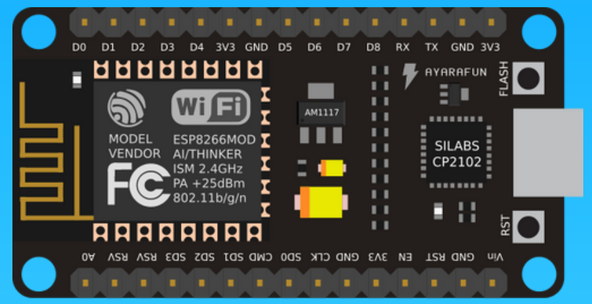
PYTHON PROGRAMMING FOR IOT

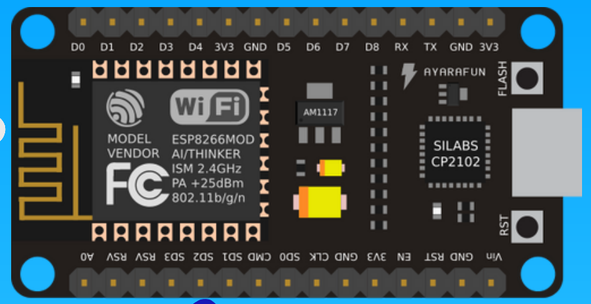


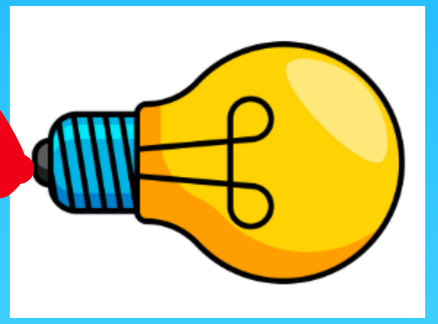
oleh : Muhammad Husni Muttaqin

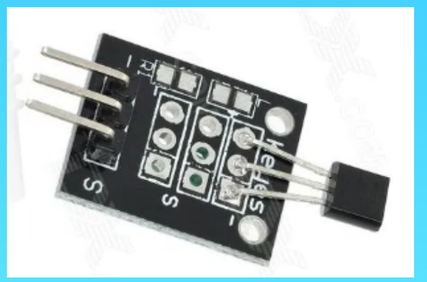
LET'S GO!

PERKENALKAN, SAYA MUHAMMAD HUSNI MUTTAQIN

Saya adalah seorang Python Programmer di PT Syergie Indoprima dan seorang mahasiswa pascasarjana di STEI ITB. Disini saya akan sharing tentang python programming untuk elektronika yang merupakan pekerjaan saya sehari-hari saya harap teman teman dapat menikmati learning series kali ini. mudah mudahan dapat bermanfaat ilmunya







Internet connection

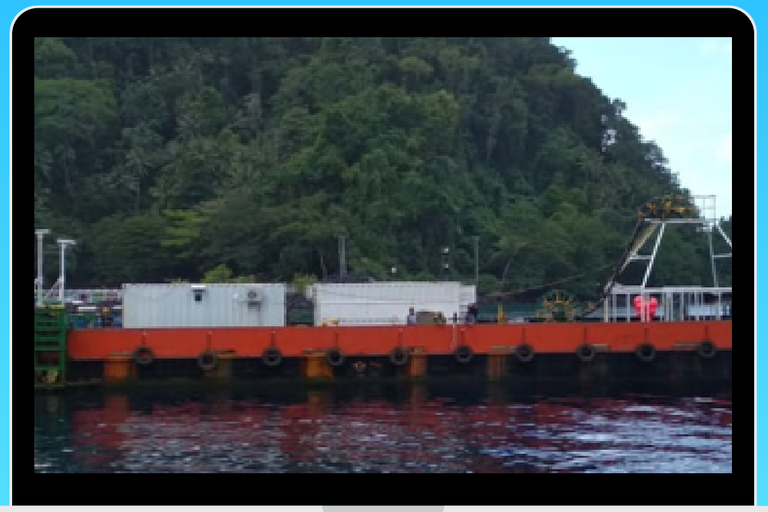
read sensor

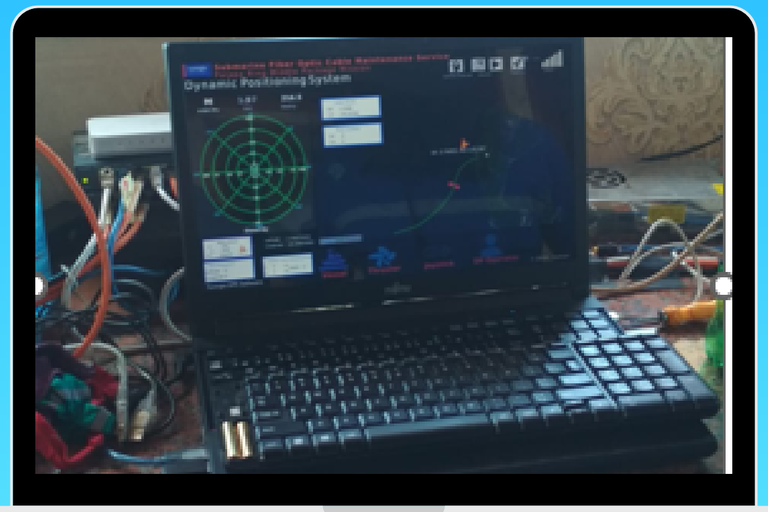
send voltage output

TENTANG PEKERJAAN SAYA

saya dan tim mengembangkan aplikasi dengan bahasa pemrograman python yang terintegrasi dengan microcontroller untuk peralatan penunjang instalasi kabel laut

skill requirement : microcontroller, python, electronics





TENTANG HOBI SAYA

hobi saya adalah ikutan riset dikampus. apa saja yang saya sudah buat ?

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The Training of Making Graphical User Interface (GUI) Using Python for Teachers and Students of Engineering Vocational School in Purwakarta

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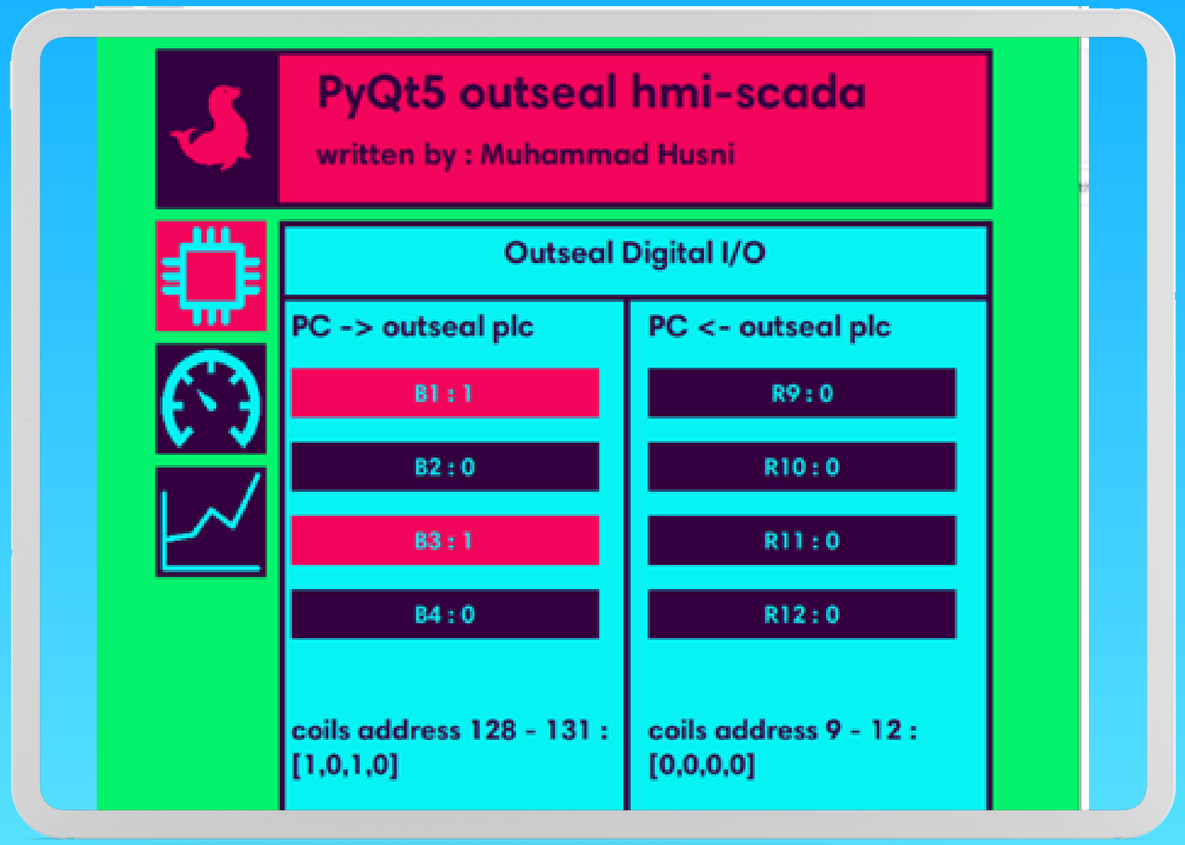
ABSTRACT

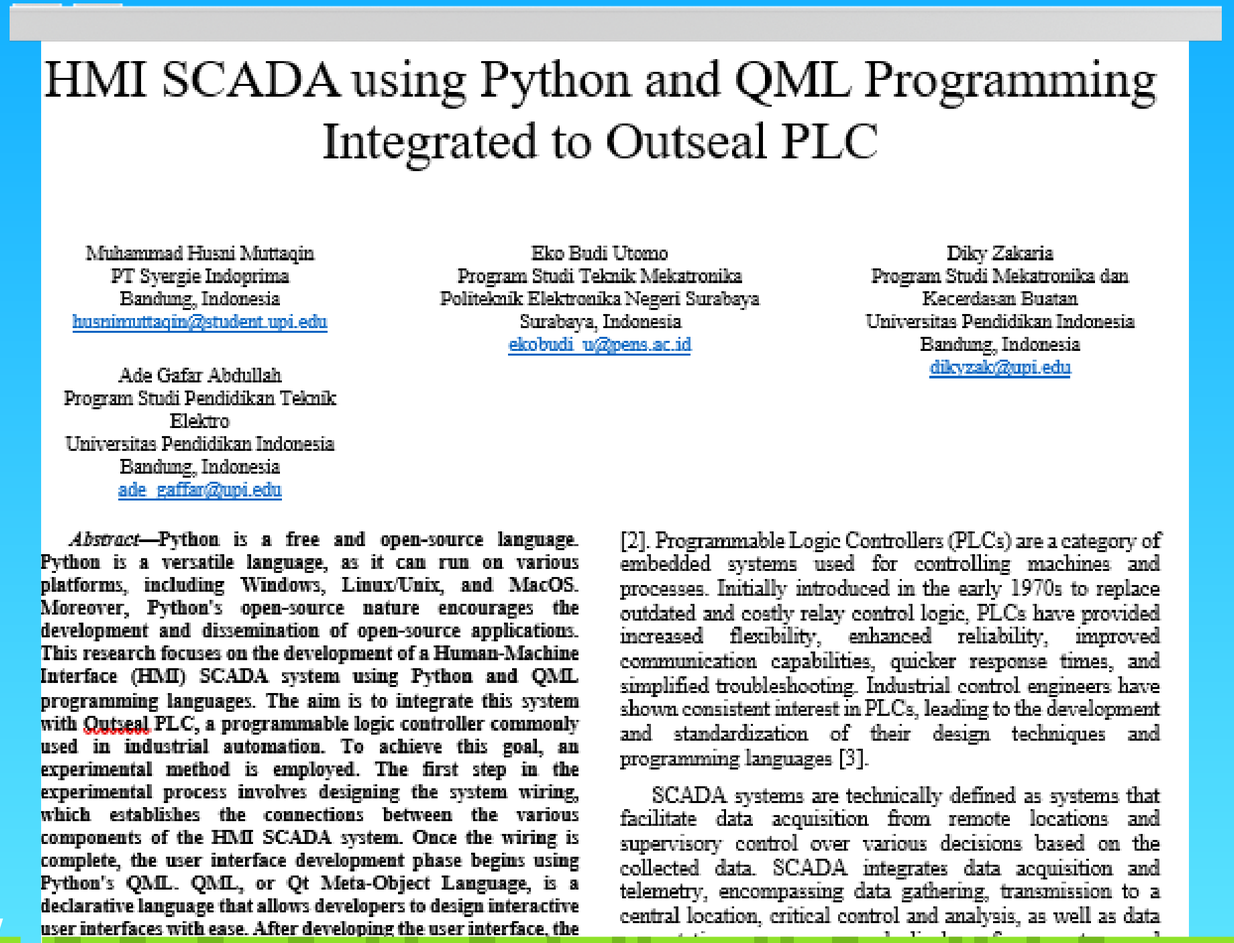
The purpose of this community service activity is to introduce the Python programming language to teachers and students of vocational school in Purwakarta exploiting an application to create a simple graphical user interface (GUI). Python is a programming language that is currently trending. The training was carried out in 3 stages, namely preparation, implementation and evaluation. As a result, participants were able to follow this training well and were able to create their own version of a simple GUI. Participants were also able to integrate their GUI with Arduino. After this activity, participants are expected to be able to explore how to make simple GUI using the modules that have been given.

Keywords: *Python, GUI, Arduino, Vocational School, Teacher, Student.*

hobi saya adalah ikutan riset dikampus. apa saja yang saya sudah buat ?



https://www.instagram.com/p/Cm6iV0dpSBB/



HMI SCADA using Python and QML Programming Integrated to Outseal PLC

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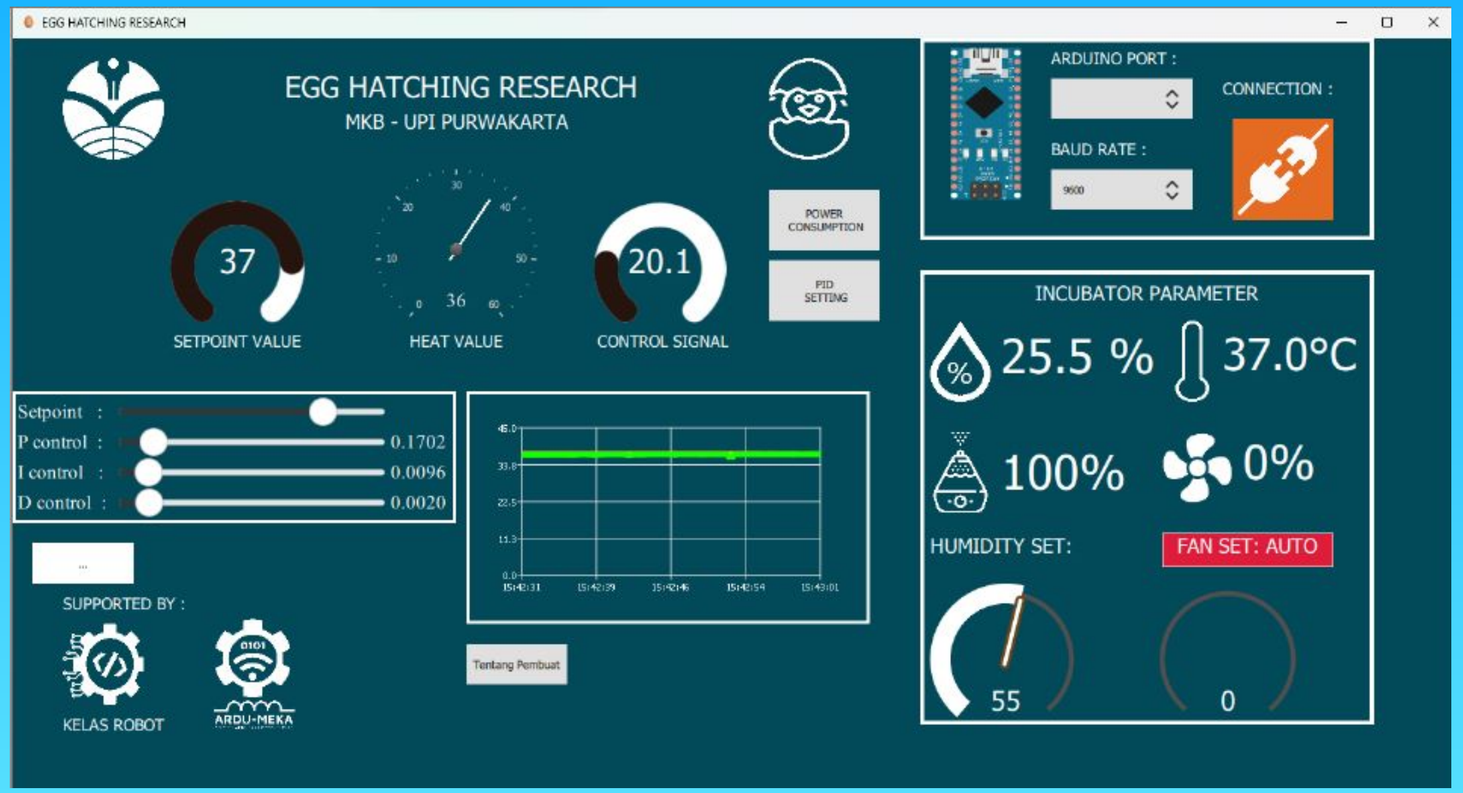
***Abstract*—Python is a free and open-source language. Python is a versatile language, as it can run on various platforms, including Windows, Linux/Unix, and MacOS. Moreover, Python's open-source nature encourages the development and dissemination of open-source applications. This research focuses on the development of a Human-Machine Interface (HMI) SCADA system using Python and QML programming languages. The aim is to integrate this system with Outseal PLC, a programmable logic controller commonly used in industrial automation. To achieve this goal, an experimental method is employed. The first step in the experimental process involves designing the system wiring, which establishes the connections between the various components of the HMI SCADA system. Once the wiring is complete, the user interface development phase begins using Python's QML. QML, or Qt Meta-Object Language, is a declarative language that allows developers to design interactive user interfaces with ease. After developing the user interface, the**

[2]. Programmable Logic Controllers (PLCs) are a category of embedded systems used for controlling machines and processes. Initially introduced in the early 1970s to replace outdated and costly relay control logic, PLCs have provided increased flexibility, enhanced reliability, improved communication capabilities, quicker response times, and simplified troubleshooting. Industrial control engineers have shown consistent interest in PLCs, leading to the development and standardization of their design techniques and programming languages [3].

SCADA systems are technically defined as systems that facilitate data acquisition from remote locations and supervisory control over various decisions based on the collected data. SCADA integrates data acquisition and telemetry, encompassing data gathering, transmission to a central location, critical control and analysis, as well as data

TENTANG HOBI SAYA

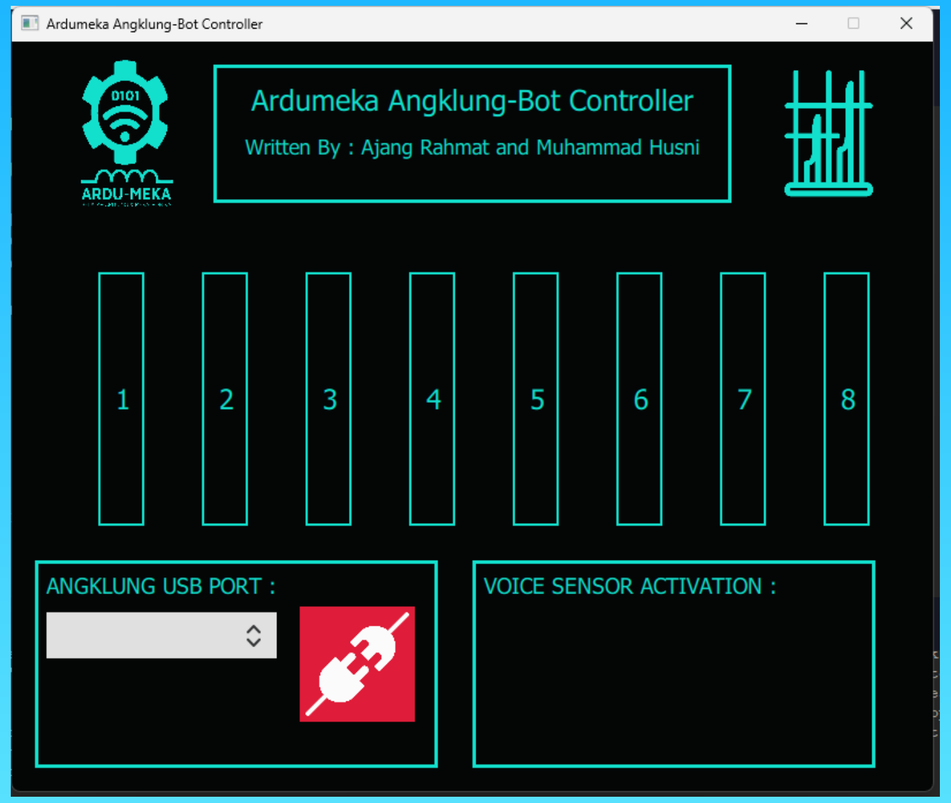
hobi saya adalah ikutan riset dikampus. apa saja yang saya sudah buat ?



TENTANG HOBI SAYA

selain di kampus, saya juga suka aktif di komunitas. nah ini acara di sumedang creative fest

https://www.instagram.com/p/Clu7rM-yPoS/?img_index=5



JADI HARI INI KITA AKAN MEMBUAT APLIKASI DESKTOP UNTUK IOT. APA SAJA CONTOH PENGAPLIKASIANYA ?

1. APLIKASI TIKETING DI STASIUN

JADI HARI INI KITA AKAN MEMBUAT APLIKASI DESKTOP UNTUK IOT. APA SAJA CONTOH PENGAPLIKASIANYA ?

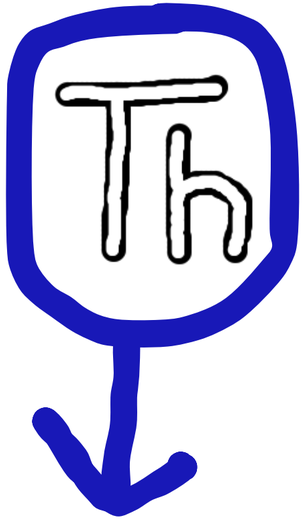
2. NAVIGASI MOBIL

JADI HARI INI KITA AKAN MEMBUAT APLIKASI DESKTOP UNTUK IOT. APA SAJA CONTOH PENGAPLIKASIANYA ?

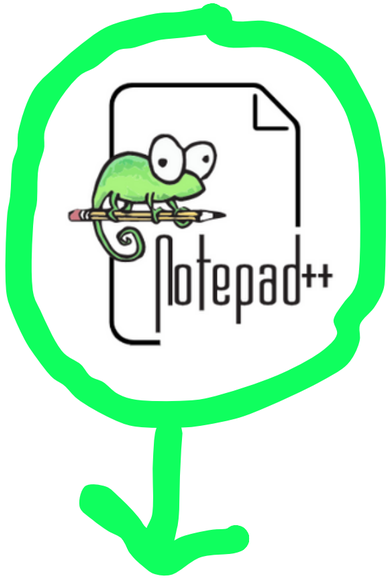
3. VENDING MACHINE

SOFTWARE YANG KITA BUTUHKAN

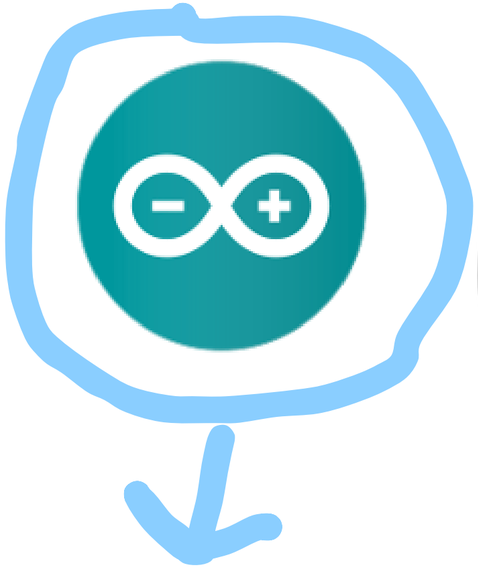
kita memerlukan beberapa aplikasi



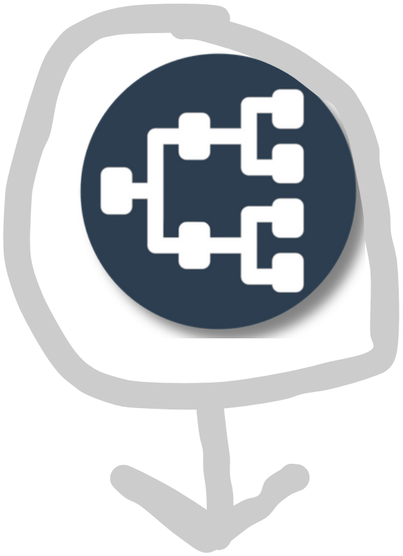
untuk coding
Python



untuk coding
QML



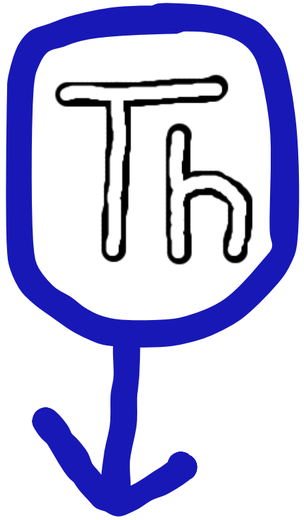
untuk coding
Arduino



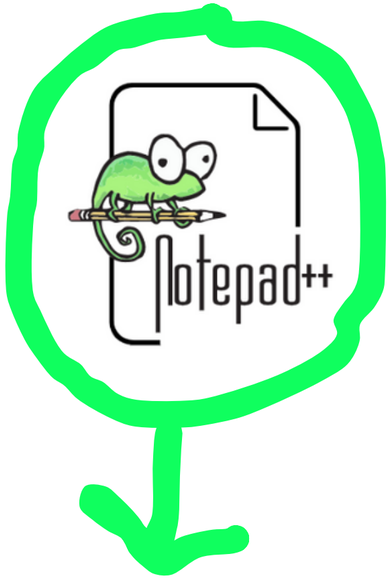
untuk debug
MQTT

TATA CARA INSTALASINYA

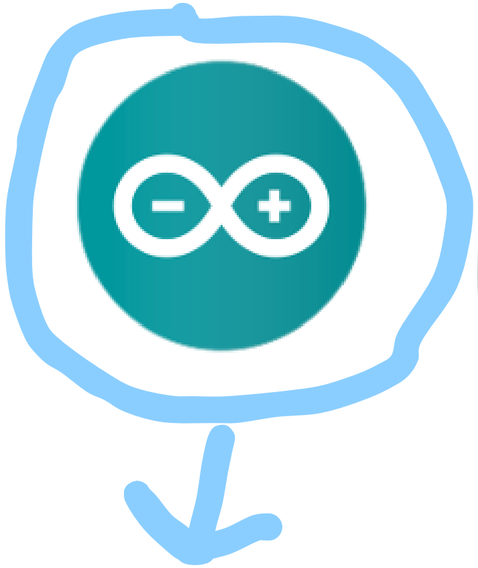
disini install seperti biasa saja karena semuanya open source



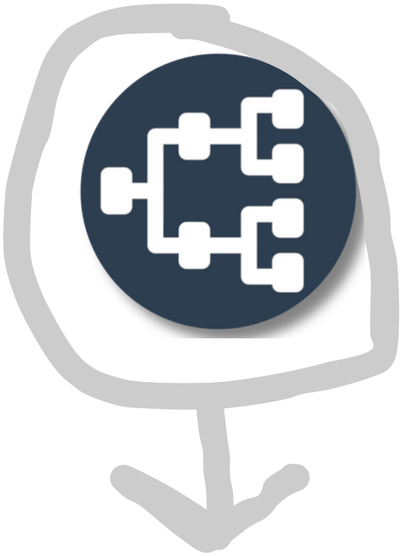
untuk coding
Python



untuk coding
QML



untuk coding
Arduino



untuk debug
MQTT

PERKENALAN CODING PYTHON

mungkin beberapa ada yang baru pertama kali mencoba

Kita Coba syntax dasar :

- **Print text**
- **Membuat variable**
- **Input variabel**
- **Tipe data**
- **Operasi matematika**

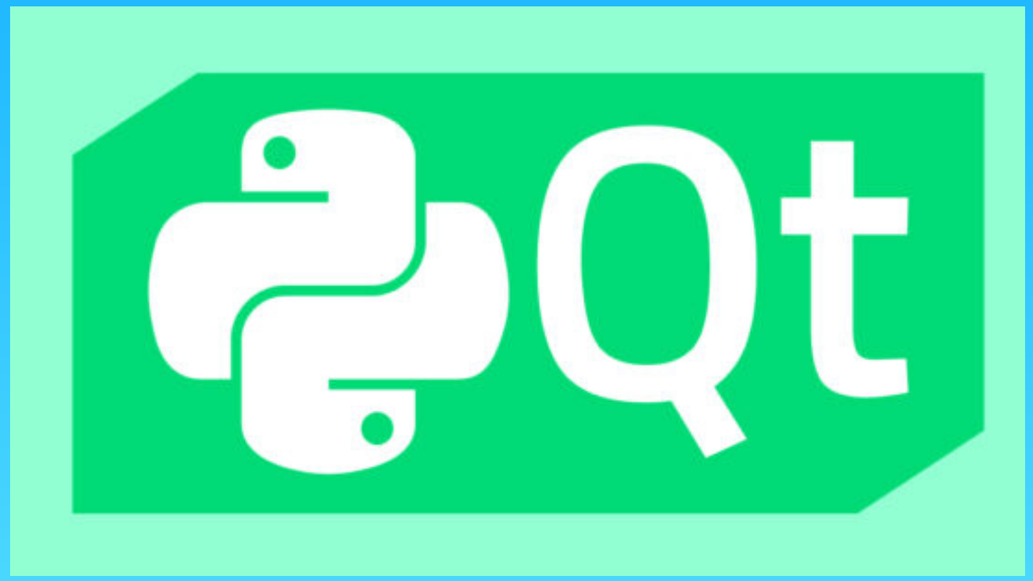
PERKENALAN CODING PYTHON

perintah	instruksi
print kata "hello world"	print ("hello world")
membuat variabel a	a = 10
memasukkan nilai pada variabel a	a = input("masukkan nilai a : ")
mencoba beberapa tipe data	string, float, integer, boolean
mencoba beberapa operasi matematika	+ - * /

PERKENALAN CODING PYTHON

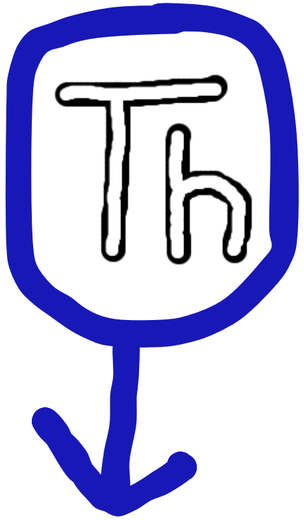
1. **String (str):**
   - **Tipe data "string" digunakan untuk menyimpan teks atau urutan karakter.**
   - **Dalam Python, string didefinisikan dengan tanda kutip tunggal ('...') atau tanda kutip ganda ("...").**
   - **Contoh: nama = "John", kalimat = 'Halo, dunia!'**
2. **Integer (int):**
   - **Tipe data "integer" digunakan untuk menyimpan bilangan bulat (angka tanpa desimal).**
   - **Contoh: umur = 25, jumlah_barang = 10**
3. **Float (float):**
   - **Tipe data "float" digunakan untuk menyimpan bilangan pecahan atau bilangan desimal.**
   - **Contoh: harga = 19.99, tinggi = 1.75**
4. **Boolean (bool):**
   - **Tipe data "boolean" hanya memiliki dua nilai mungkin, yaitu True (benar) atau False (salah).**
   - **Digunakan untuk menyatakan logika pernyataan atau kondisi.**

PERKENALAN CODING PYTHON DAN QML

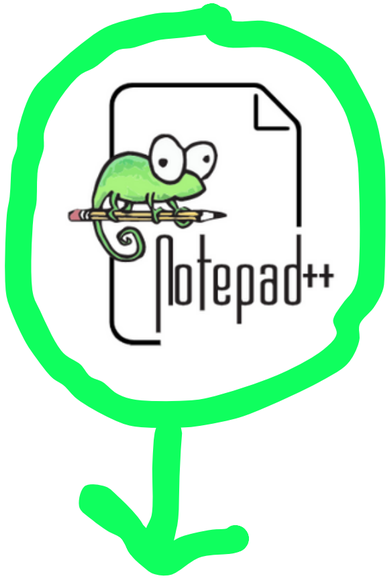


INSTALASI LIBRARY TAMBAHAN

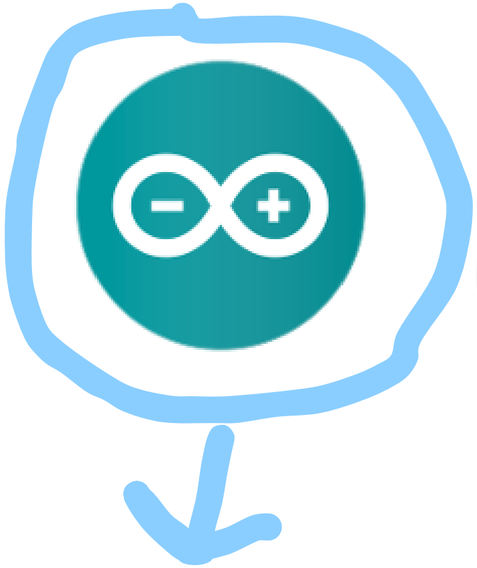
disini install seperti biasa saja karena semuanya open source



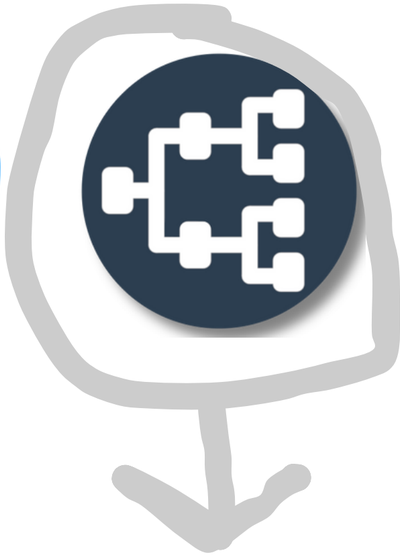
PyQt5
paho.mqtt



-



esp8266 board
pubsubclient

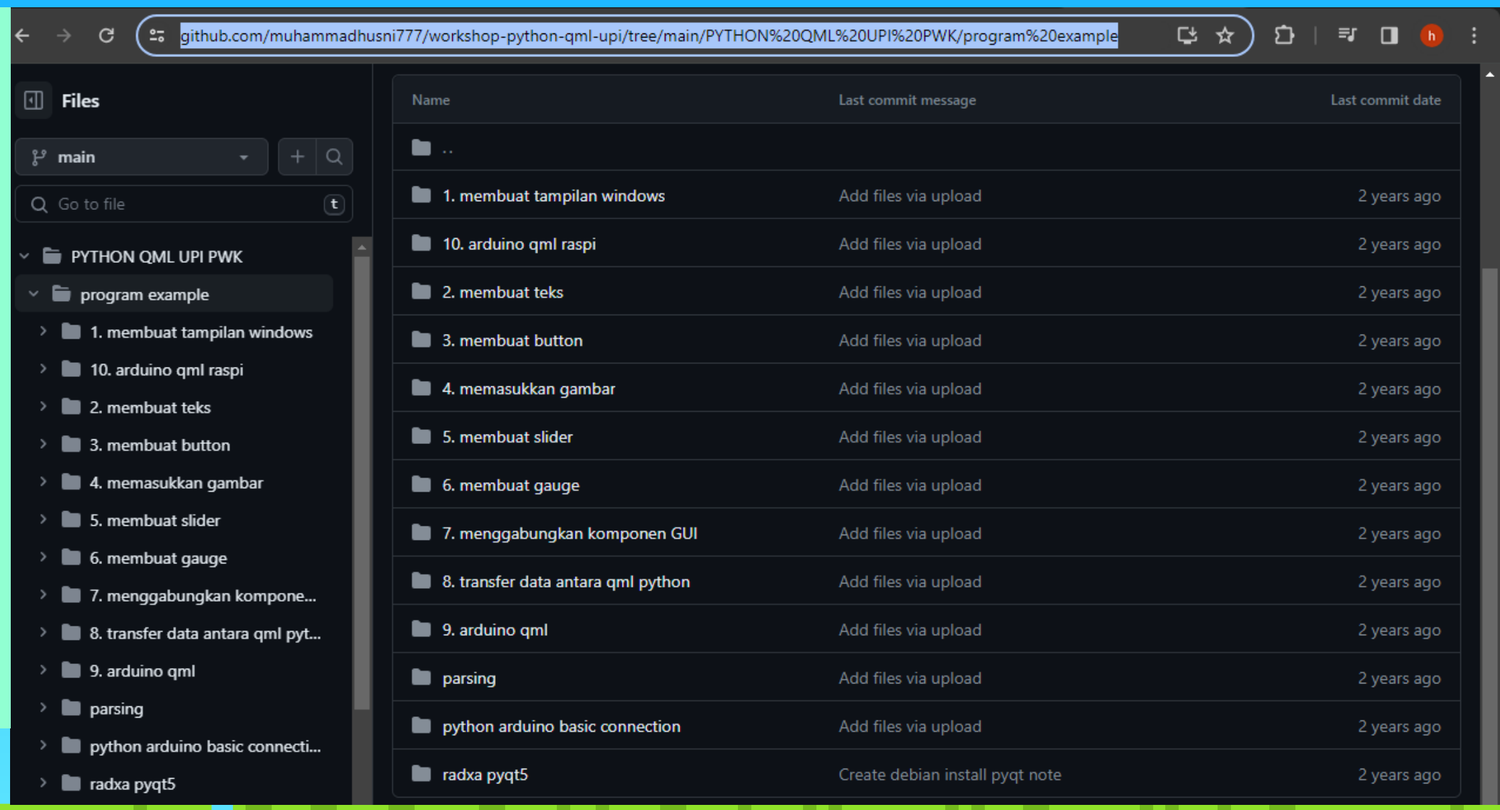


-

CODING MINIMUM UNTUK PYTHON QML

sudah ada template nya supaya bisa cepat dalam ngoding

https://github.com/muhammadhusni777/workshop-python-qml-upi/tree/main/PYTHON%20QML%20UPI%20PWK/program%20example

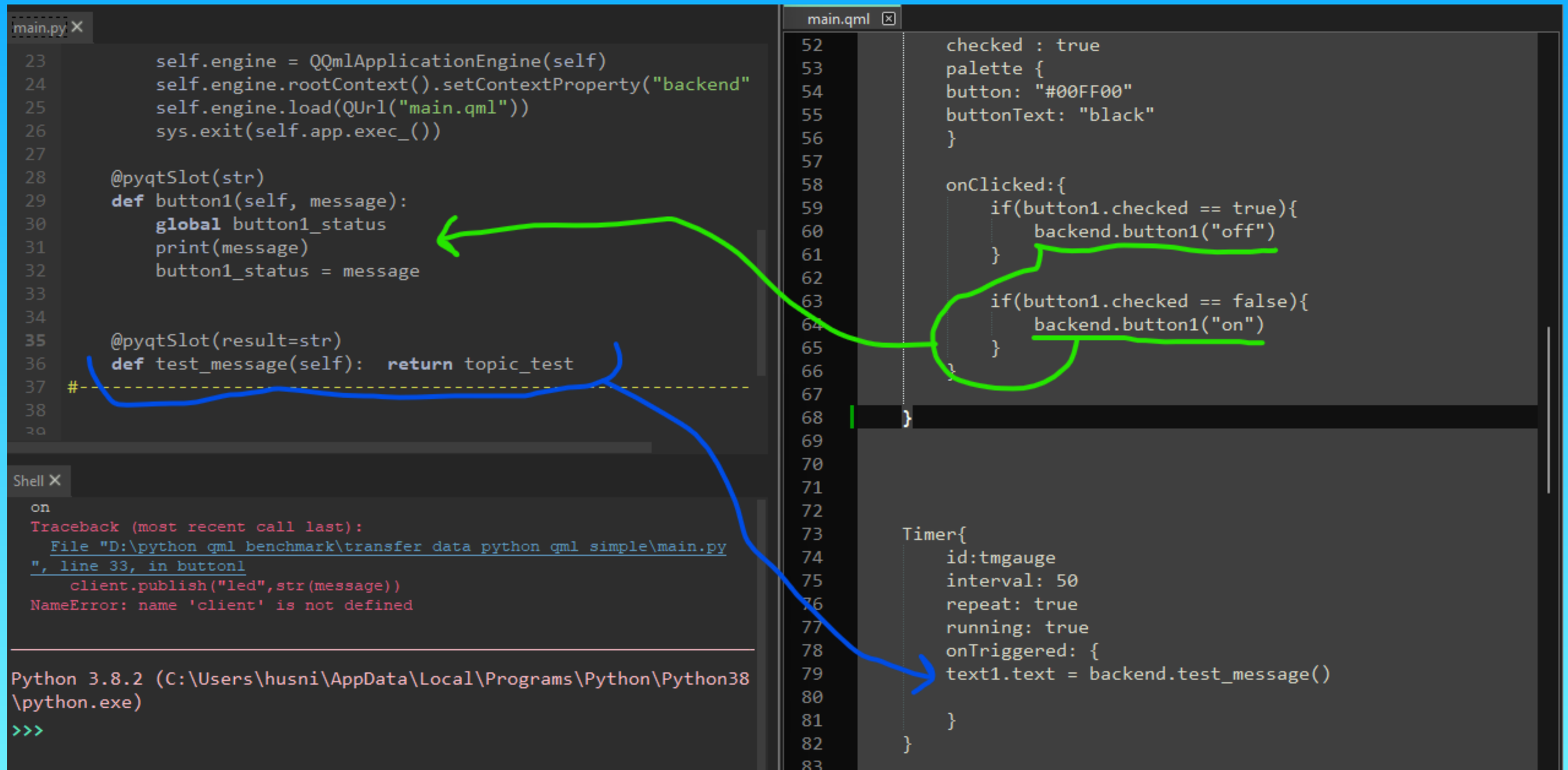


CODING MINIMUM UNTUK PYTHON QML

sudah ada template nya supaya bisa cepat dalam ngoding

https://github.com/muhammadhusni777/WORKSHOP-SUKABUMI/tree/main/transfer%20data%20python%20qml%20simple

CARA KERJANYA



main.py

```
23          self.engine = QQmlApplicationEngine(self)
24          self.engine.rootContext().setContextProperty("backend"
25          self.engine.load(QUrl("main.qml"))
26          sys.exit(self.app.exec_())
27
28      @pyqtSlot(str)
29      def button1(self, message):
30          global button1_status
31          print(message)
32          button1_status = message
33
34
35      @pyqtSlot(result=str)
36      def test_message(self):  return topic_test
37  #-----------------------------------------------------------
38
```

Shell

```
on
Traceback (most recent call last):
  File "D:\python qml benchmark\transfer data python qml simple\main.py
", line 33, in button1
    client.publish("led",str(message))
NameError: name 'client' is not defined

Python 3.8.2 (C:\Users\husni\AppData\Local\Programs\Python\Python38
\python.exe)
>>>
```

main.qml

```
52          checked : true
53          palette {
54          button: "#00FF00"
55          buttonText: "black"
56          }
57
58          onClicked:{
59              if(button1.checked == true){
60                  backend.button1("off")
61              }
62
63              if(button1.checked == false){
64                  backend.button1("on")
65              }
66          }
67
68      }
69
70
71
72
73      Timer{
74          id:tmgauge
75          interval: 50
76          repeat: true
77          running: true
78          onTriggered: {
79          text1.text = backend.test_message()
80
81          }
82      }
83
```

KOMPONEN PADA QML

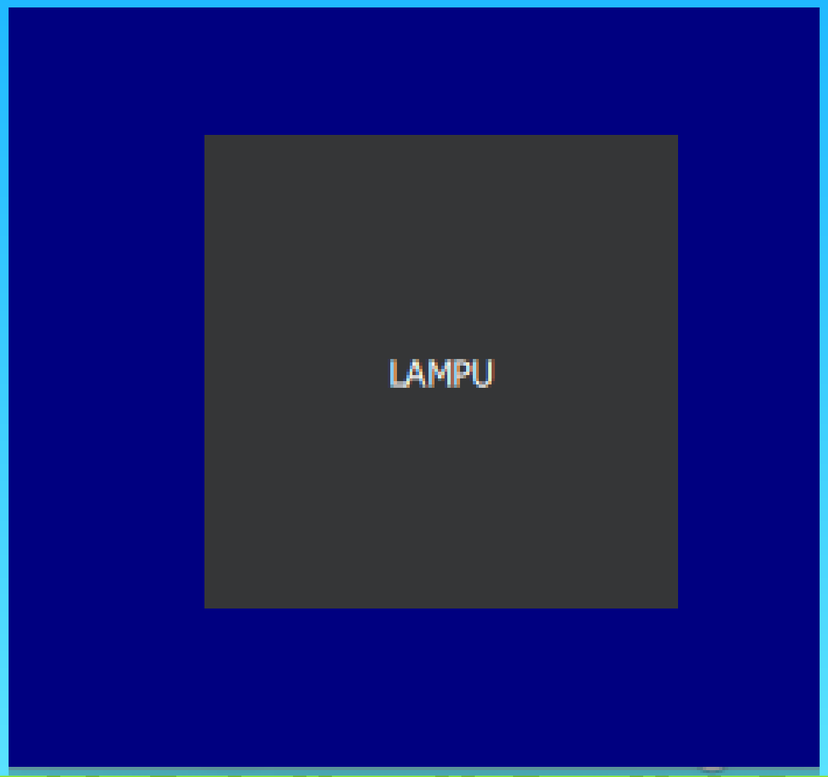
text

```
Text{
    id : text1
    x:100
    y:200
    text:"Hello World"
    color: "#00FF00"
    font.family   : "Comic Sans MS"
    font.pixelSize: 35
    font.bold : true
    }
}
```

KOMPONEN PADA QML

Button

```
Button {
        id: button1
        anchors.horizontalCenter: parent.horizontalCenter
        y :200
        width : 150
        height : 150
        text: "LAMPU"
        checkable : true
        checked : true
        palette {
        button: "#00FF00"
        buttonText: "black"
        }

        onClicked:{
            if(button1.checked == true){
                backend.button1("off")
            }

            if(button1.checked == false){
                backend.button1("on")
            }
        }
}
```



KOMPONEN PADA QML

Image

```
Image{
    x:50
    y:0
    width : 250
    height : 250
    source: "arduino.png"
    }
```

KOMPONEN PADA QML

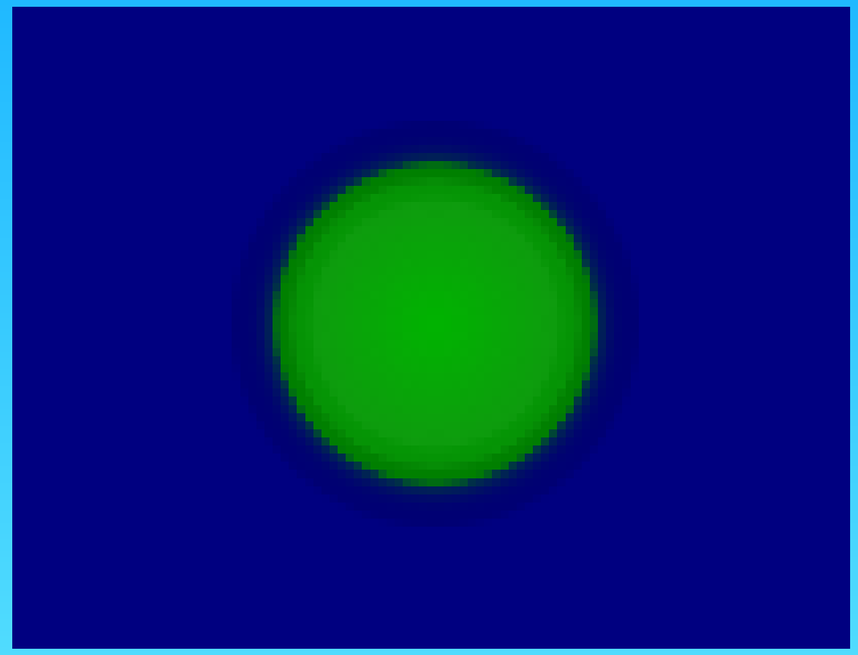
Gauge

```
CircularGauge {
        id : gauge1
        x: 10
        y: 70
        height : 250
        width : 250
        value: 0
        minimumValue: 0
        maximumValue: 100

        style: CircularGaugeStyle {
            labelStepSize: 10
```

KOMPONEN PADA QML

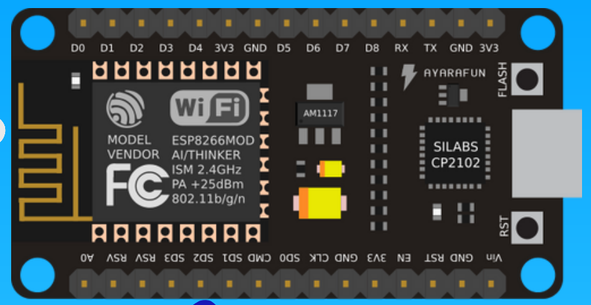
Status Indicator

```
StatusIndicator{
        id : indicator1
        x : 170
        y : 130
        width : 50
        height : 50
        color : "green"
        active  :true

    }
```

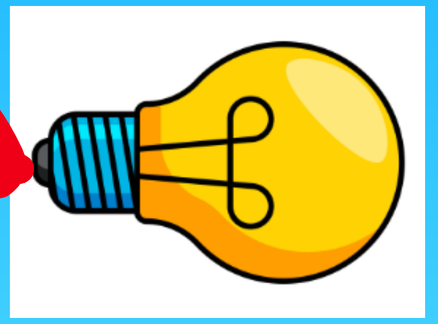


MENGIRIMKAN DATA KE MICROCONTROLLER MELALUI MQTT

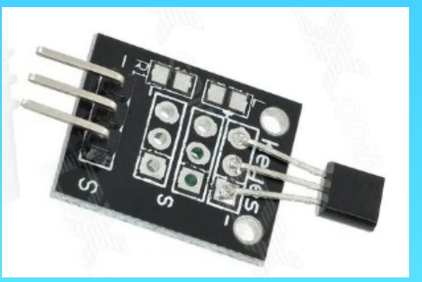
broker : mqtt.ardumeka.com
port : 11219



topic : “lamp”
message : “on” atau “off”

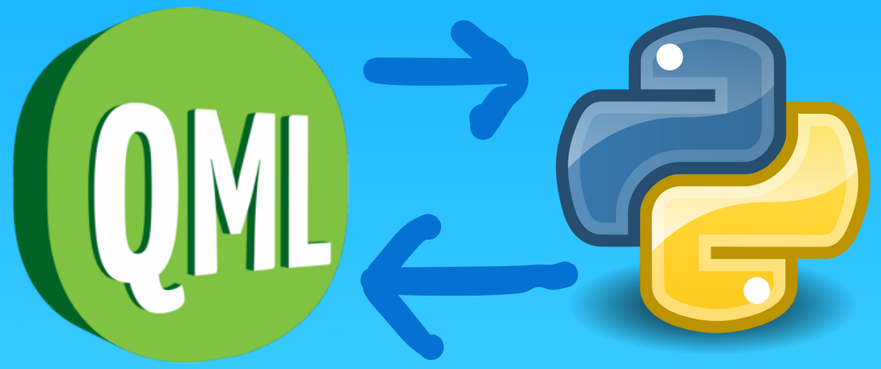


topic : “sensor”
message : *angka pembacaan



CODING PYTHON QML MQTT

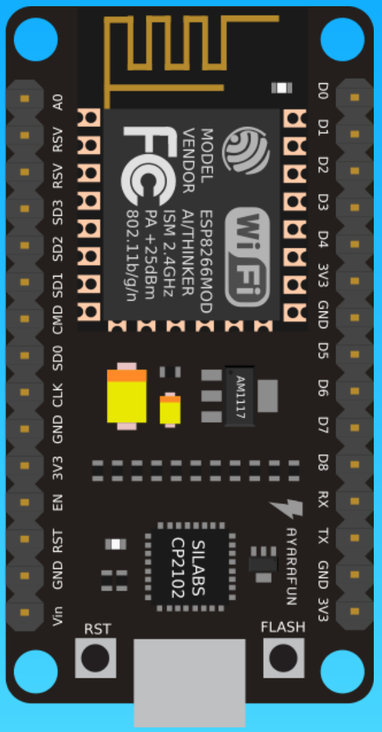
- Menghubungkan Program QML dan Python
- Mengirimkan data MQTT sesuai dengan apa yang dirancang
- Membaca data MQTT sesuai apa yang dirancang



https://github.com/muhammadhusni777/WORKSHOP-SUKABUMI/tree/main/16.%20MQTT%20GUI

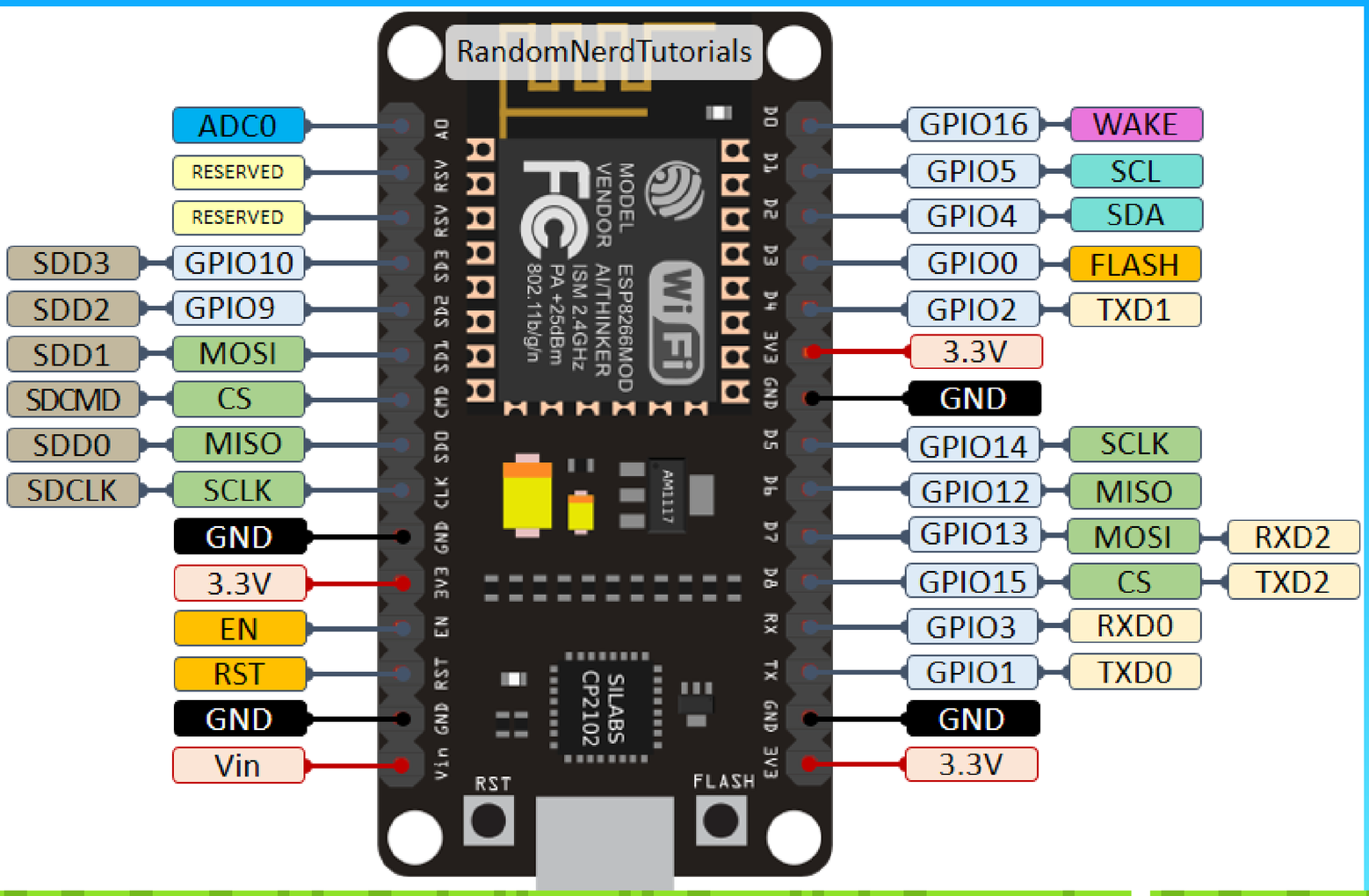
CODING ESP8266 MQTT

- Menghubungkan Microcontroller ke WiFi
- Menghubungkan ke broker MQTT
- Menerima data MQTT sesuai apa yang dirancang
- Mengirim data MQTT sesuai apa yang dirancang



https://github.com/muhammadhusni777/WORKSHOP-SUKABUMI/tree/main/16.%20MQTT%20GUI

CODING ESP8266 MQTT



CARA KERJA KESELURUHAN

ADA YANG MAU DIDISKUSIKAN ?

WAKTUNYA BERKREASI

coba buatkan sebuah miniatur aplikasi IoT dengan python dan QML dengan komponen yang disediakan