prototyping
platform!**

**Hardware
Software!**

ARDUINO IDE



```
Koding_Blink
1 void setup() {
2     pinMode(13, OUTPUT);
3 }
4
5 void loop() {
6     digitalWrite(13, HIGH);
7 }
```

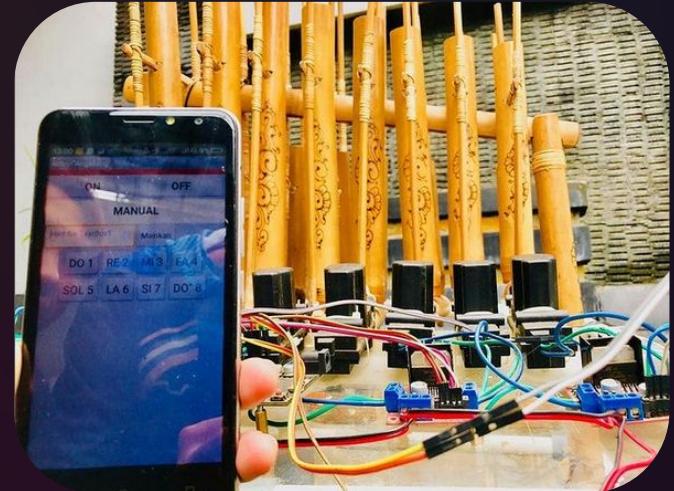
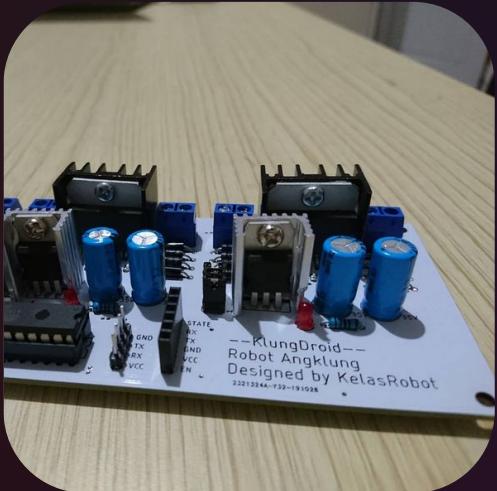
Done compiling.

Apakah Arduino Hanya Untuk Mainan?

LCD TFT x Piala Award_



Robot Angklung_



Monitoring Hidroponik_



Monitoring Hidroponik_



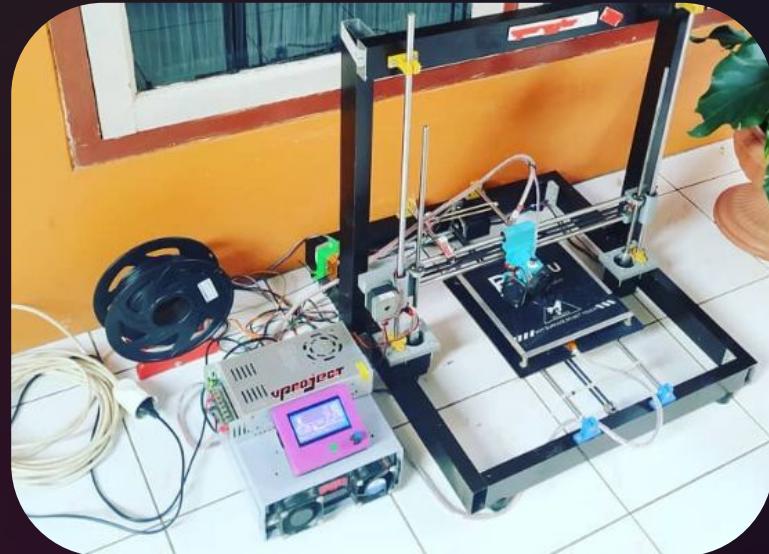
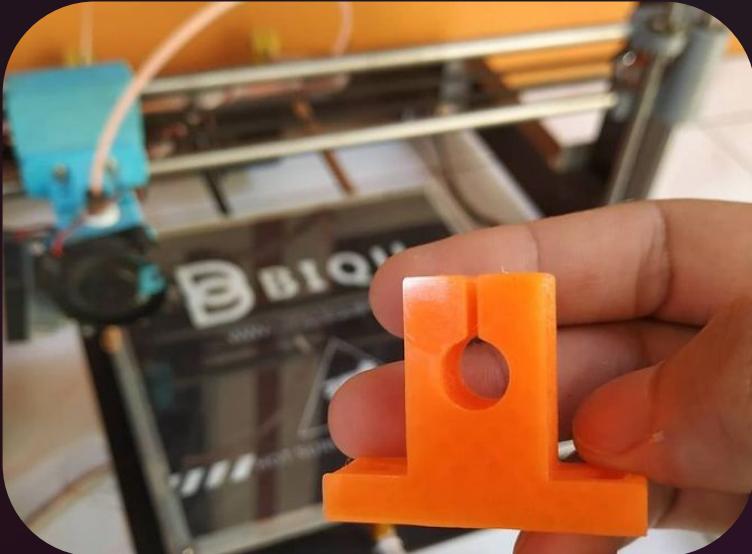
Sumber:

<https://www.youtube.com/watch?v=KhupQfbESmU>

Robot_



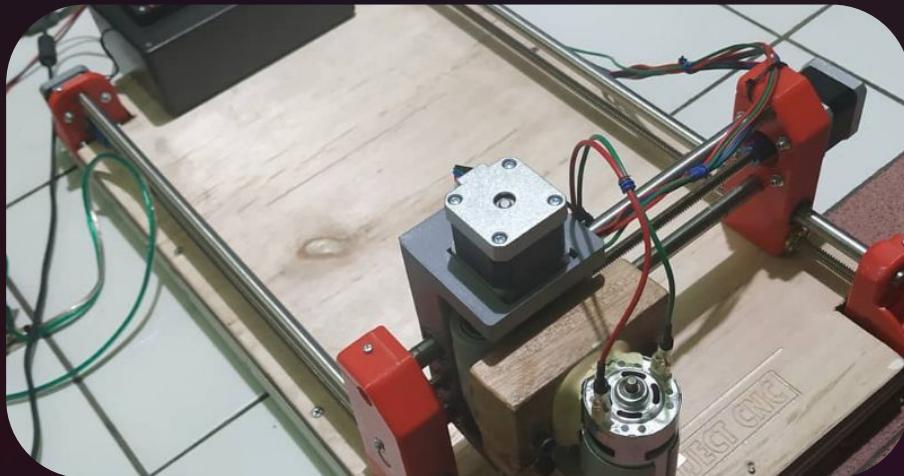
3D Print



Sumber:

<https://www.instagram.com/vprojectmakers/>

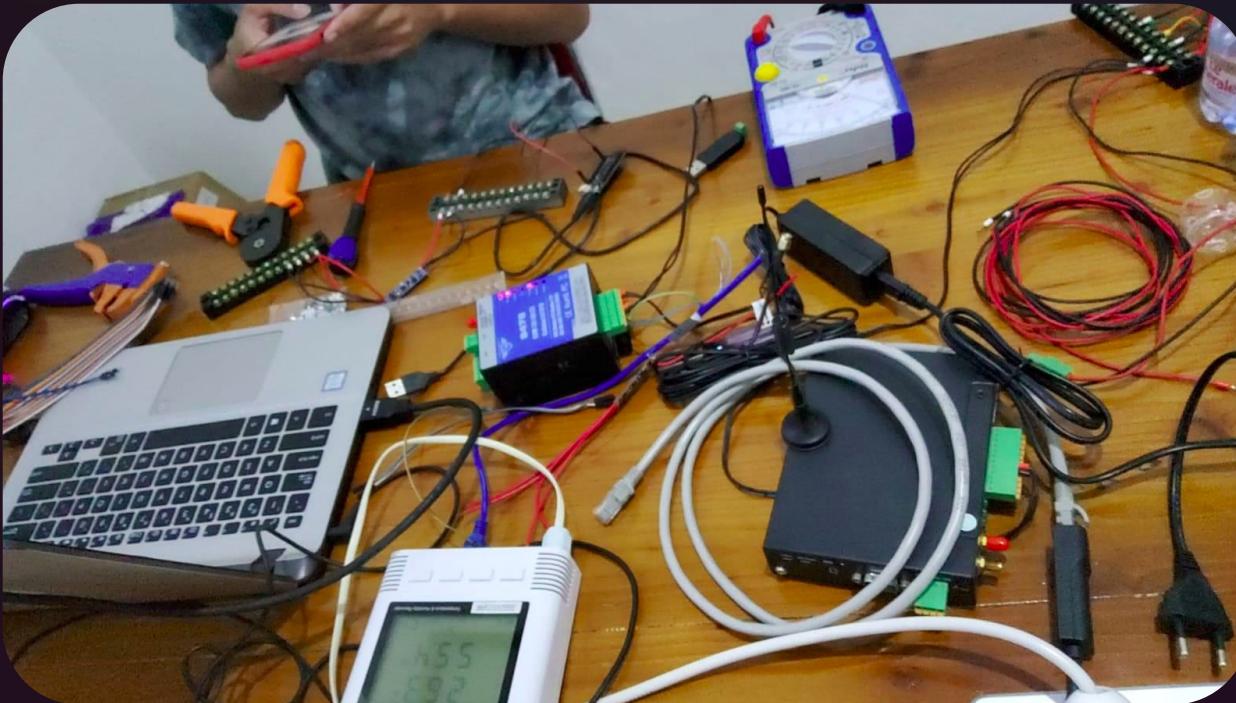
CNC Router_



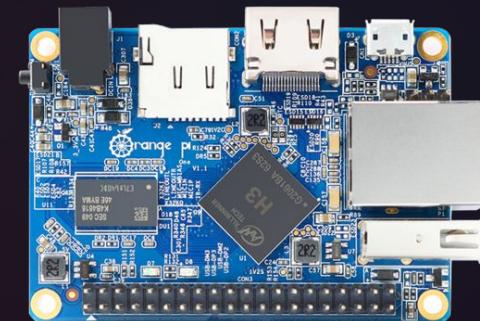
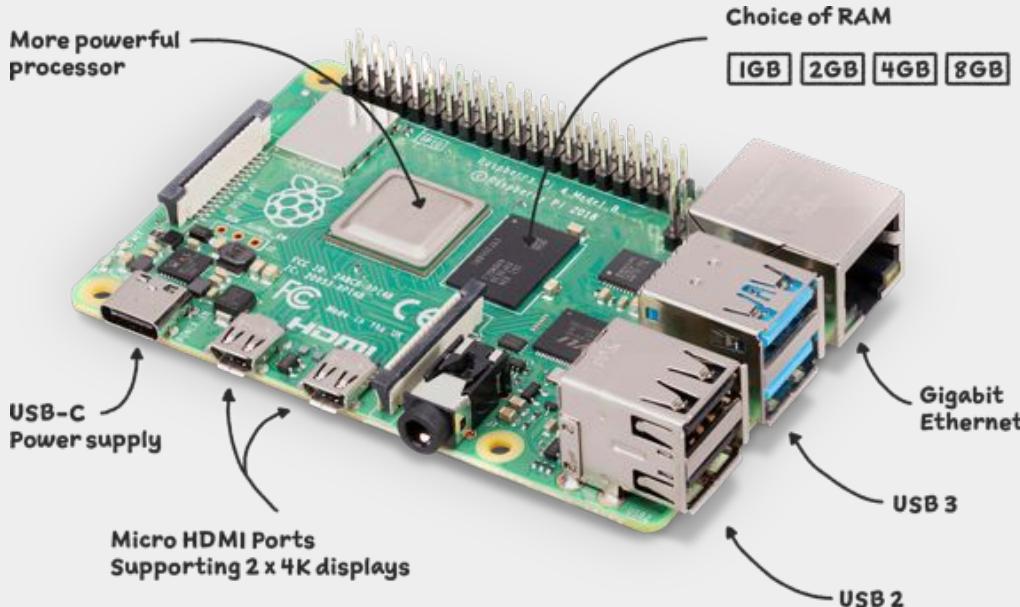
Sumber:

<https://www.instagram.com/vprojectmakers/>

Industrial Device x Arduino_



Board Microprocessor_



Source Image:
[https://www.raspberrypi.com
/products/raspberry-pi-4-model-b/](https://www.raspberrypi.com/products/raspberry-pi-4-model-b/)
[http://www.orangepi.org/html
/hardWare/computerAndMicrocontrollers/details/OrangePi-One.html](http://www.orangepi.org/html/hardWare/computerAndMicrocontrollers/details/OrangePi-One.html)

Board Microprocessor_

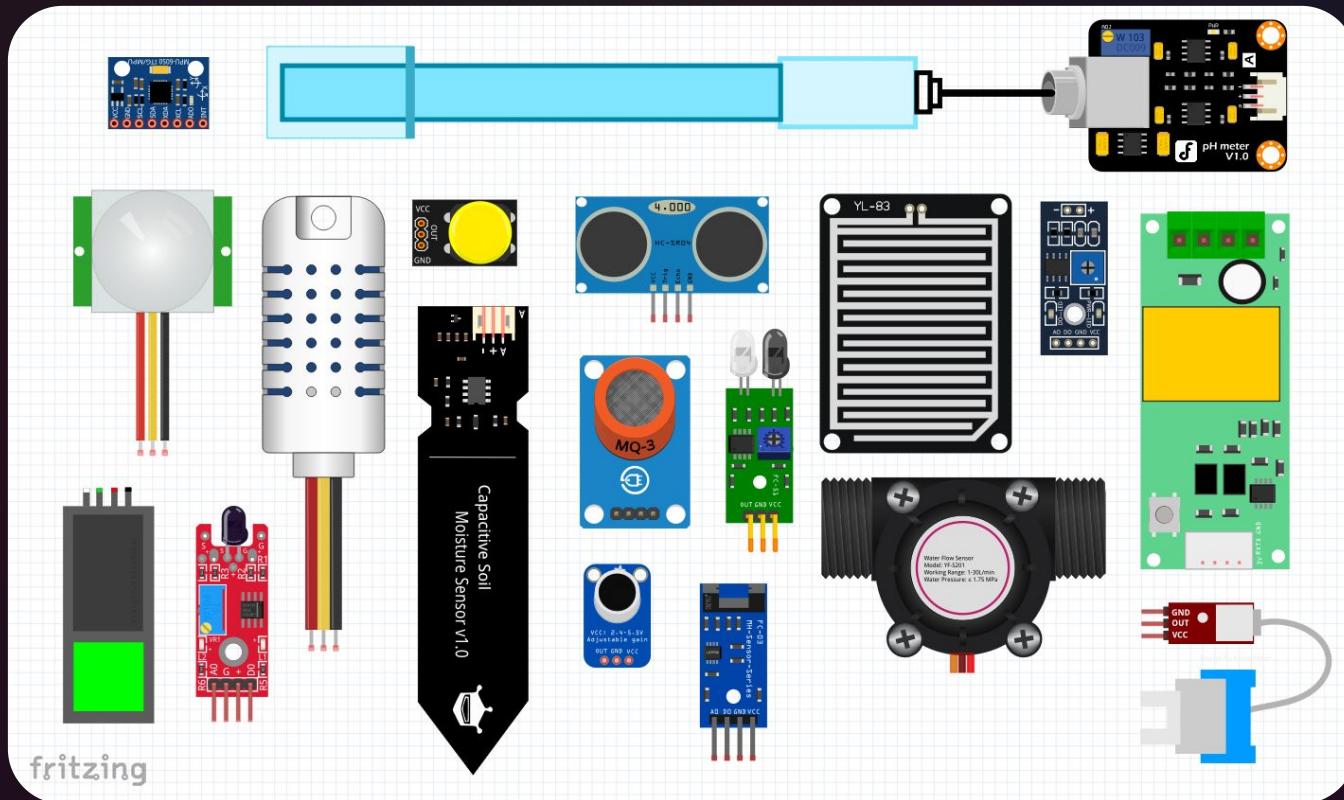
Source Image:

<https://www.raspberrypi.com/products/raspberry-pi-4-model-b/>



SENSOR & ACTUATOR

SENSOR_



INDUSTRIAL SENSOR



Inductive Proximity Sensor



Limit Switch



Magnetic
Proximity Sensor



Laser Sensor



Photoelectric Sensor

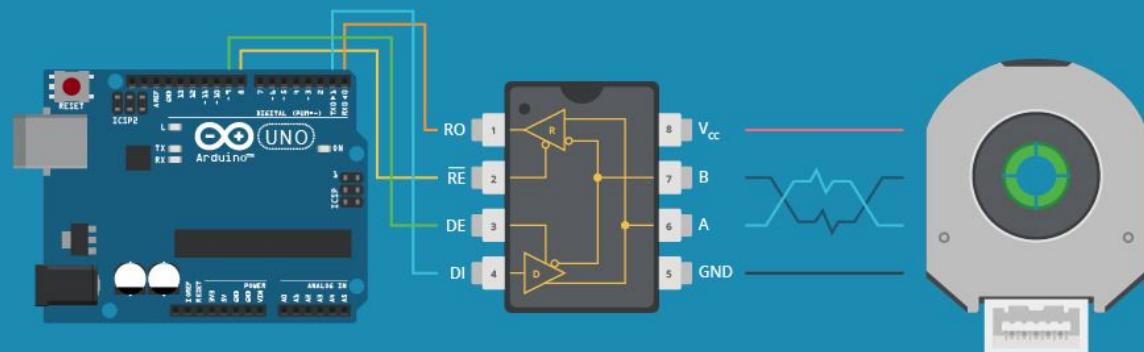


Capacitive
Proximity Sensor

InstrumentationTools.com

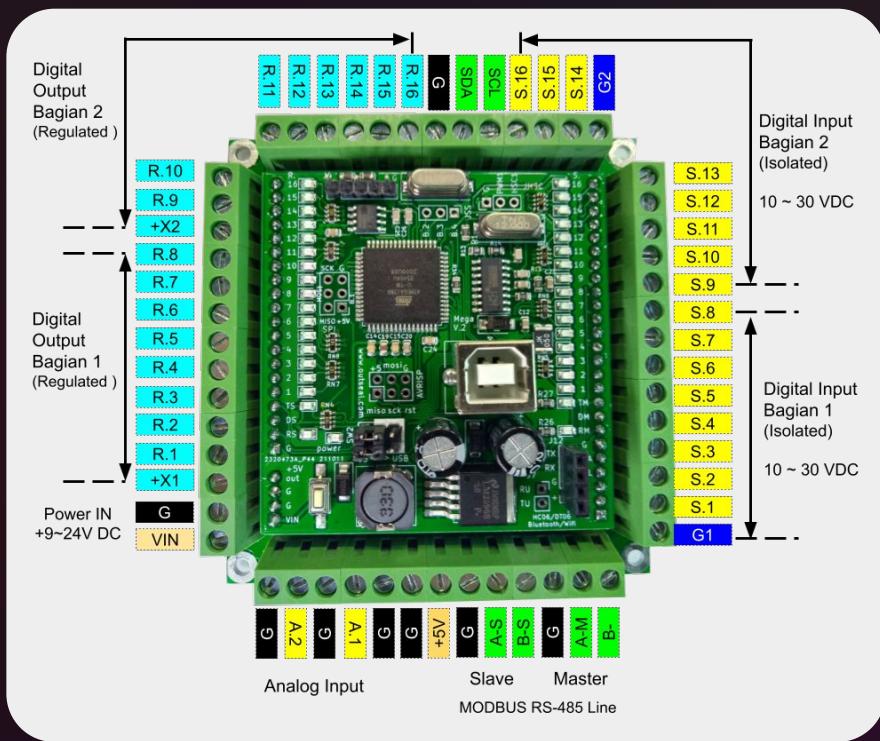
Source Image:
<https://instrumentationtools.com/sensors-handbook/>

INDUSTRIAL RS485 > ARDUINO_



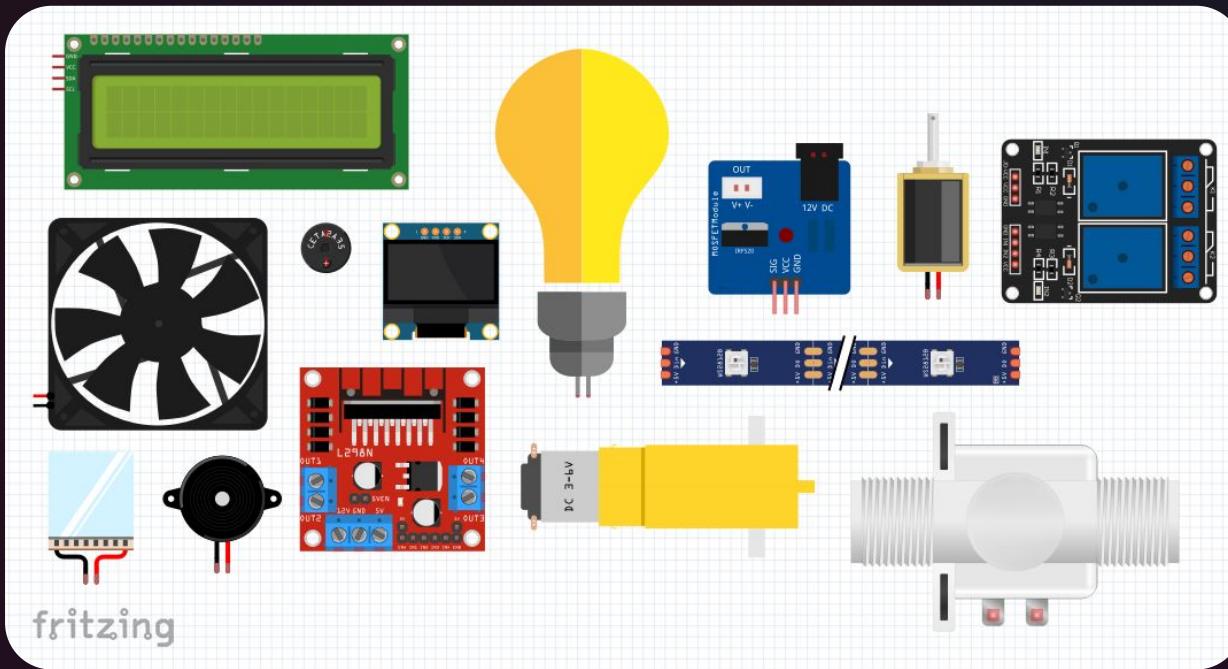
Source Image:
[https://www.cuidevices.com/
blog/rs-485-serial-interface-explained](https://www.cuidevices.com/blog/rs-485-serial-interface-explained)

INDUSTRIAL BOARD ARDUINO_



Source Image:
<https://www.outseal.com/site/index.html>

ACTUATOR DAN OUTPUT MODULE

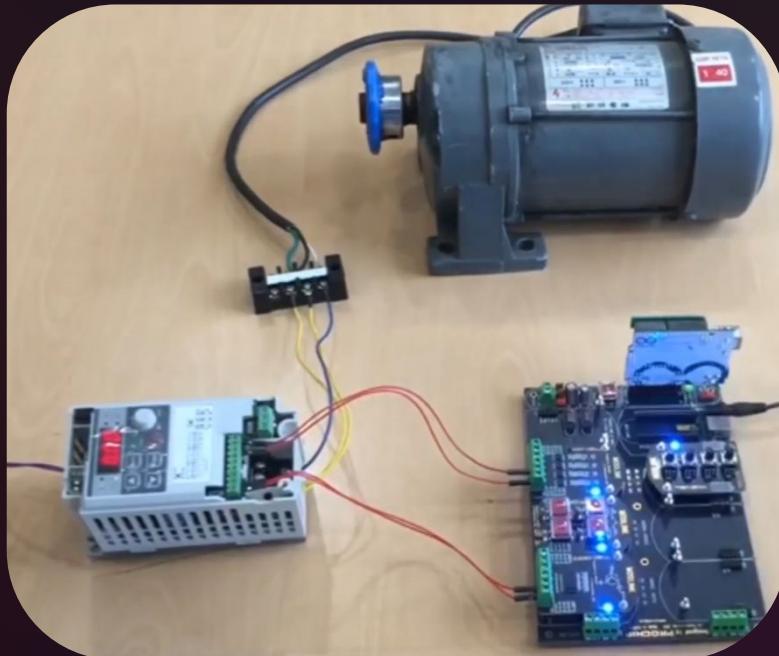


INDUSTRIAL ACTUATOR



Source Image:
<https://t2conline.com/industrial-linear-actuators-as-the-automation-tool/>

ARDUINO > INDUSTRIAL MOTOR AC_



Source Image:
[https://www.youtube.com/watch?
v=eenkkqM-0I4](https://www.youtube.com/watch?v=eenkkqM-0I4)

INTERNET OF THINGS

Pengertian IoT_



**Menghubungkan
Segala Hal ke
Internet.**

Syarat IoT_

Terhubung ke Internet

Machine to Machine

Database System

User Management

Visualisasi Data

Sistem Control dan Monitoring

Contoh Proyek IoT_

<https://project.kelasrobot.com/kwhmeter>

IoT Platform_

Thingspeak



Blynk

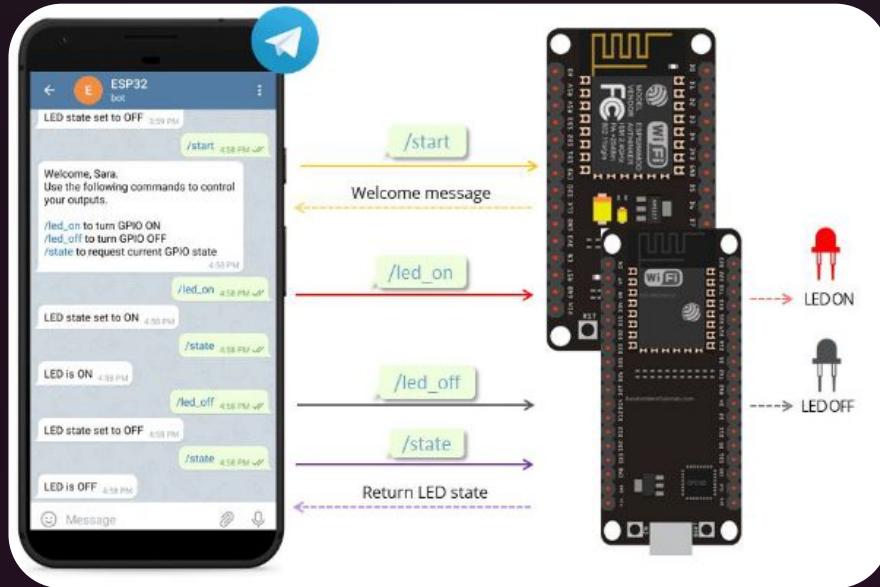


Source Image:

<https://thingspeak.com/>

<https://blynk.io/>

Pesan Telegram



Source Image:
<https://randomnerdtutorials.com/telegram-control-esp32-esp8266-nodemcu-outputs/>

ARTIFICIAL INTELLIGENCE

Pengertian AI_



“Sebuah Program
Komputer yang
meniru Kecerdasan
Manusia.”

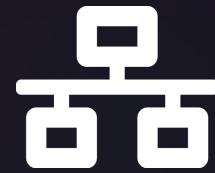
Sub Bidang AI



Machine Learning



Deep
Learning



Neural Network



Computer
Vision



Natural
Language
Processing

Penerapan AI_



Asisten Virtual



Jual Beli
Online



Mobil
Autonomous

MACHINE LEARNING

Pengertian Machine Learning



“Mesin Pembelajar
atau Bagaimana
Mesin Bisa
Belajar?”

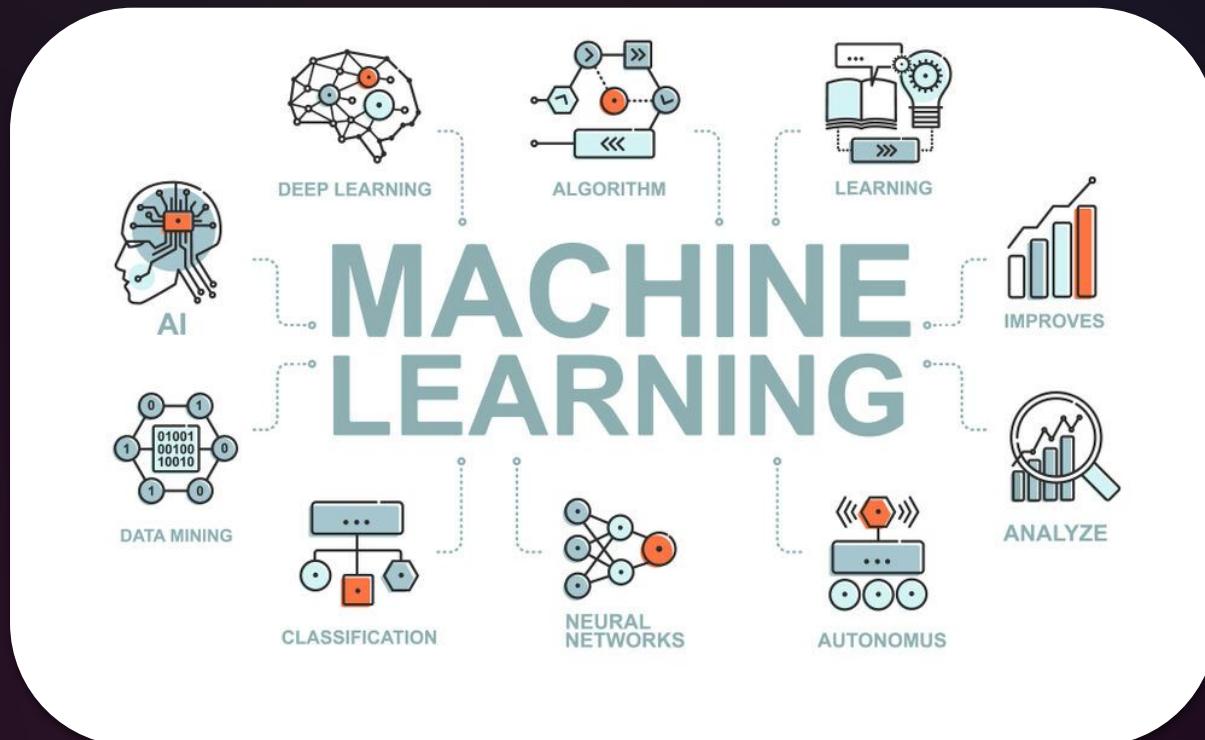
Pengertian Machine Learning

"Machine Learning is the field of study that gives computers the ability to learn without being explicitly programmed."

(Arthur Samuel, 1959)

Machine Learning Circle

Sumber Image:
<https://www.geo-circle.com/articles/49aba001-085c-4888-bbba-65f43bce951c/>

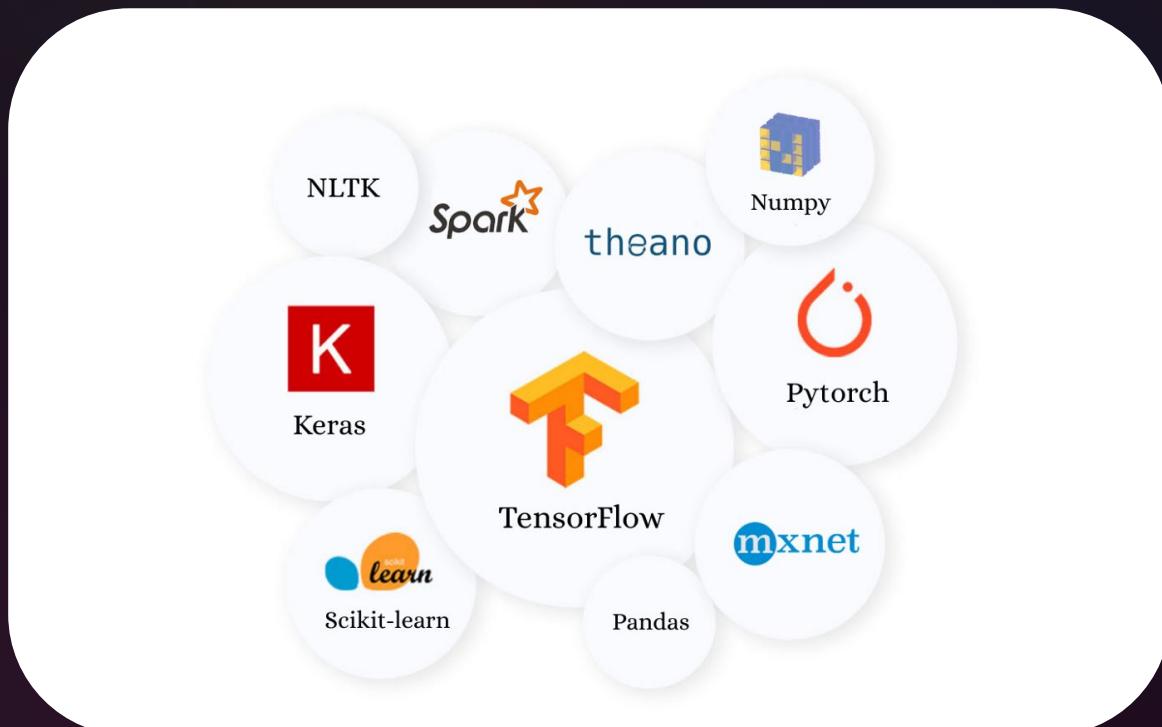


Pengertian Machine Learning

Machine learning ini sebenarnya pengembangan dari ilmu Matematika dan Statistika.

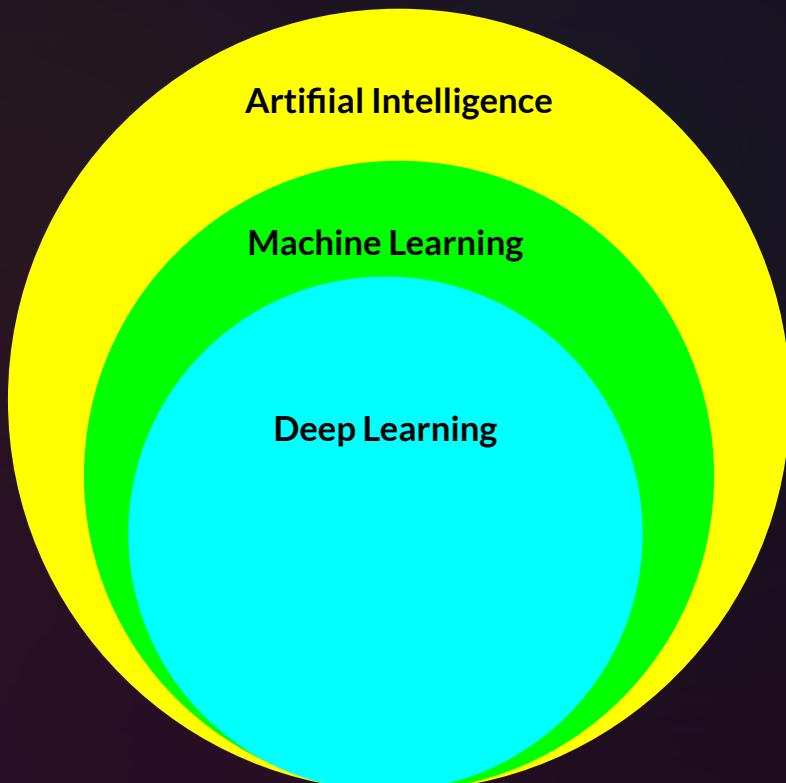
Machine Learning Tech_

<https://towardsdatascience.com/best-python-libraries-for-machine-learning-and-deep-learning-b0bd40c7e8c>



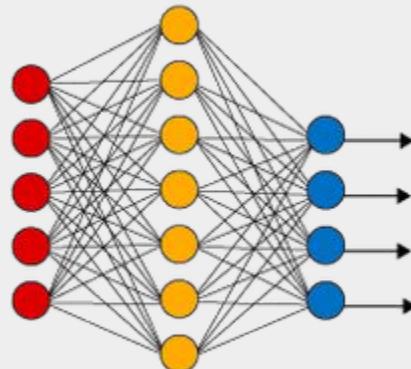
DEEP LEARNING

Pengertian Deep Learning



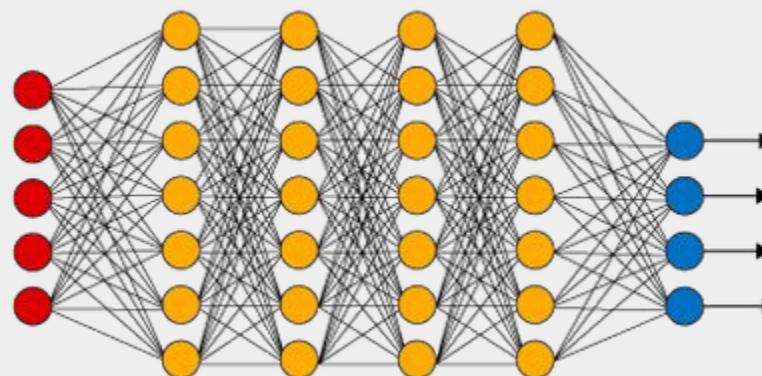
Deep Learning Neural Network

Simple Neural Network



● Input Layer

Deep Learning Neural Network



● Hidden Layer

● Output Layer

Deep Learning Tech_



Deep Learning with PyTorch

<https://tempodeinovacao.com.br/o-que-e-o-pytorch/>

COMPUTER VISION

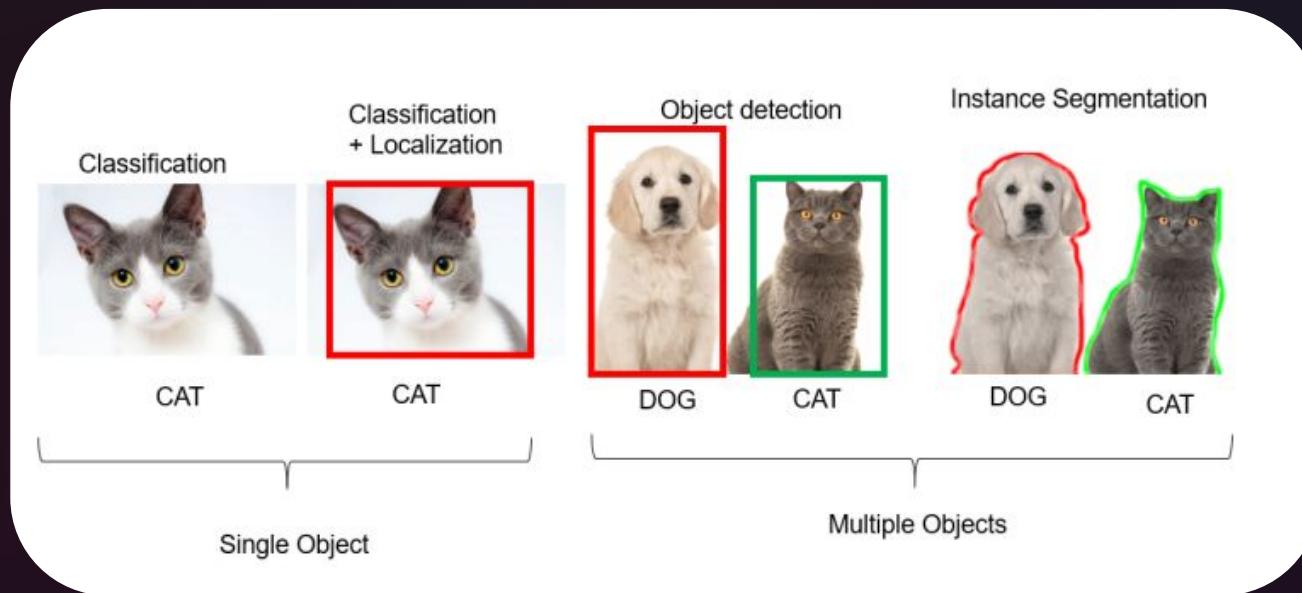
Pengertian Computer Vision

“Bagaimana
Komputer Dapat
Melihat?”



<https://www.searchenginejournal.com/generate-structured-data-automatically-computer-vision/373940/>

Pengertian Computer Vision



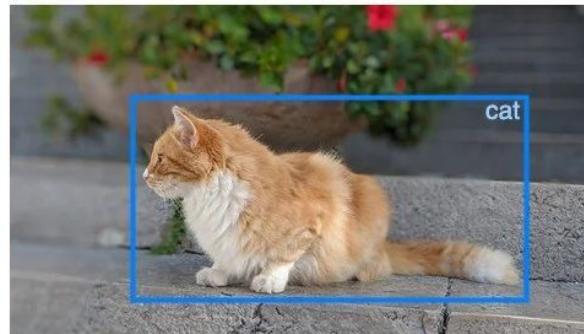
Klasifikasi, Object Detection, Segmentation

Image Classification



is there a cat?

Object Detection



where is the cat?

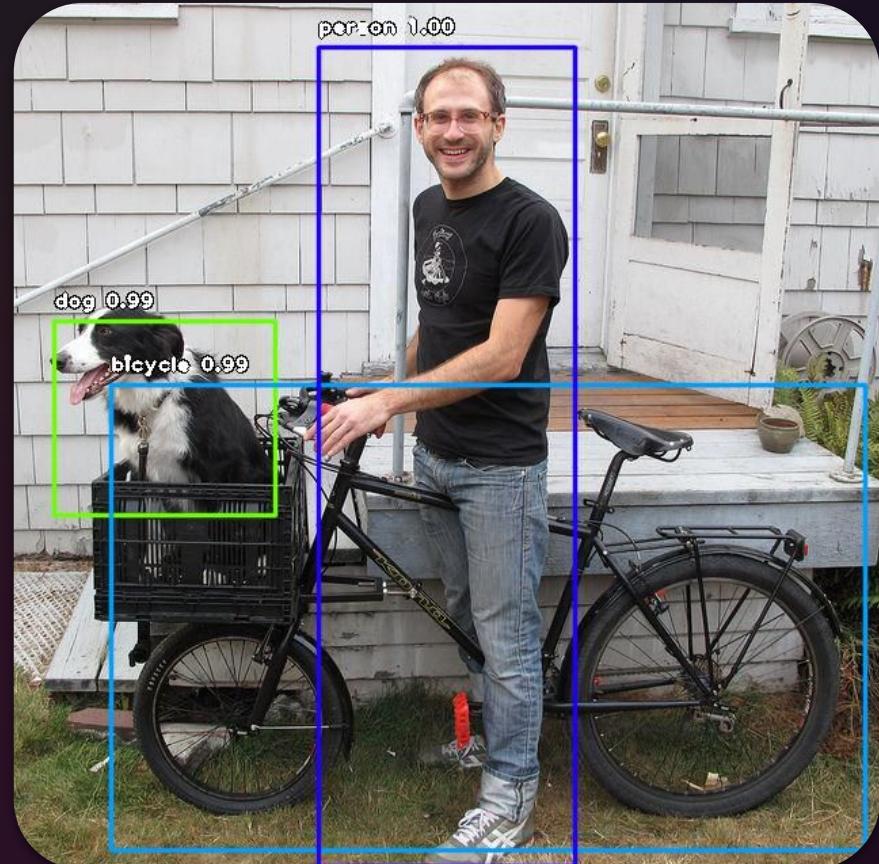
Image Segmentation



image pixels of the cat?

YOLO Object Detection

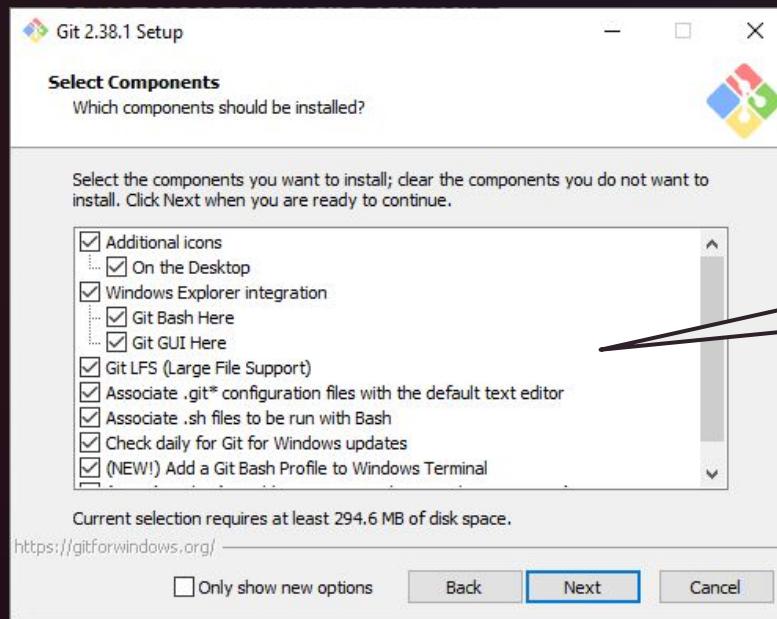
<https://analyticsindiamag.com/hands-on-guide-to-object-detection-using-yolo/>



PRAKTEK

Install GIT_

Download di Web Resmi: <https://git-scm.com/downloads>



CENTANG
SEMUA

Install Python 3.8.10_

Download di Web Resmi:

<https://www.python.org/downloads/release/python-3810/>

Catatan: jika sebelumnya sudah install versi 9 atau 10, install lagi aja versi 8, python bisa install berbagai versi.

Install Visual Studio Code_

Download di Web Resmi:

<https://code.visualstudio.com/download>

Alternatif untuk komputer kentang, bisa gunakan notepad++ atau Sublime.

Install Arduino IDE 1.8.x

Download di Web Resmi:

<https://www.arduino.cc/en/software>

Jika mau menggunakan versi 2 silakan, cuma tidak direkomendasikan di komputer kentang.

Download Proyek

<https://github.com/ajangrahmat/yolov4-mqtt>

melalui git

```
git clone https://github.com/ajangrahmat/yolov4-mqtt
```

Virtual Environment_

Install: pip install virtualenv

Create: virtualenv -p python3.8.10 yolov4

Install: pip install virtualenv

Activate: source yolov4/Scripts/activate

Deactivate: deactivate

Install Package_

```
pip install -r requirements.txt
```

Running Python_

python yolov4.py

python yolov4_mqtt.py

QnA