

IOT <=> AI

ผศ. เนลิมชันม์ ไวยด์วงศ์

สาขาวิชา วิศวกรรมอุตสาหการ

คณะวิศวกรรมศาสตร์ มหาวิทยาลัยหอการค้าไทย

<https://github.com/chalermchonvis/IOT-and-AI>

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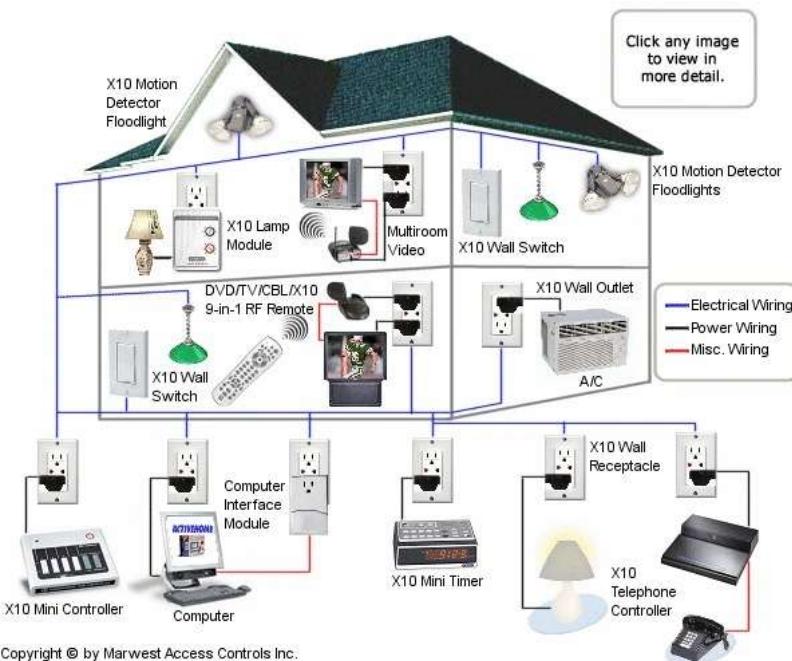
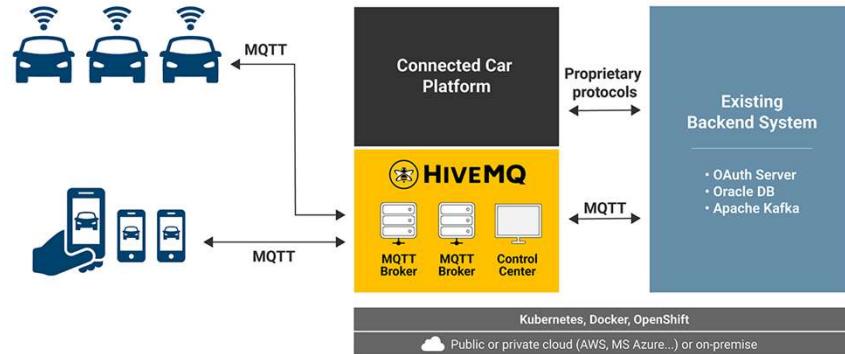
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Internet of Things (IoT)

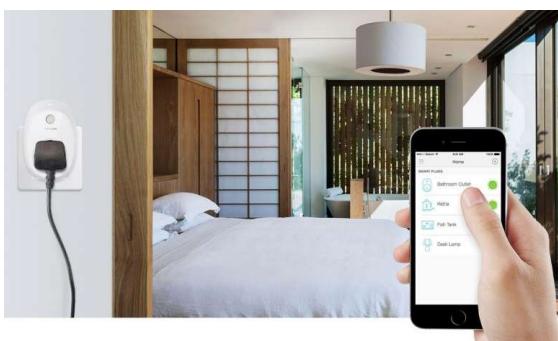
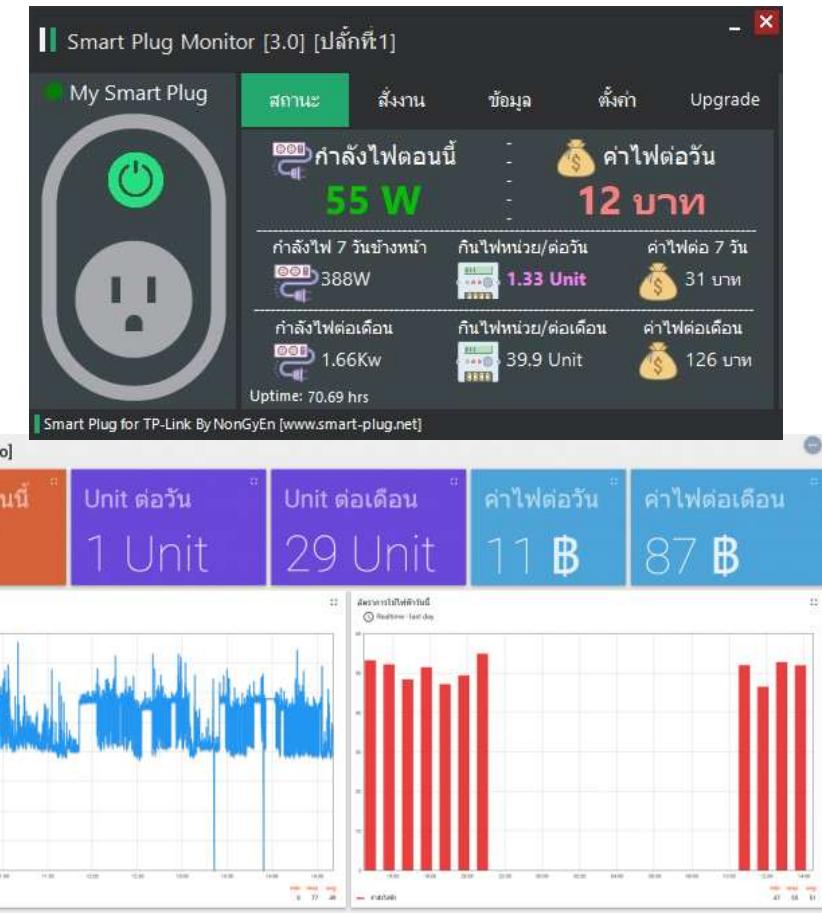
- การที่อุปกรณ์มีเล็กทรอนิกส์ที่สามารถเชื่อมโยงหรือสื่อสารข้อมูลระหว่างอุปกรณ์และระบบคอมพิวเตอร์ผ่านระบบเครือข่ายภายในและอินเทอร์เน็ต ผ่านทางช่องทางการสื่อสารแบบต่าง ๆ เช่น **Wireless ,Lan ,Wifi , NB-IOT, Lora, 3G ,4G ,5G** เช่น
 - Smart Device
 - Smart Grid
 - Smart Home
 - Smart Network
 - Smart Intelligent Transportation

Smart Home and Smart Left (DIY IOT Lab)

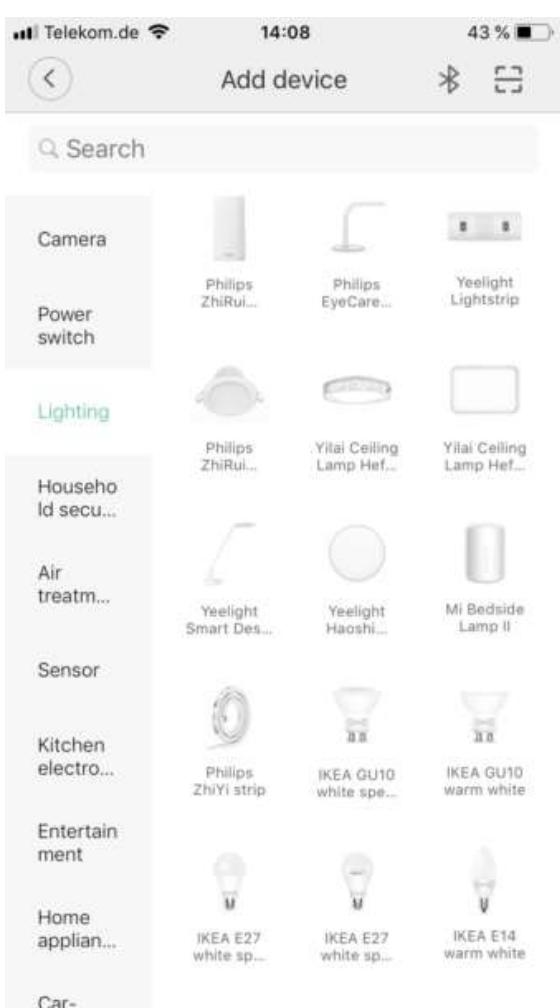


Smart Plug Monitor

โปรแกรมควบคุมปลั๊กไฟ TP-Link HS110



Smart home หรือ บ้านอัจฉริยะ

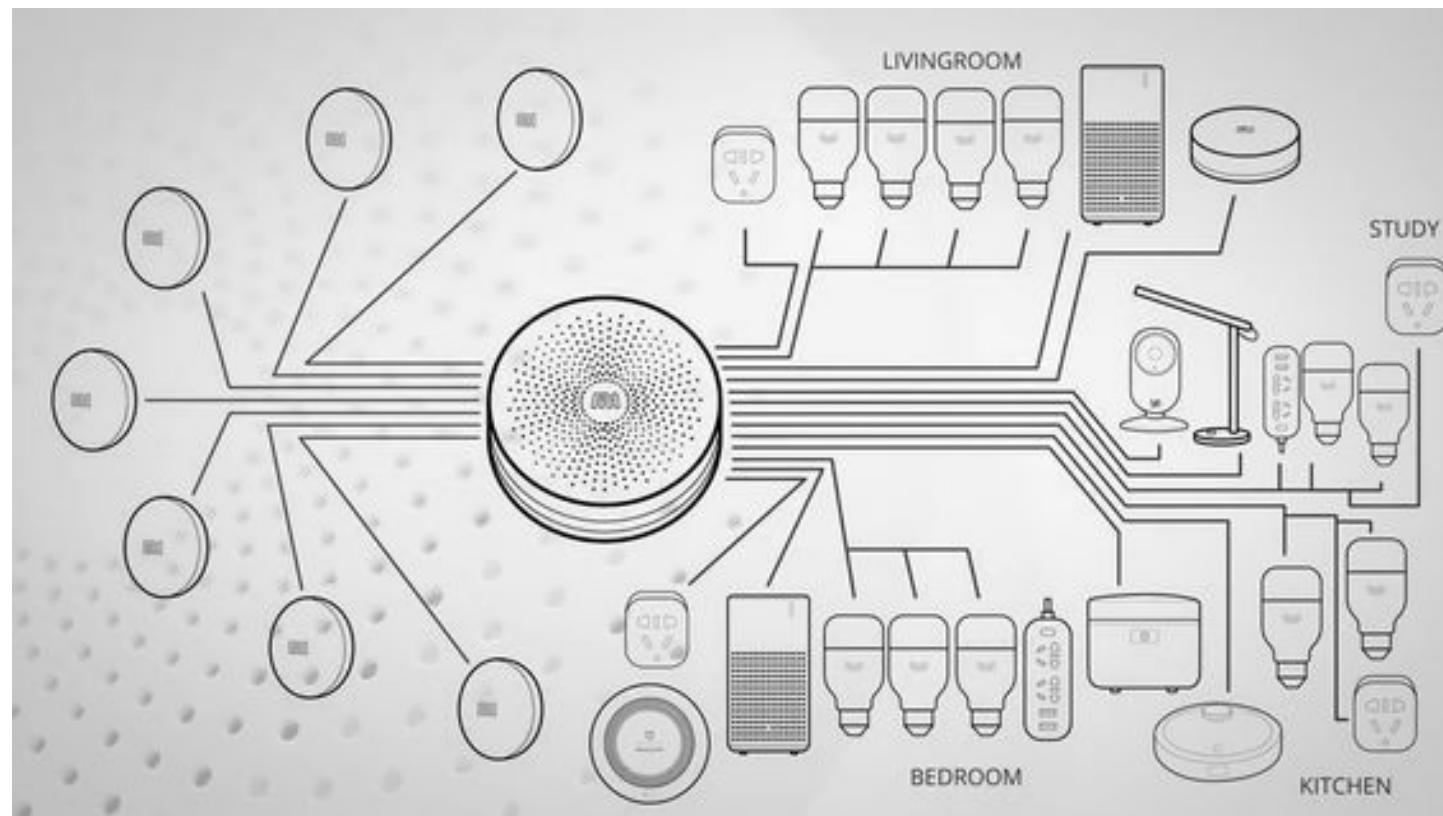


- โดยทั่วไปเรียกว่า **home automation** ซึ่งสามารถถูกจำแนกความสามารถและความซับซ้อนในการควบคุมออกเป็น

- ระบบควบคุมไฟฟ้าแสงสว่าง เช่น เปิด/ปิด หรือปรับระดับความสว่าง
- ระบบควบคุมอุปกรณ์ไฟฟ้าภายในบ้าน เช่น สั่งงานเครื่องปรับอากาศ หรือการเปิดปิดม่าน
- ระบบรักษาความปลอดภัย เช่น เซิร์ฟเวอร์ระบบกันขโมย/กล้องกันบ.รักษาความปลอดภัย

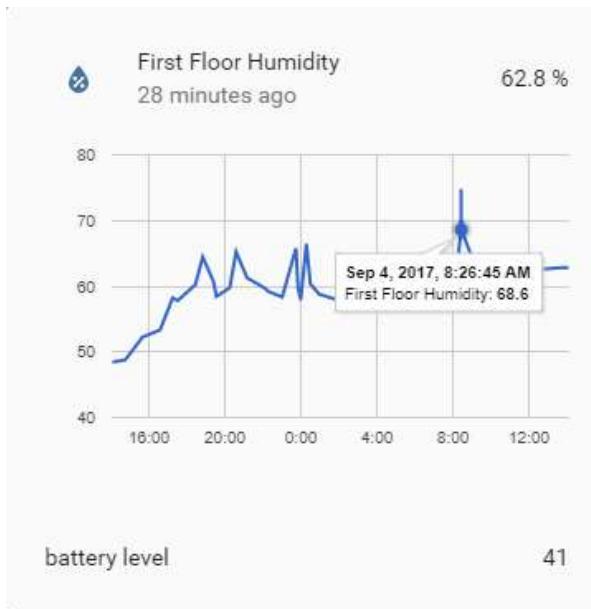


Smart home Features

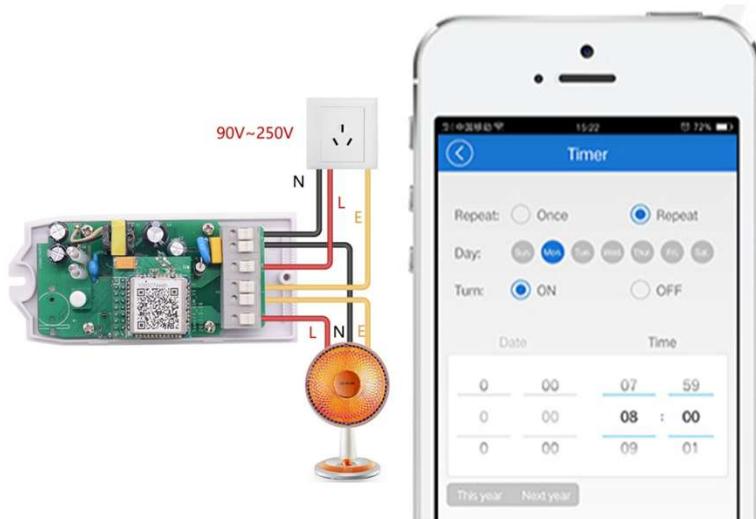
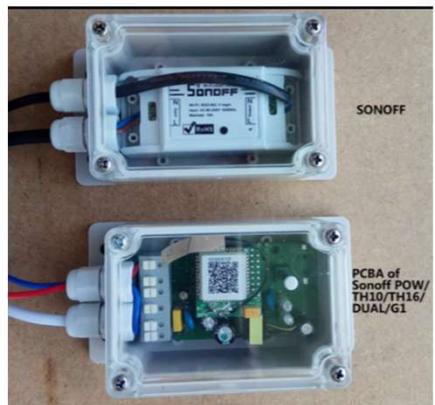


Mi Temperature and Humidity Sensor





Esp8266



Create
single/repeat/countdown timers
to auto-turn on/off appliances

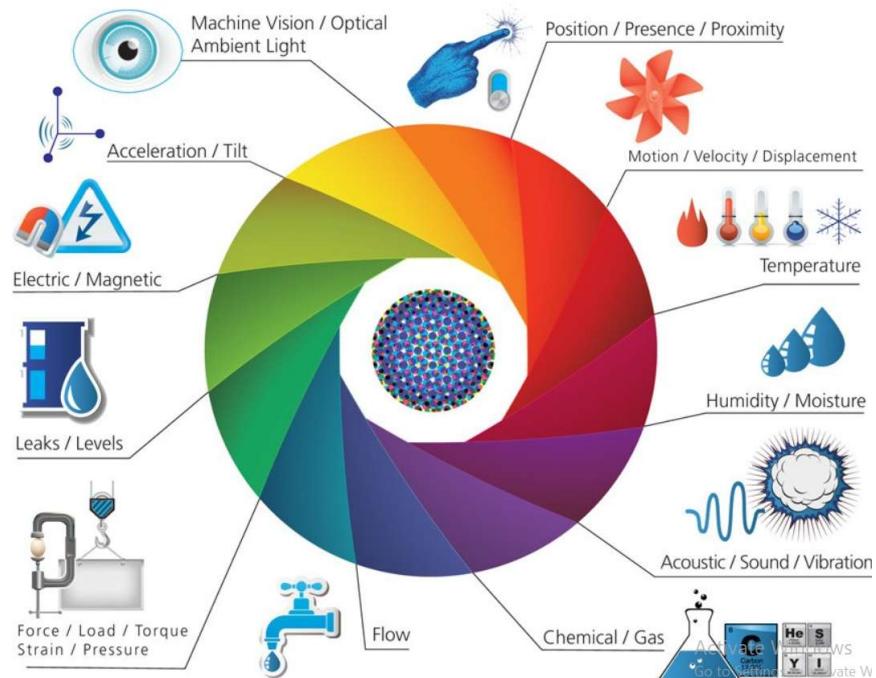
Lights lit up at 8:00 and auto-off at 23:00 every day



Basic IOT Sensors

Digital Sensors

- On/Off
- High/Low
- True/False
- 0/1



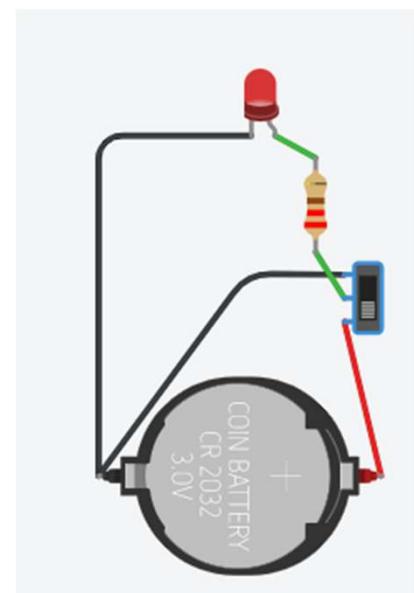
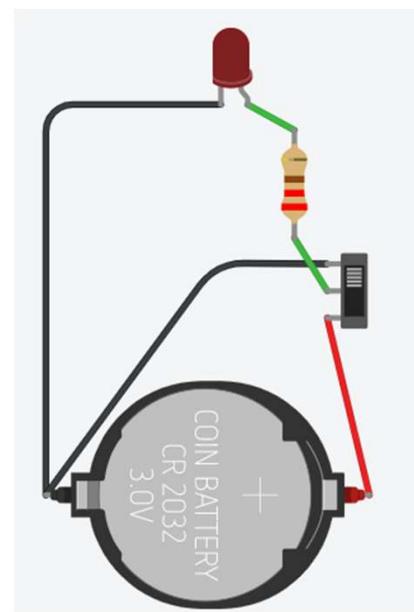
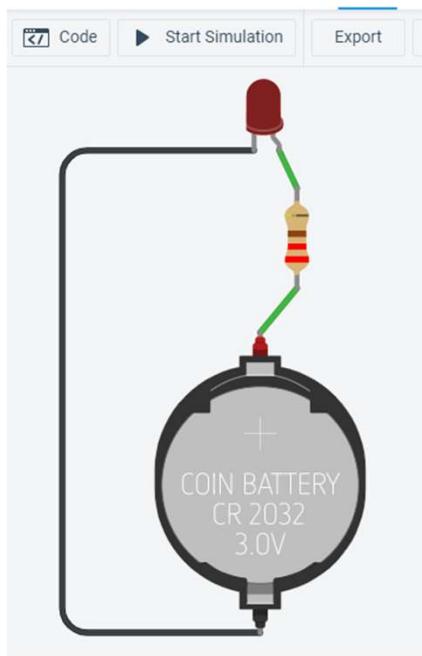
Analog Sensors

- 0 – 20 mv
- 0 -10 v
- 0 – 65535 (FFFF H)

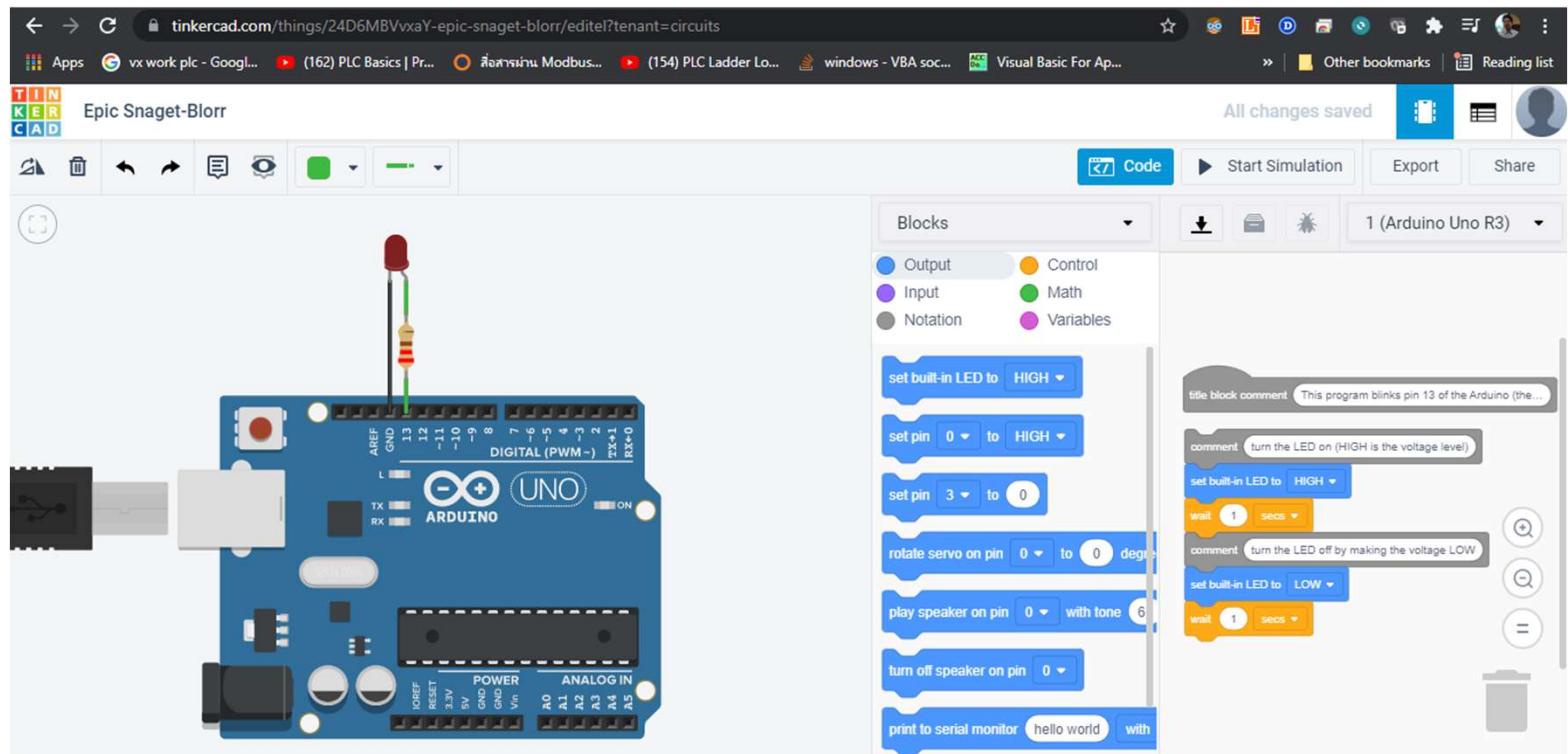
Different Types of Sensors



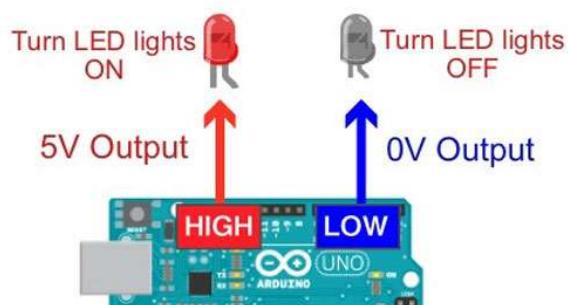
Basic LED Light UP Circuit Control



IOT Basic Programming (On/Off LED)



Toggle between two different states



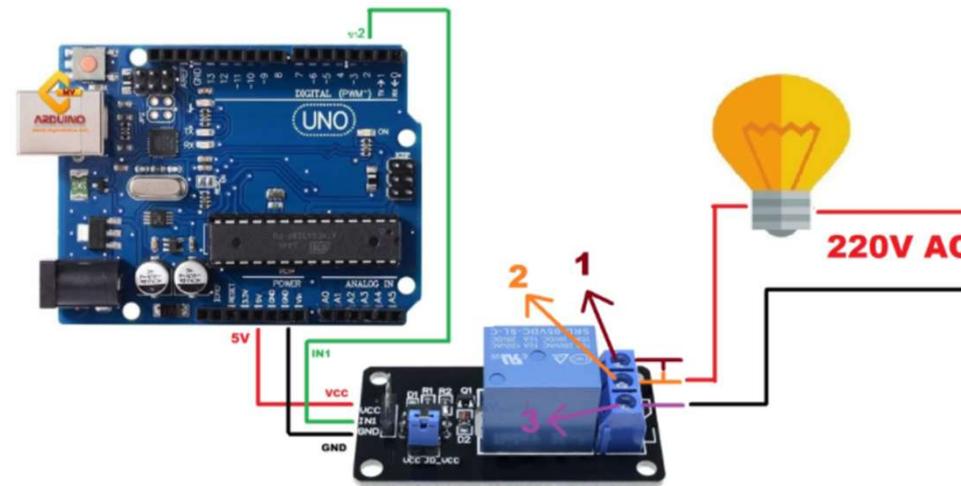
```
void setup() {  
    pinMode( 13 , OUTPUT );  
}  
void loop() {  
    digitalWrite( 13 , HIGH );  
}
```



```
1 // C++ code  
2 //  
3 /*  
4     This program blinks pin 13 of the Arduino (the  
5     built-in LED)  
6 */  
7  
8 void setup()  
9 {  
10     pinMode(13, OUTPUT);  
11 }  
12  
13 void loop()  
14 {  
15     // turn the LED on (HIGH is the voltage level)  
16     digitalWrite(13, HIGH);  
17     delay(1000); // Wait for 1000 millisecond(s)  
18     // turn the LED off by making the voltage LOW  
19     digitalWrite(13, LOW);  
20     delay(1000); // Wait for 1000 millisecond(s)  
21 }
```

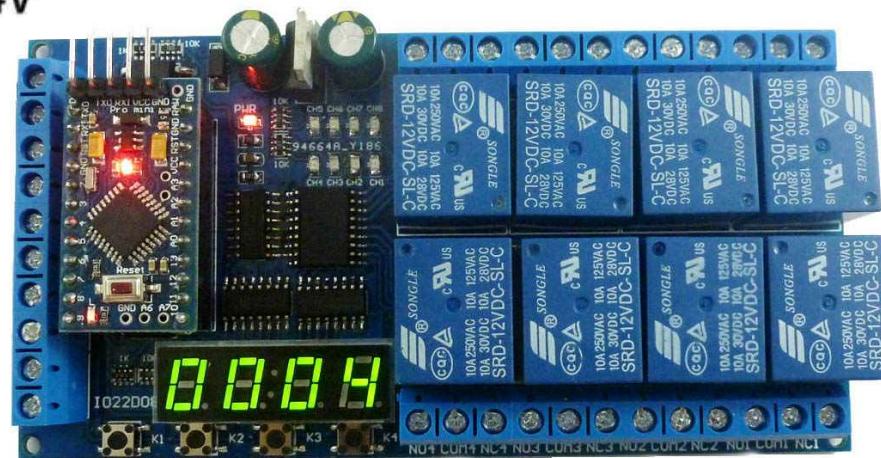


- gnd -> GND
- Vcc -> 5V
- In-> ขา2

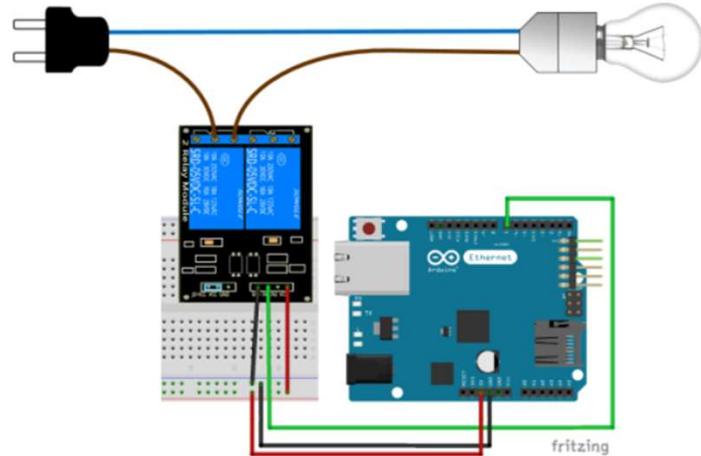




5V 12V 24V



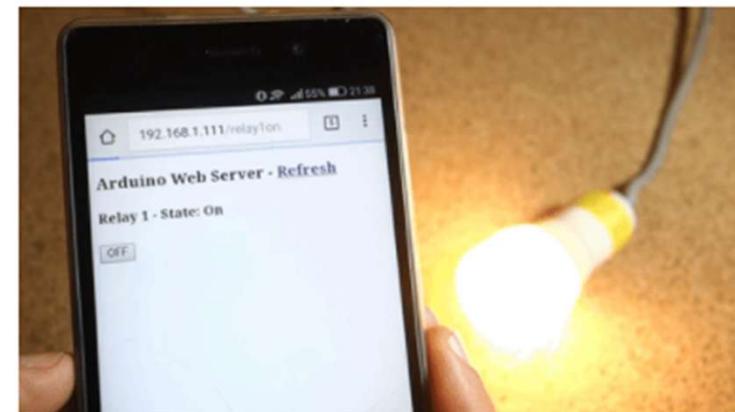
Basic IOT (Smart Home)

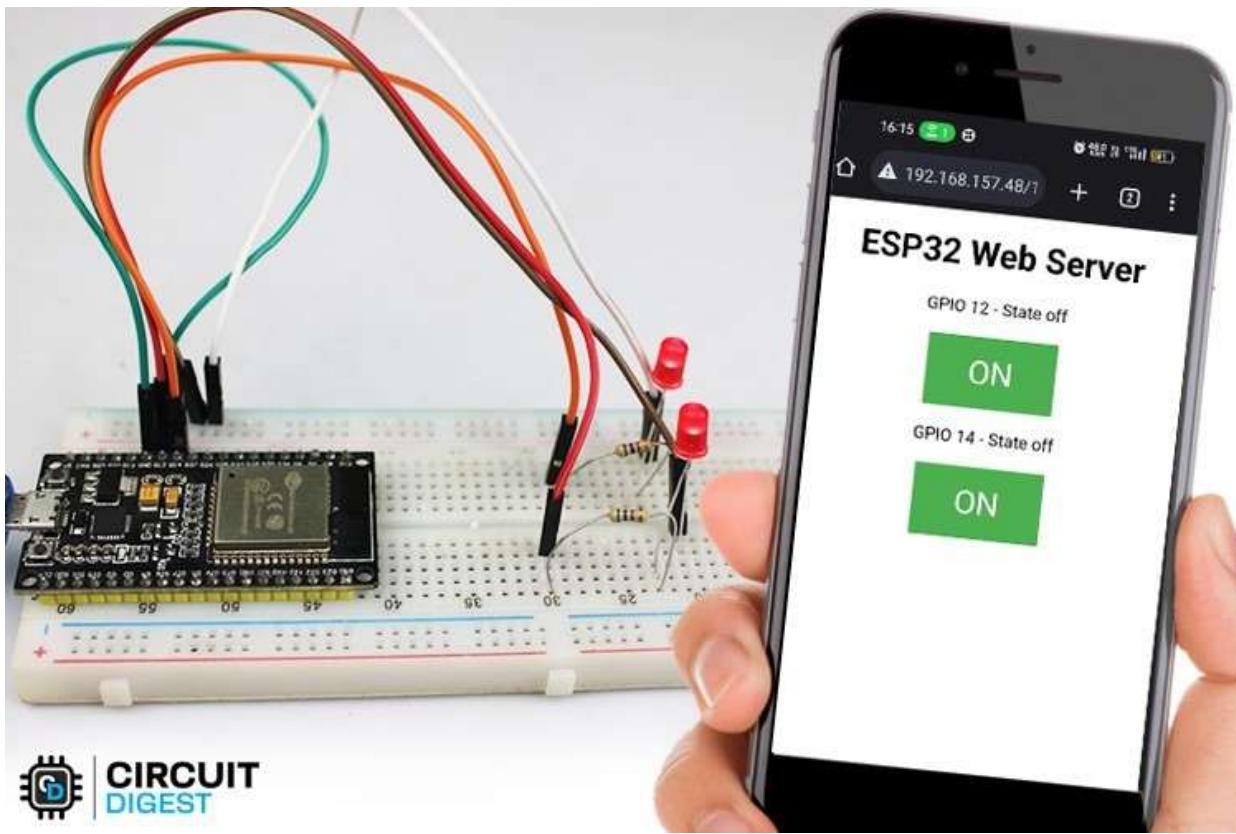


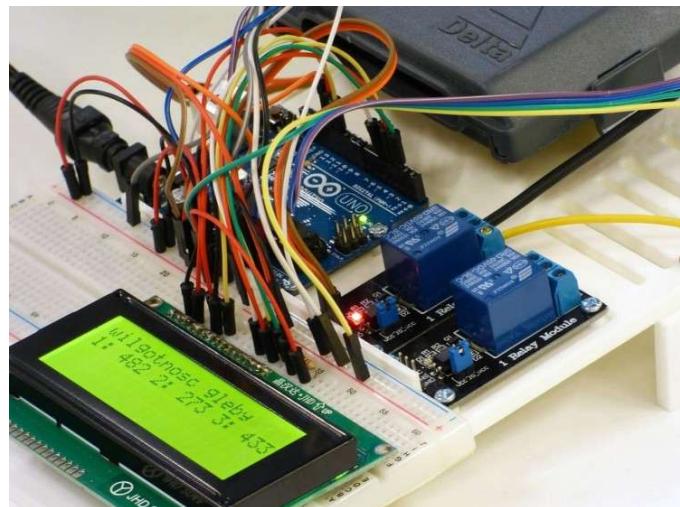
Arduino Web Server - Refresh

Relay 1 - State: Off

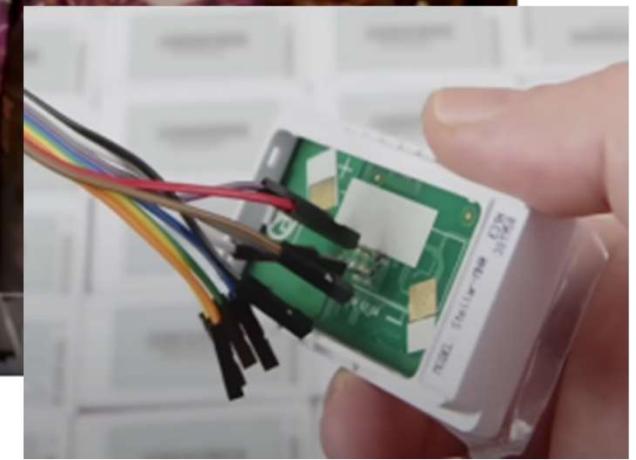
ON



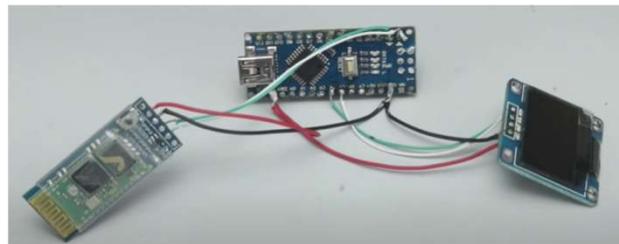
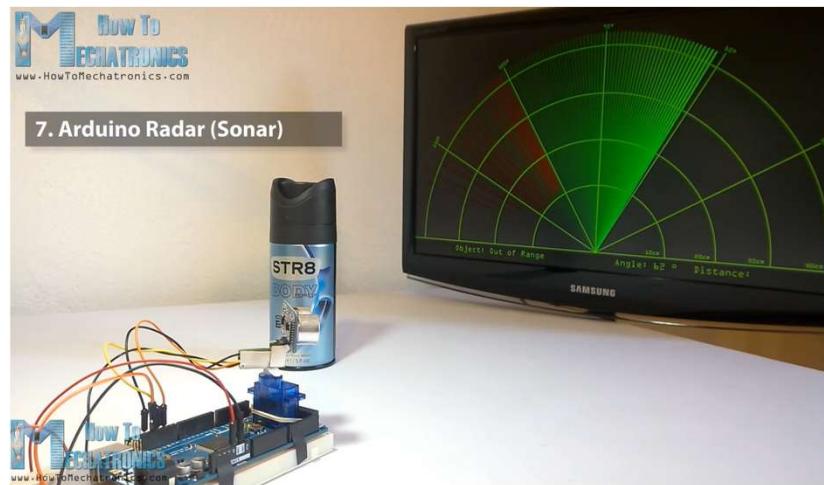
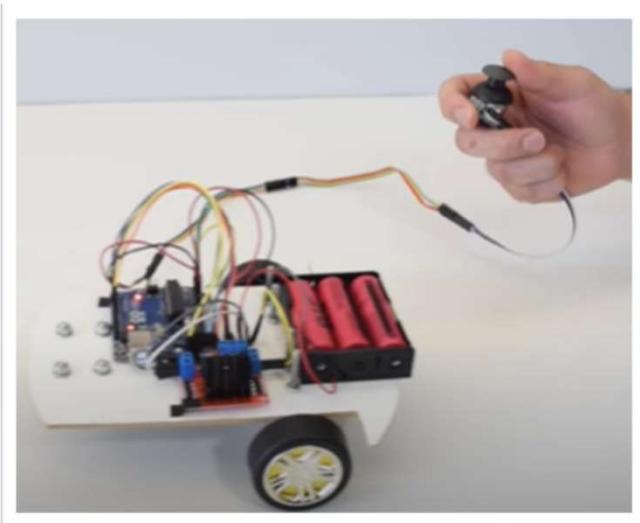








10 Arduino Projects with DIY Step by Step Tutorials





เทคโนโลยีการพิมพ์ 3 มิติมีอะไรบ้าง? 3D Printing Technologies

<https://x3dtechnology.com/blogs/knowledge/3d-printing-technologies>

ตัวอย่างที่มีขายอยู่ในไทย

https://www.print3dd.com/?gclid=Cj0KCQiAvJXxBRCeARIsAMSkAppa63XWe46rkT_sqbdfHney9jwJk7fsnb9h8gBEgaES6LUNQwkKzGlaAkAiEALw_wcB

ทำอะไรได้บ้าง

FDM Small-Mid Size 3D Printer รับประกันขนาดเล็กกว่า 30cm



FDM Big Size 3D Printer รับประกัน 30cm-100cm



DLP/SLA 3D Printer รับประกัน เป็นจานระเหยด



Industrial SLA SLS SLM 3D Printer รับประกัน อุตสาหกรรม เพื่อการผลิต



3D Scanner อุปกรณ์ 3มิติ ก้าวแบบ Handheld ॥a: Station

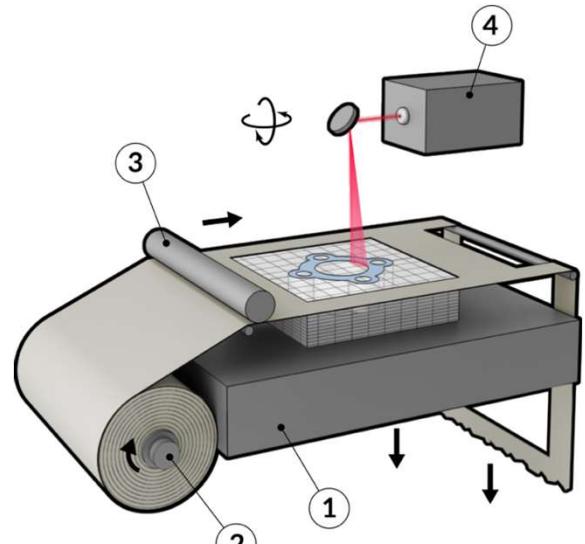
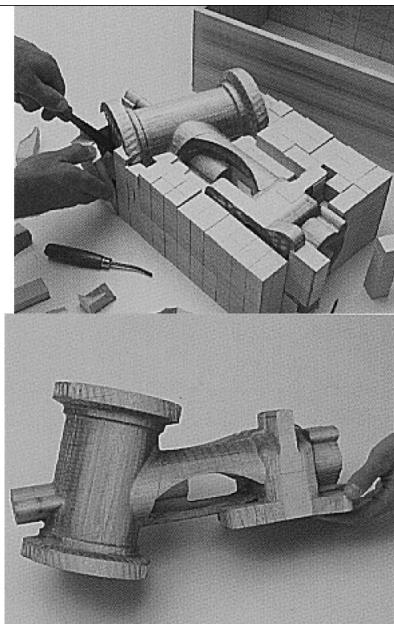
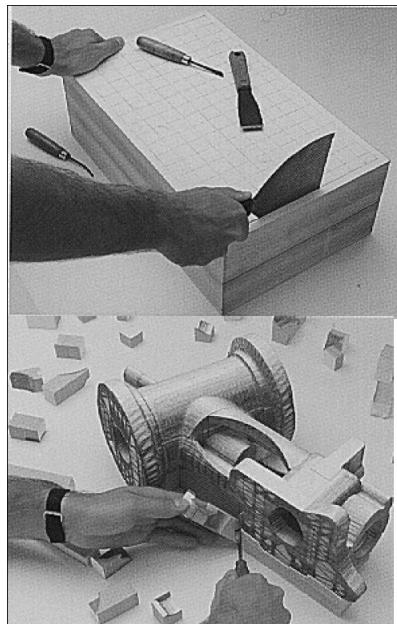


Material / Accessories เส้นพลาสติก / เครื่อง / อุปกรณ์ / อื่นๆ

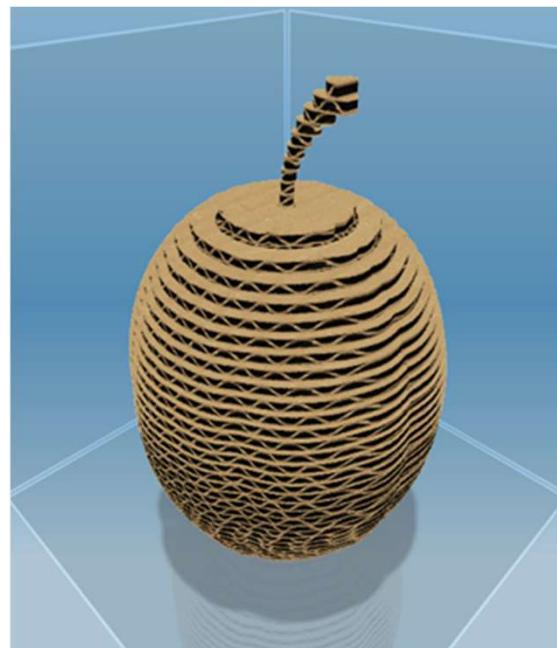
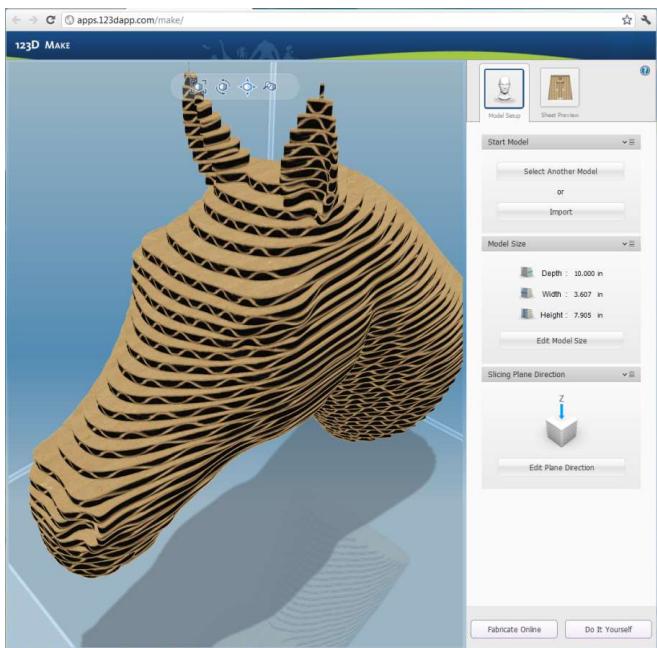
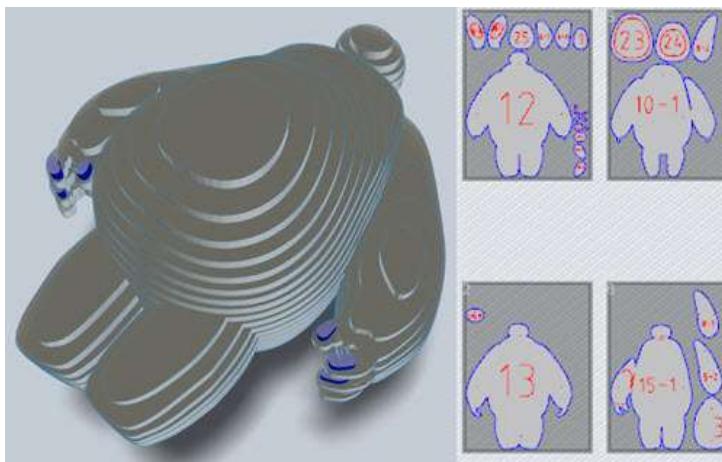
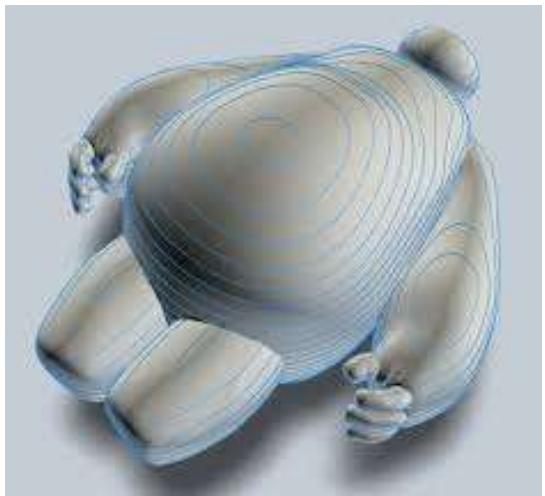


3D Printer Back Ground Rapid Prototyping

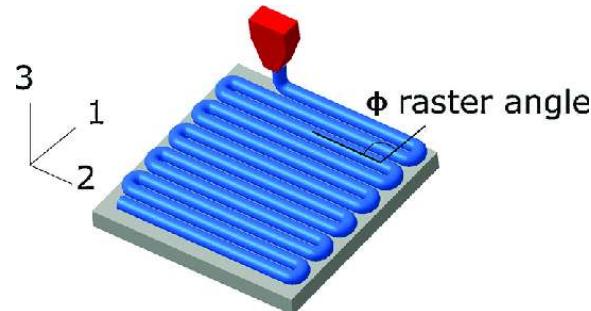
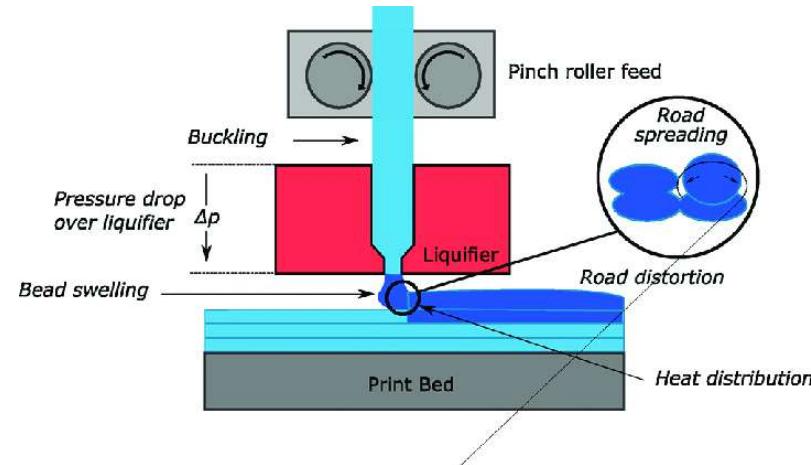
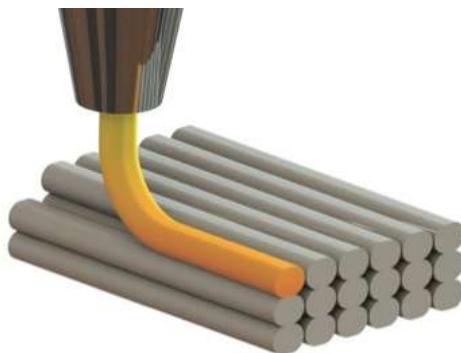
Laminated Object Manufacturing, LOM

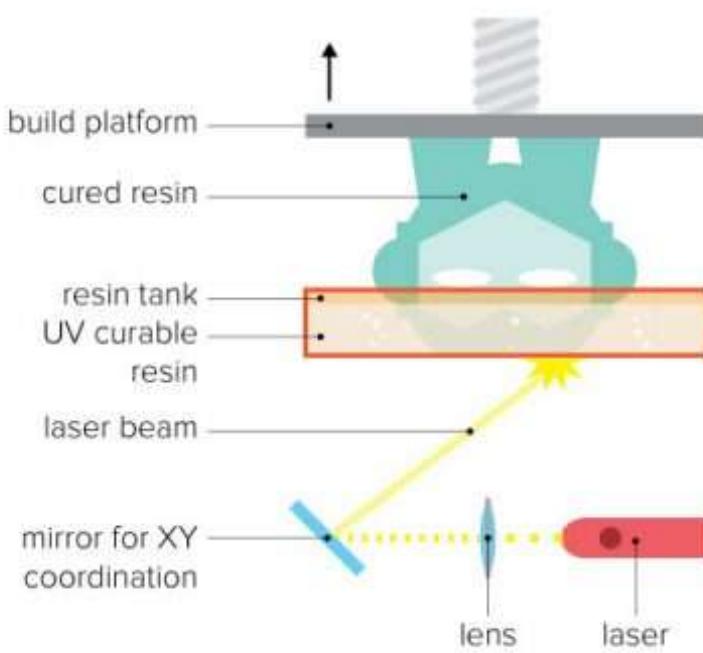


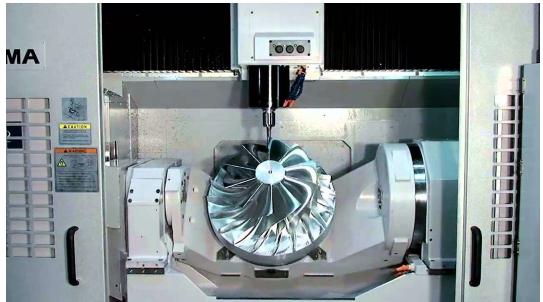
MANUFACTURINGGUIDE



Extrusion deposition: Fused Deposition Modeling (FDM)



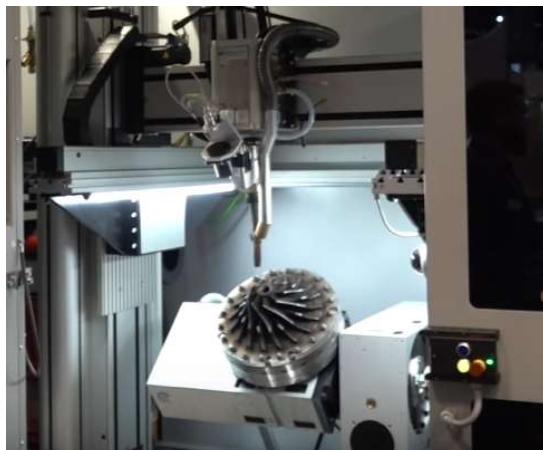




<https://www.youtube.com/watch?v=CqePrbeAQoM> 1:33



<https://www.youtube.com/watch?v=te9OaSZ0kf8>



New Machine 3D Prints Metal Using a Process Similar to MIG Welding

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

G-Code



```
G1 X-11.896 Y-7.663 F9000
G1 Z0.333 F6000
G1 E0.0000 F1350
G92 E0
G1 X-11.848 Y-7.736 E0.0051
G1 X-11.847 Y-7.738 E0.0052
```

```
G1 X113.169 Y93.365 E2.69049
G1 X113.169 Y96.819 E3.10497
G1 X123.696 Y96.783 E4.36822
G1 X124.248 Y94.339 E4.66889
G1 X128.551 Y94.339 E5.18525
G1 X130.147 Y94.739 E5.38269
G1 X131.276 Y94.739 E5.51817
G1 X131.657 Y95.118 E5.58266
G1 X133.234 Y95.513 E5.77775
G1 X133.083 Y96.535 E5.90172
G1 X135.508 Y98.947 E6.31215
G1 X133.670 Y101.313 E6.67168
G1 X133.824 Y101.822 E6.73549
```

Fan speed setting ;Layer count: 25
Nozzle travel speed ;LAYER:0
(without extrusion) M107
Nozzle printing speed ;TYPE:SKIRT
(with extrusion) G1 F2340 X56.093 Y55.800 E0.18815
X, Y Coordinates G1 X56.346 Y55.605 E0.20373
G1 X57.299 Y55.078 E0.25684
G1 X58.540 Y54.758 E0.31934
G1 X59.404 Y54.719 E0.36152
G1 X60.320 Y53.688 E0.42878

Annotations:

- Fan speed setting: Points to the top two lines.
- Nozzle travel speed (without extrusion): Points to the M107 command.
- Nozzle printing speed (with extrusion): Points to the G1 command with F2340.
- X, Y Coordinates: Points to the first G1 command's coordinates.
- Layer height: Points to the Z0.300 value in the first G1 command.
- Extrusion length: Points to the E0 values in the subsequent G1 commands.



Open Source Controller
(1,500 บาท)



Modix Big-60 Assembly

DIY with same electronic equipments

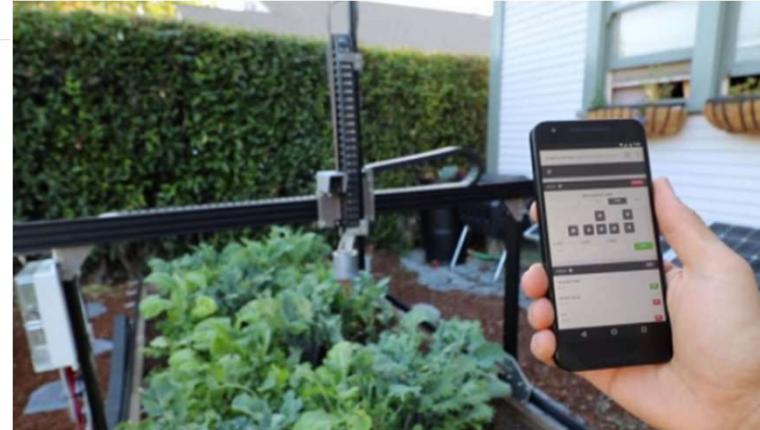
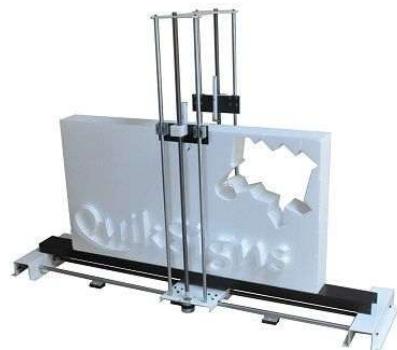


(4,500 บาท)



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

นวัตกรรม Open Source ที่สามารถสร้างได้ด้วยตนเอง

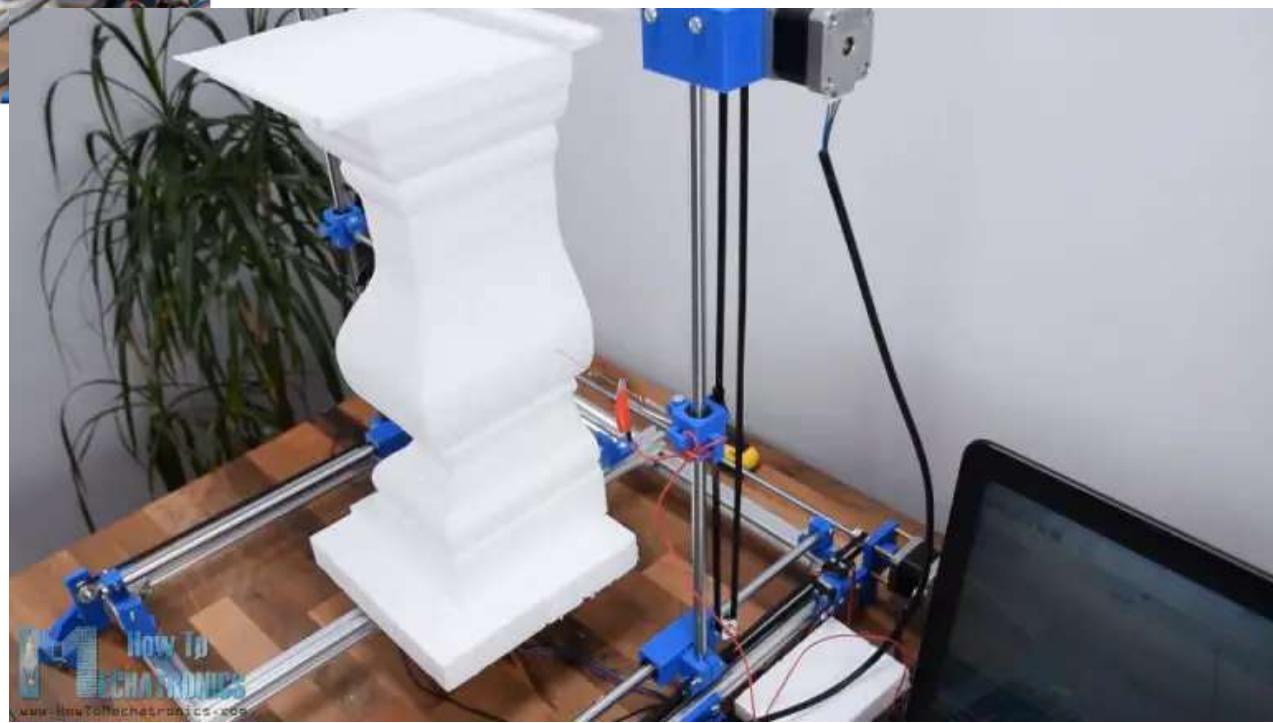


Arduino CNC

Hot Wire Cutter



<https://howtomechatronics.com/projects/arduino-cnc-foam-cutting-machine/>



VDO Demo

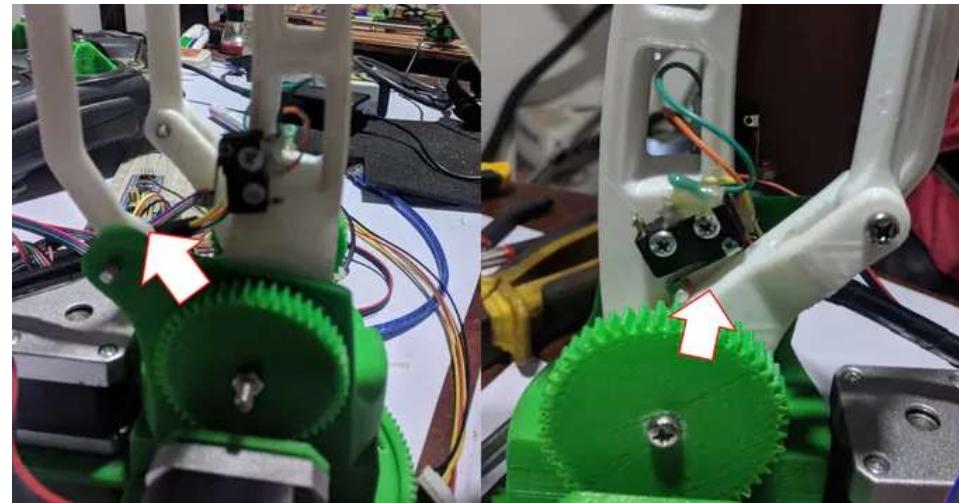
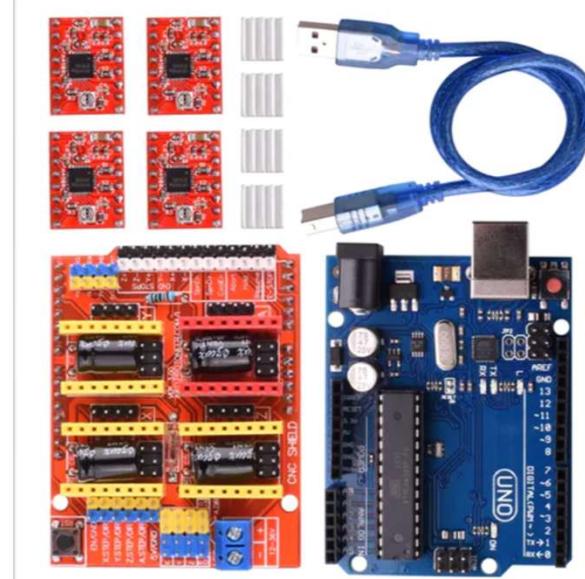
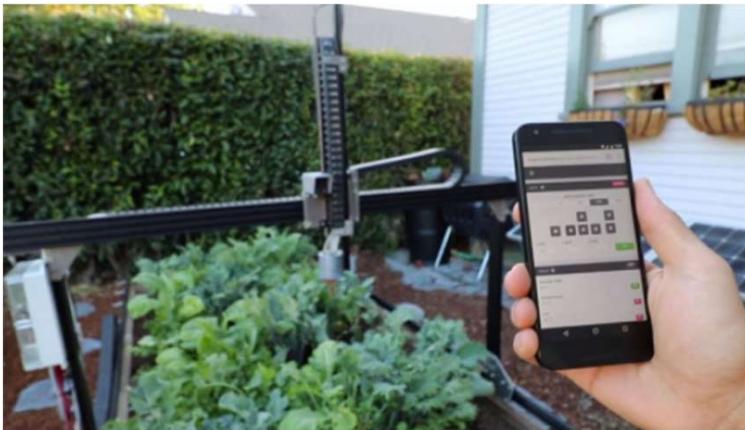


Figure 1: On the left, the MK2 Plus arm. On the right, the ABB IRB460.



<https://create.arduino.cc/projecthub/yasaspeiris/mk2-plus-robot-arm-controller-458d55>



<https://stemgarden.co/farmbot/>

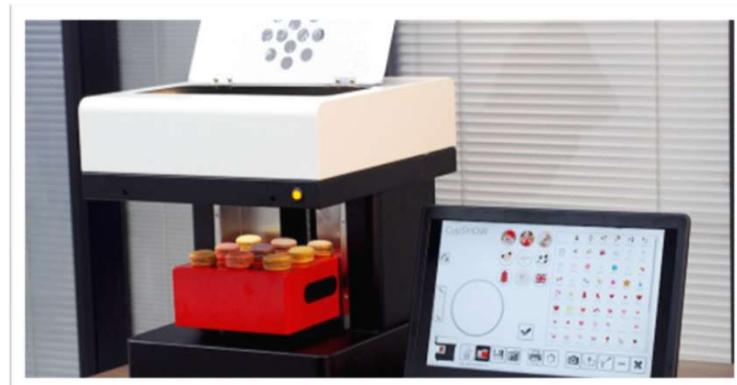
Open Source Food Technology Lab



เครื่องวาดแพนเค้ก

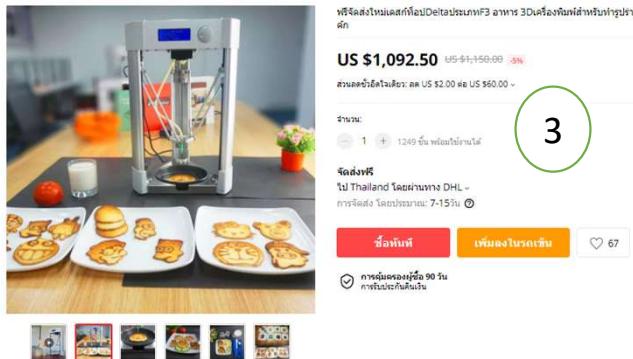
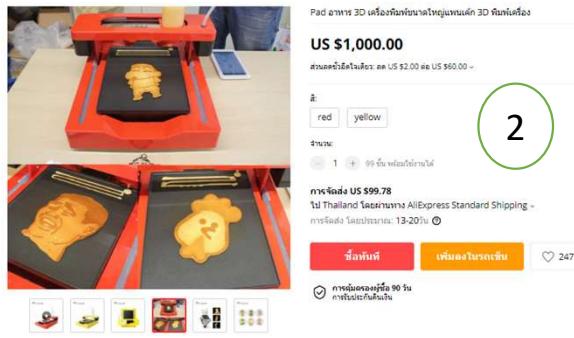
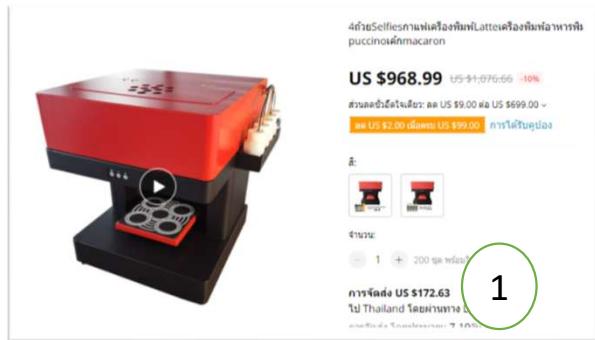


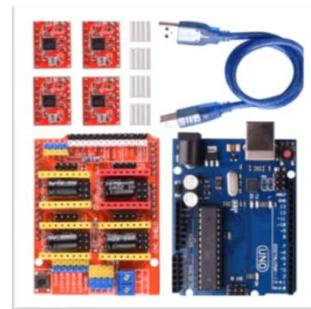
เครื่องพิมพ์ สี บนอาหาร



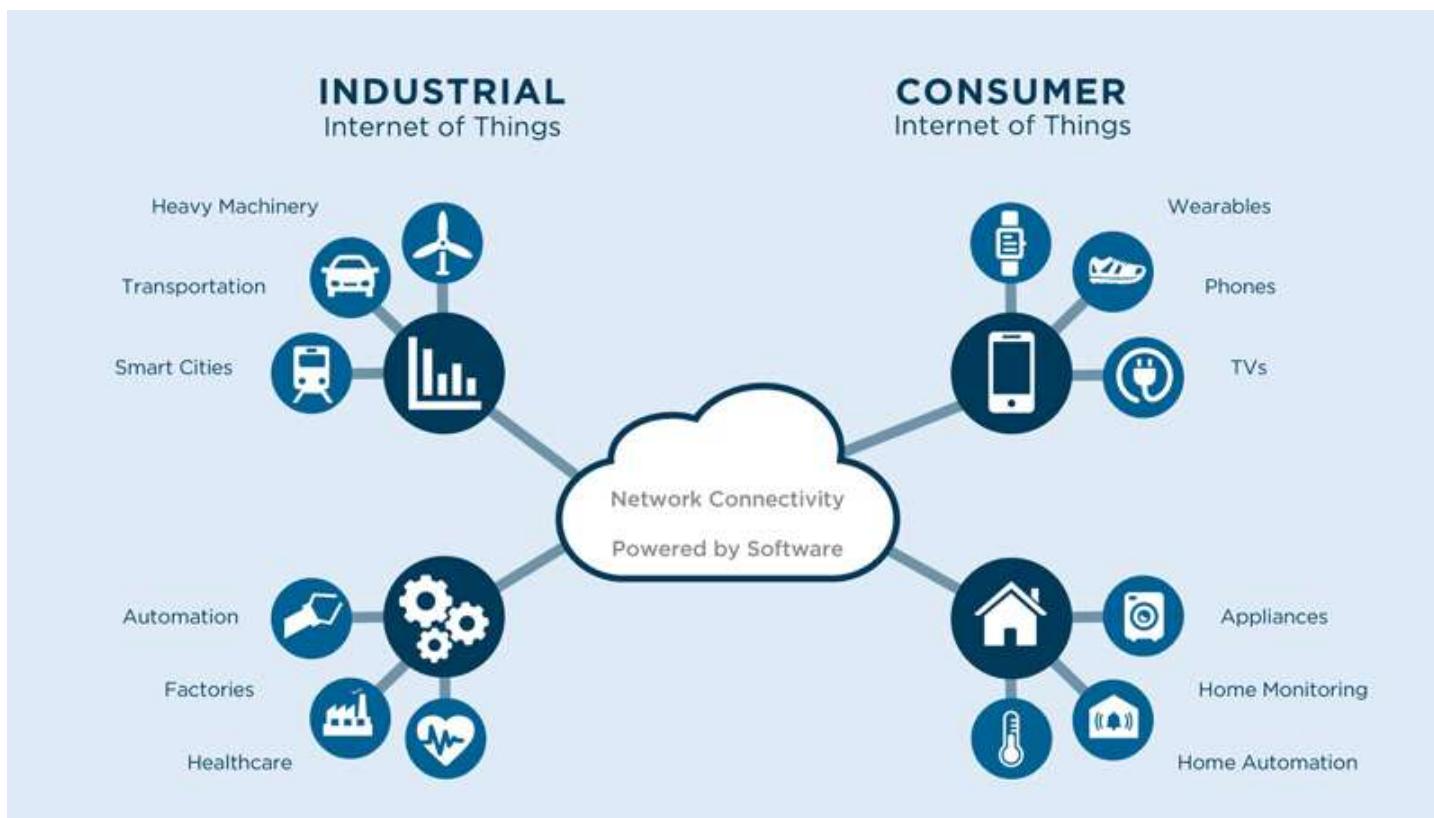
Open Source Food Technology Lab

แสดงตัวอย่างของอุปกรณ์เกิดจากบริษัท Start Up





I^IOT vs IOT



INDUSTRIAL INTERNET OF THINGS (IIOT) AND SCADA

- จากหัวใจหลักของอุตสาหกรรม 4.0 คือ การสื่อสาร และการรวมข้อมูล ซึ่งในอุตสาหกรรมมีสองแนวทาง คือ
 - การประยุกต์อุปกรณ์ IoT เข้ามาใช้งานร่วมกับเครื่องจักรอุตสาหกรรมที่มีอยู่แล้ว เพื่อเพิ่มความสามารถให้เครื่องจักรสามารถสื่อสารและจัดส่งข้อมูลเข้าระบบฐานข้อมูลได้ เพื่อลดกระบวนการในการจดบันทึก
 - การเปลี่ยนอุปกรณ์และเครื่องจักรใหม่ ที่มีความสามารถในการสื่อสาร
 - การใช้งานโปรแกรมจัดการแบบสำเร็จรูป เช่น โปรแกรม SCADA ซึ่งสะดวก แต่มีค่าใช้จ่ายสูง
 - การใช้งานโปรแกรมแบบ Open Source ซึ่งไม่มีค่าใช้จ่าย แต่ต้องใช้บุคลากรที่ความรู้และเข้าใจ
- การรวมข้อมูลในกระบวนการผลิตในรูปแบบดิจิตอล จะส่งผลให้การวิเคราะห์ข้อมูลได้อย่างรวดเร็ว และความถูกต้อง ซึ่งจะช่วยทึ้งในด้านการควบคุมการผลิต การจัดการคลังสินค้า และด้านการตรวจสอบเครื่องจักร การบำรุงรักษา การลด downtime และต้นทุน และประสิทธิภาพในการทำงาน

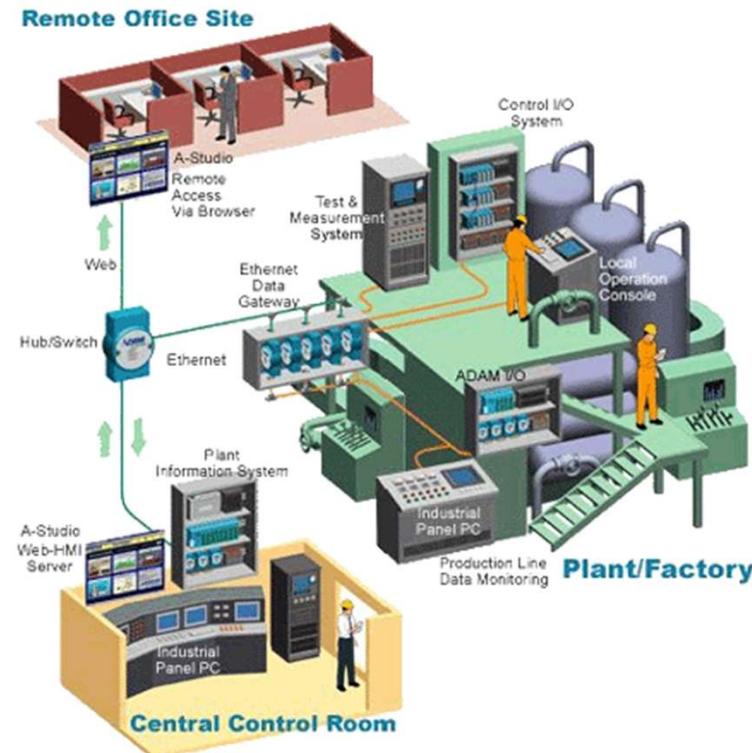
Industrial Automation Control

PLC – Programmable Logic Controller

HMI – Human Machine Interface

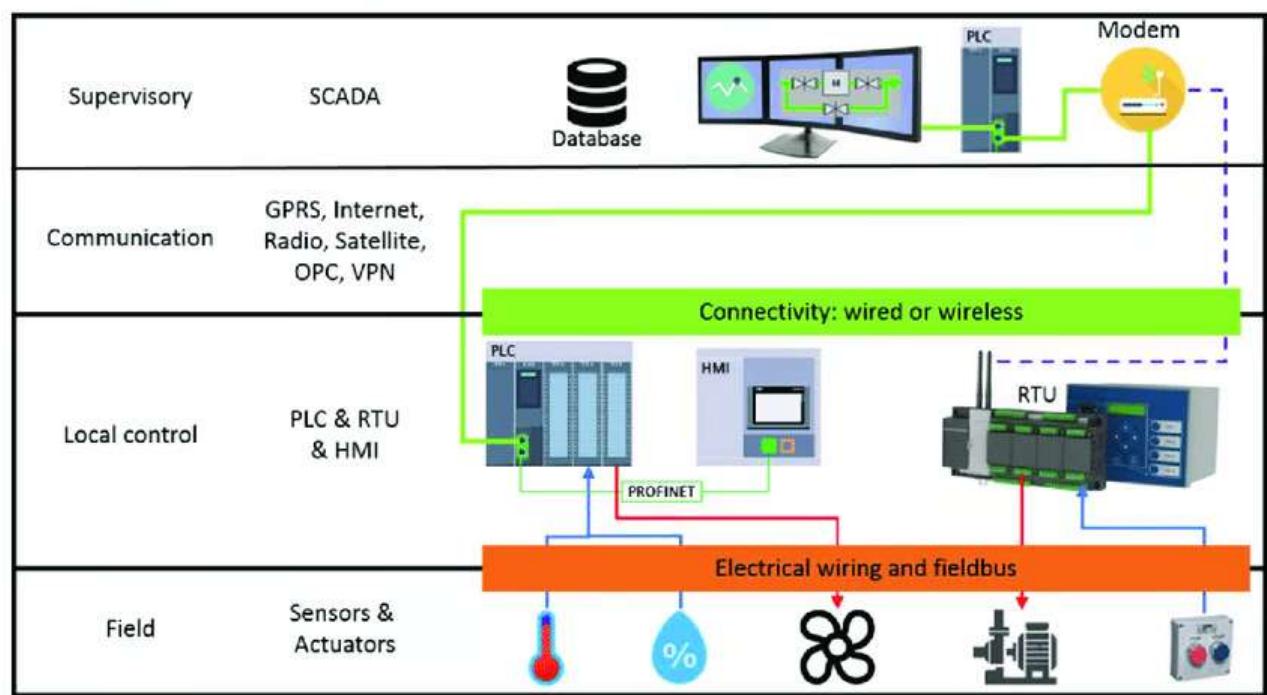
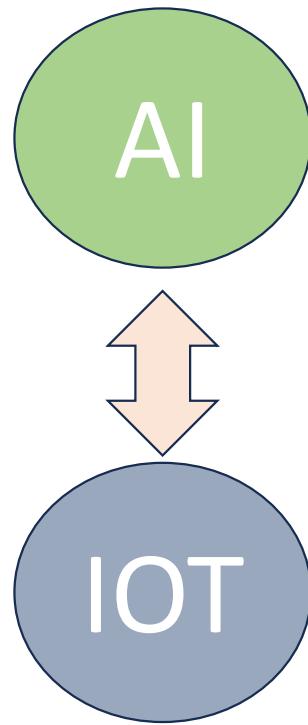
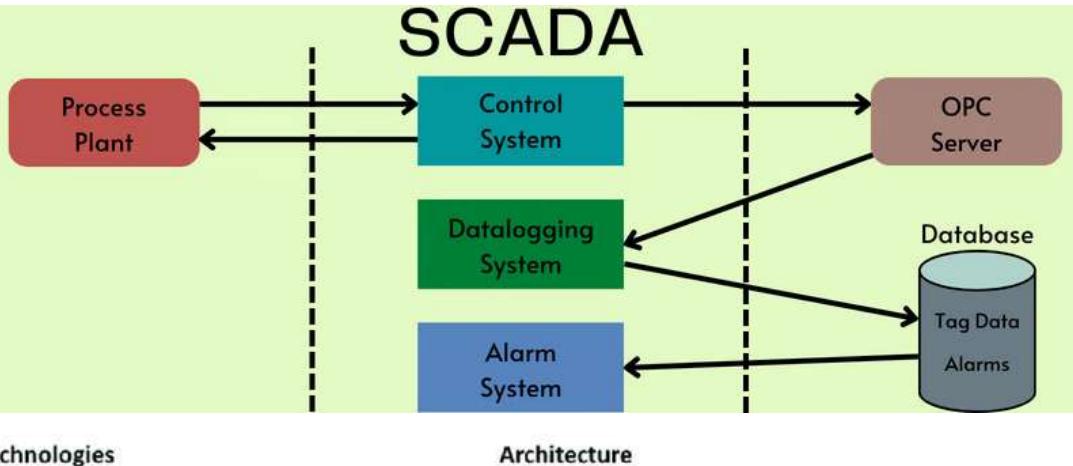
SCADA – Supervisory Control and Data Acquisition

DCS – Distributed Control System

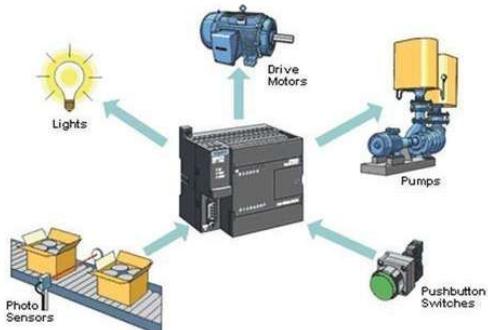
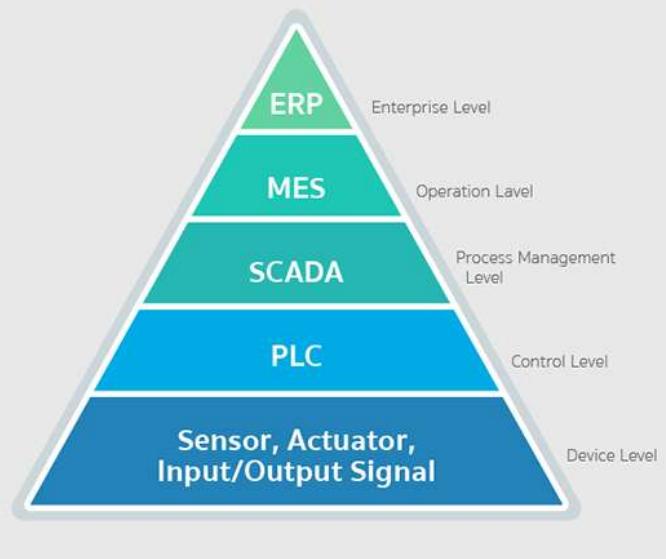


<https://electricaltrends.com/2017/03/21/10-trends-industrial-automation-and-control-market/>

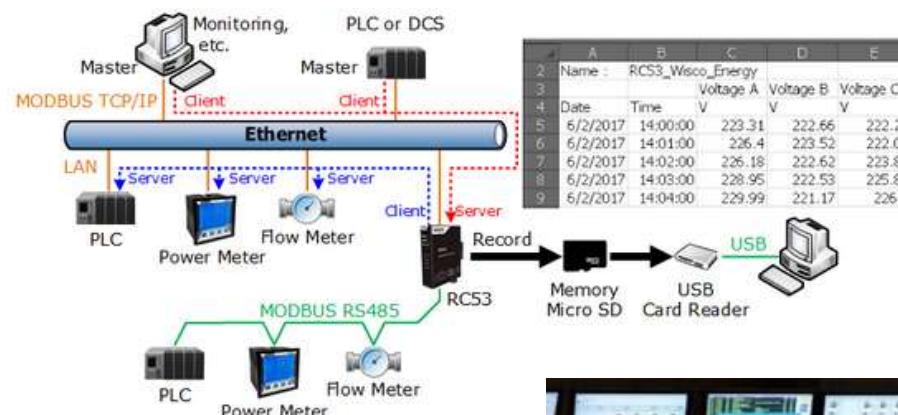
Scada

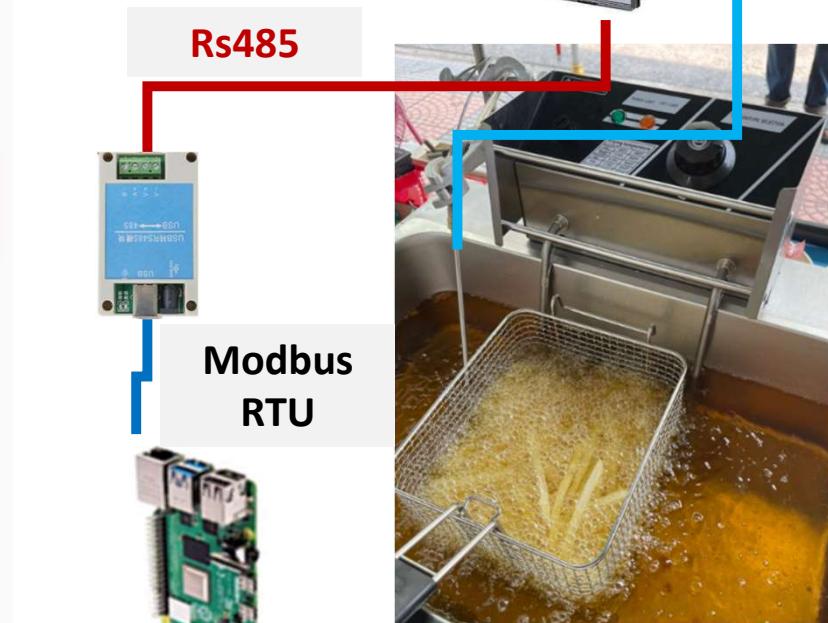
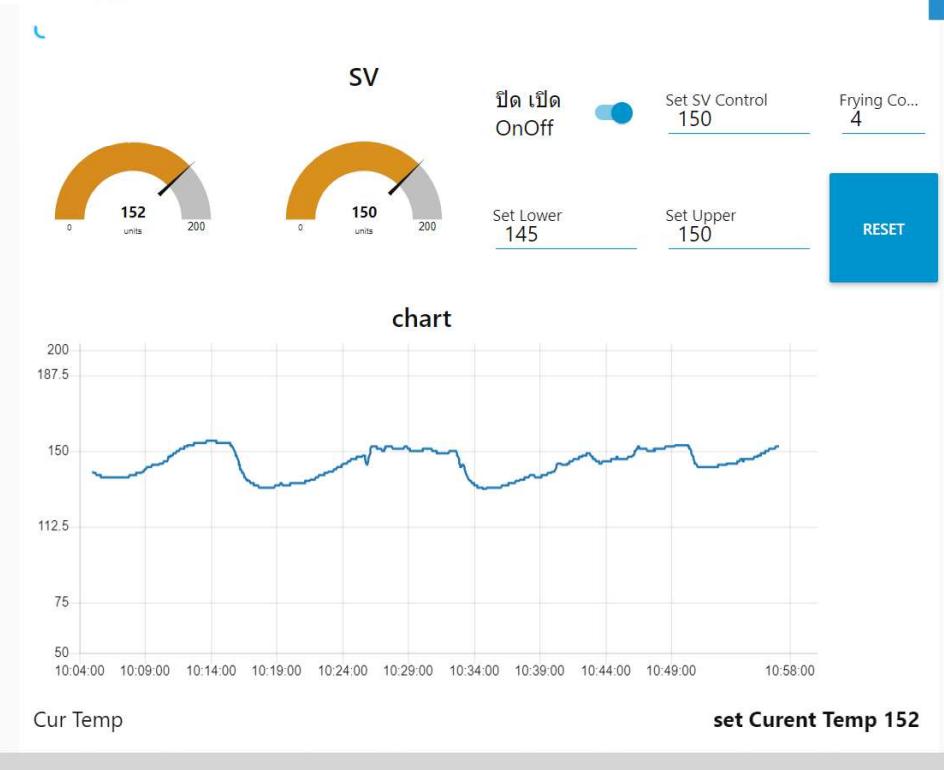
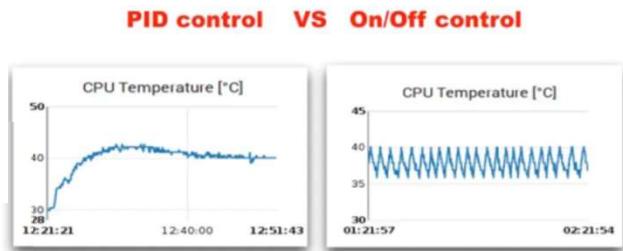


Automation Pyramid (Automation Hierarchy)

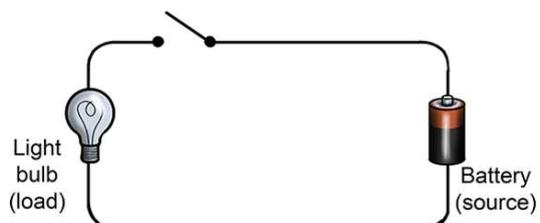
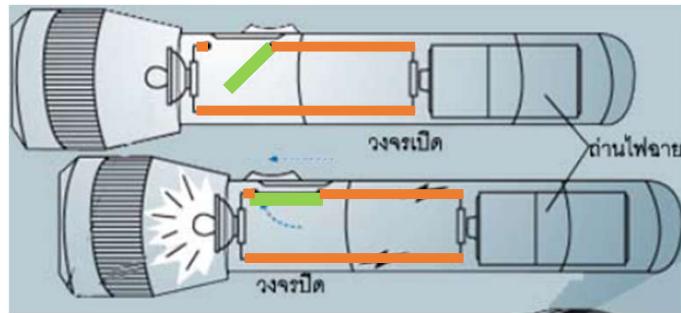


Protocol	Level	Common Applications
ModBus	Device	Manufacturing, Electric Utility
Profibus	Device	Process Industry
DeviceNet	Device	Manufacturing
DNP 3.0	Device	Electric Utility SCADA
BACNet	Control	HVAC Control, Building Automation
ControlNet	Control	Manufacturing
ARCNet	Supervisory	Office Automation, Gaming
Ethernet/IP	Supervisory	Office Automation, Internet



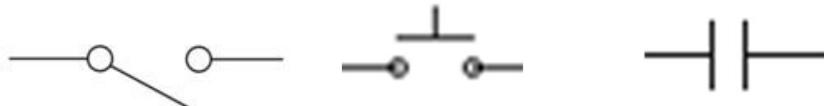


การควบคุมสวิตซ์ Switch Control



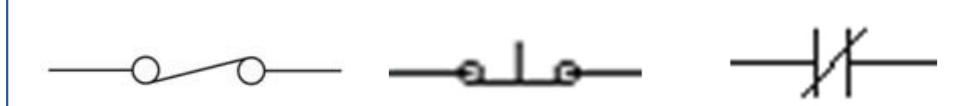
วงจรเปิด (Open Circuit)

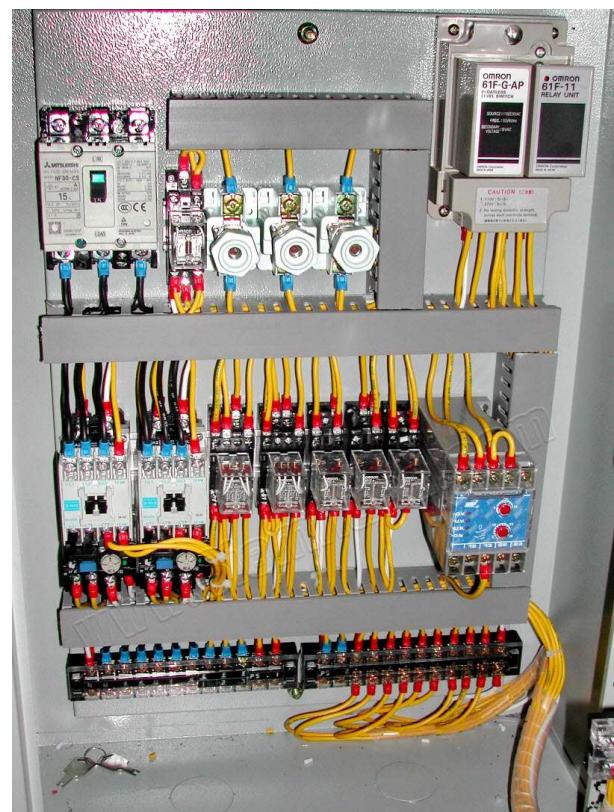
- กระแสไฟฟ้าไม่สามารถไหลผ่านได้ ทำให้อุปกรณ์ไม่ทำงาน
- หน้าตัวสัมผัสไม่เชื่อมต่อกัน (Open Contact)



วงจรปิด (Close Circuit)

- หน้าตัวสัมผัสเชื่อมต่อกัน (Close Contact)
- กระแสไฟฟ้าไหลในวงจรได้ ทำให้อุปกรณ์ทำงาน





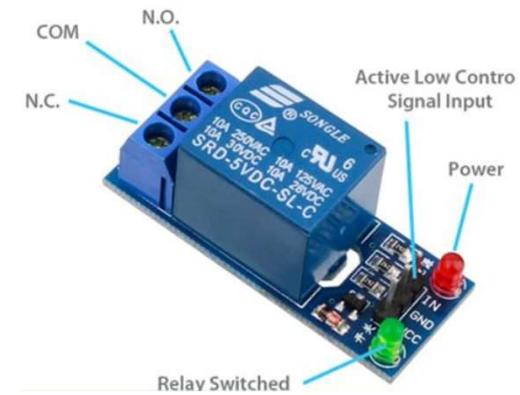
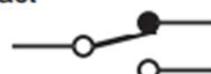
Normally Open Contact



Normally Closed Contact



Changeover Contact



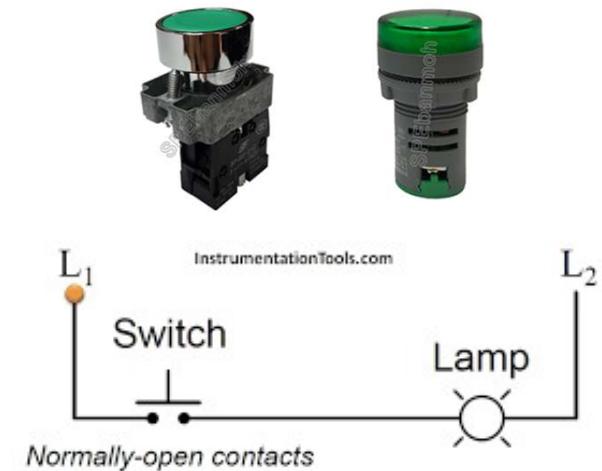
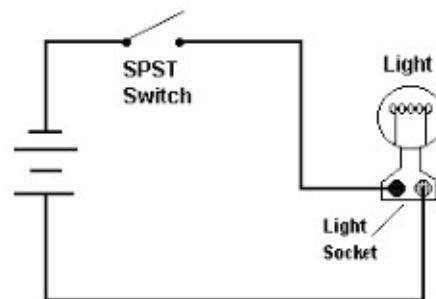


หมุนไปทาง MAN สั่งเปิดปิด
จากสวิตช์หน้าคู่

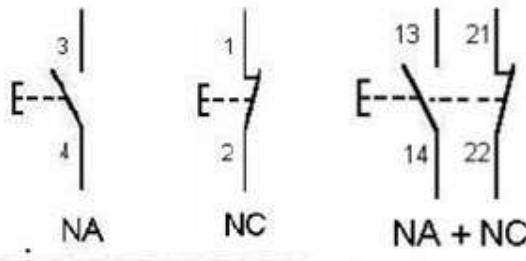
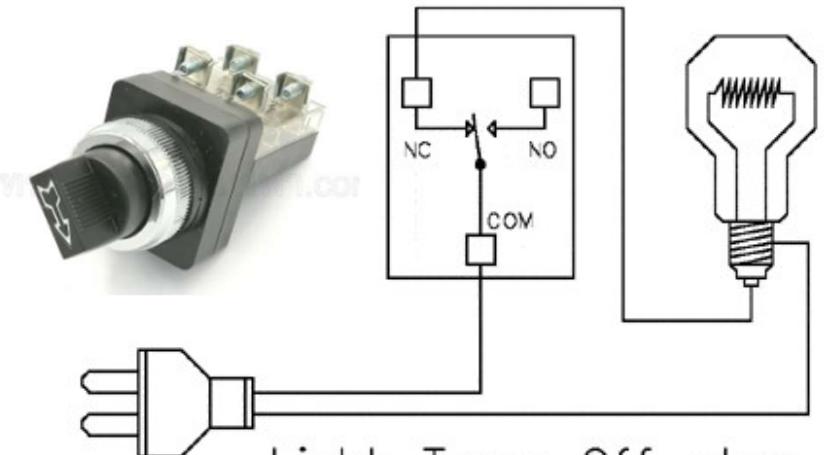


หมุนไปทาง AUTO รอเวลาที่ตั้งไว้
ด้วย timer

Light Switch Circuit

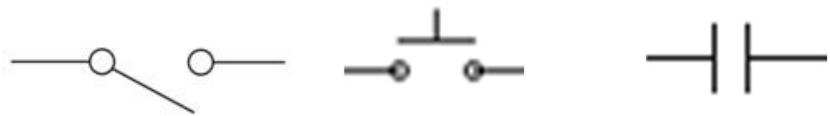


InstrumentationTools.com



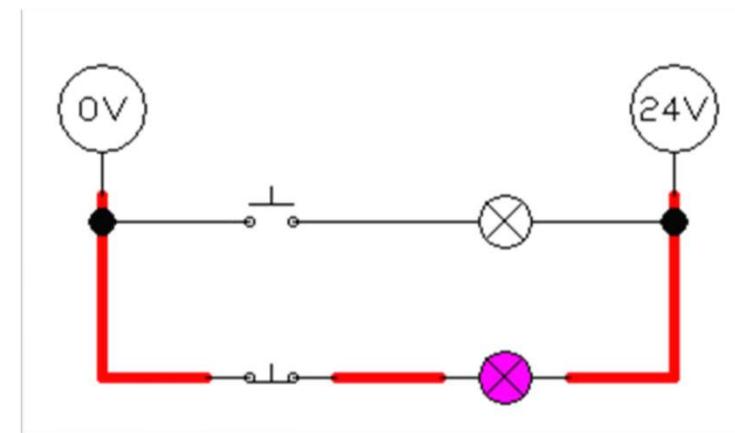
วงจรเปิด (Open Circuit)

- กระแสไฟฟ้าไม่สามารถไหลผ่านได้ ทำให้อุปกรณ์ไม่ทำงาน
- หน้าสัมผัสไม่เชื่อมต่อกัน (Open Contact)



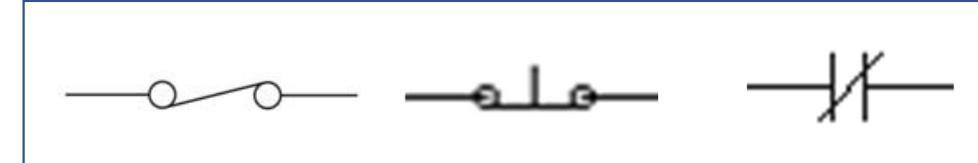
A Normal Open contact (NO)

ปกติหน้าสัมผัสเปิด



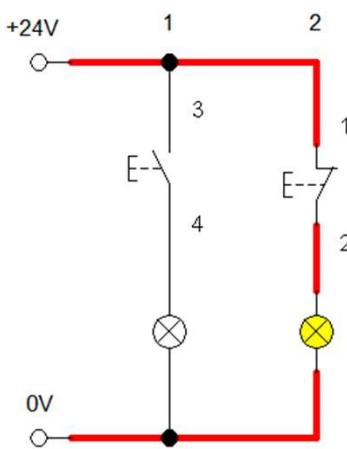
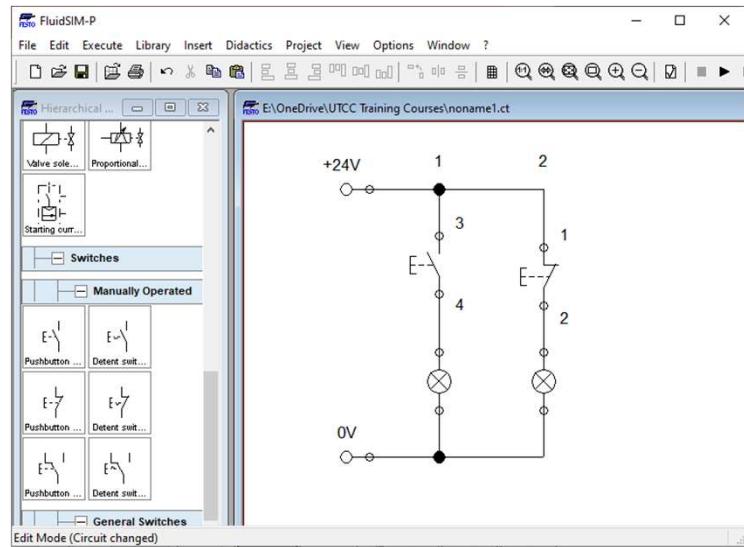
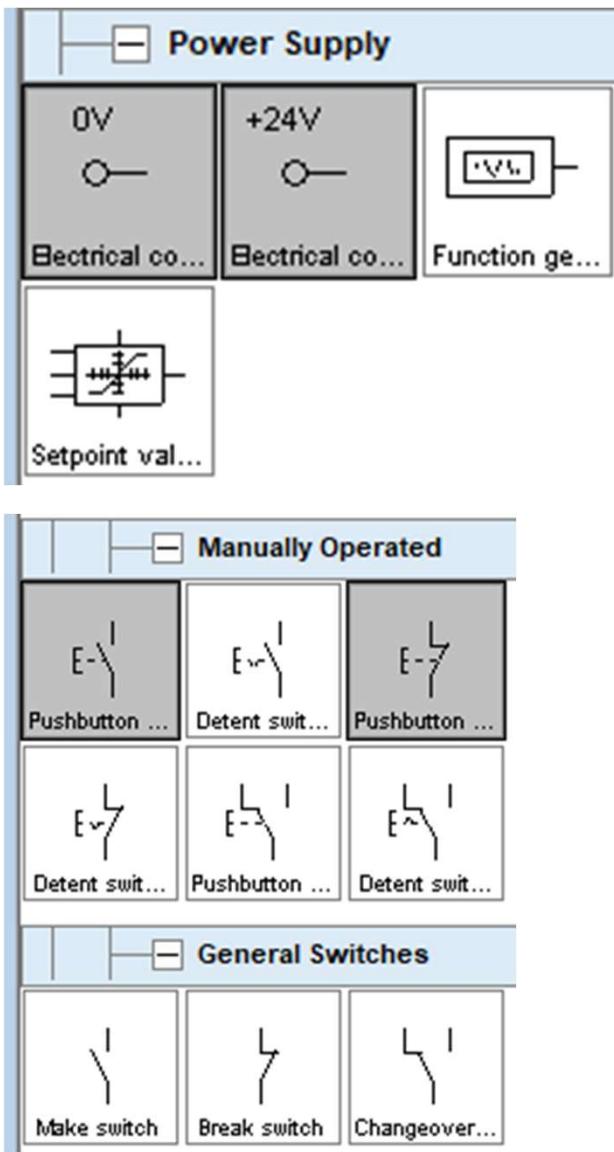
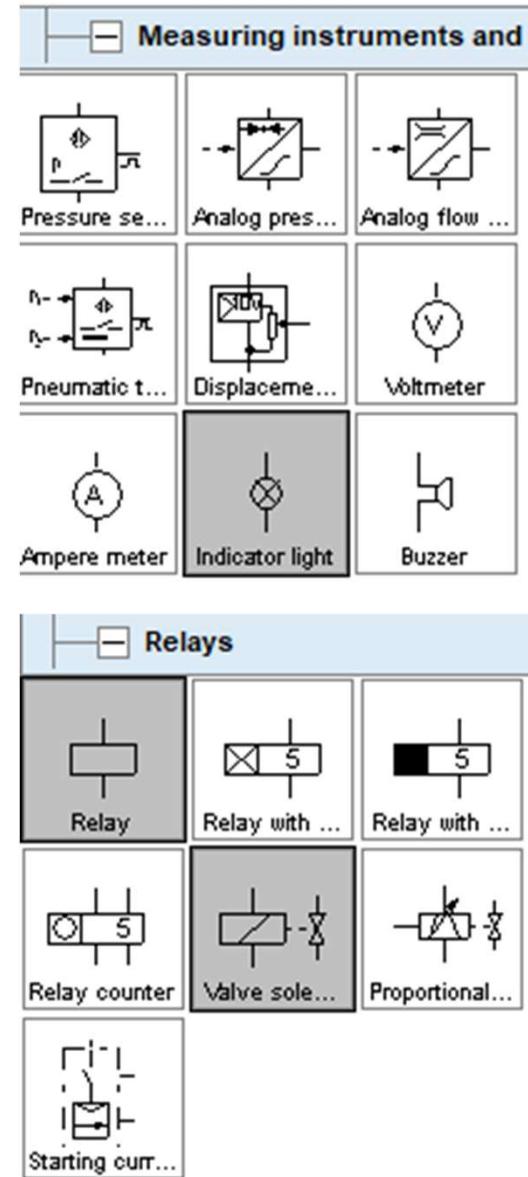
วงจรปิด (Close Circuit)

- หน้าสัมผัสเชื่อมต่อกัน (Close Contact)
- กระแสไฟฟ้าไหลในวงจรได้ ทำให้อุปกรณ์ทำงาน

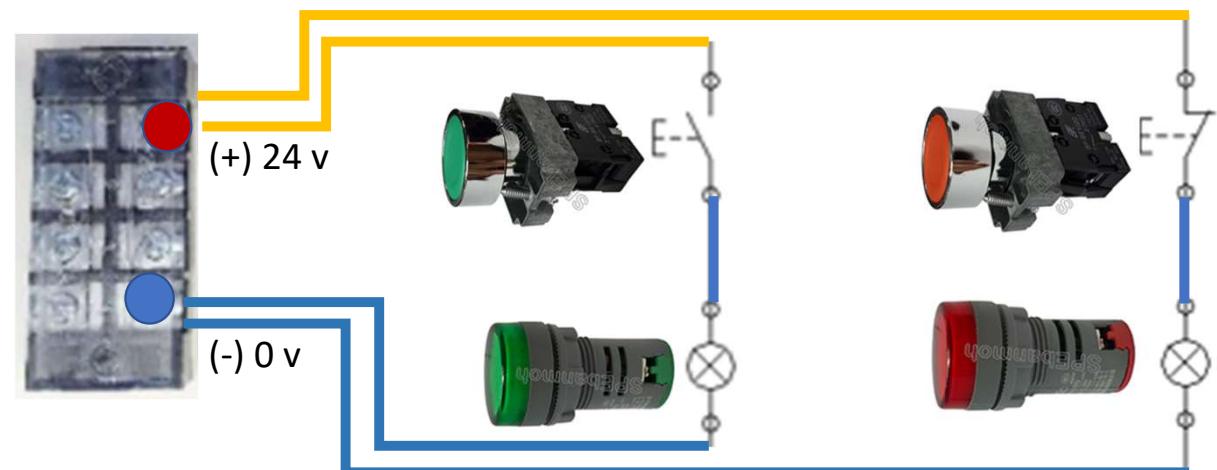
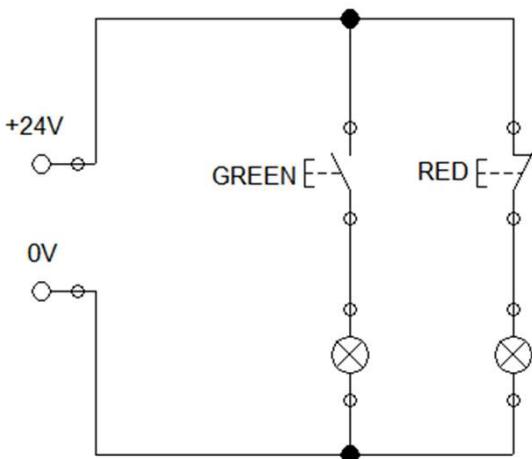
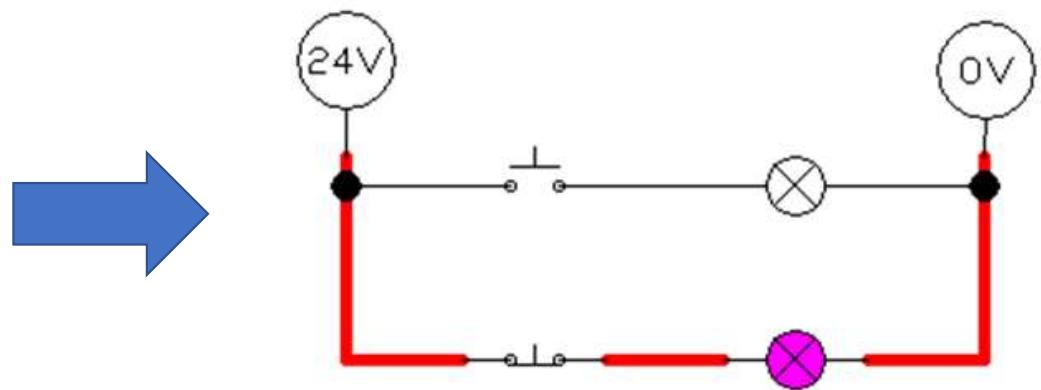
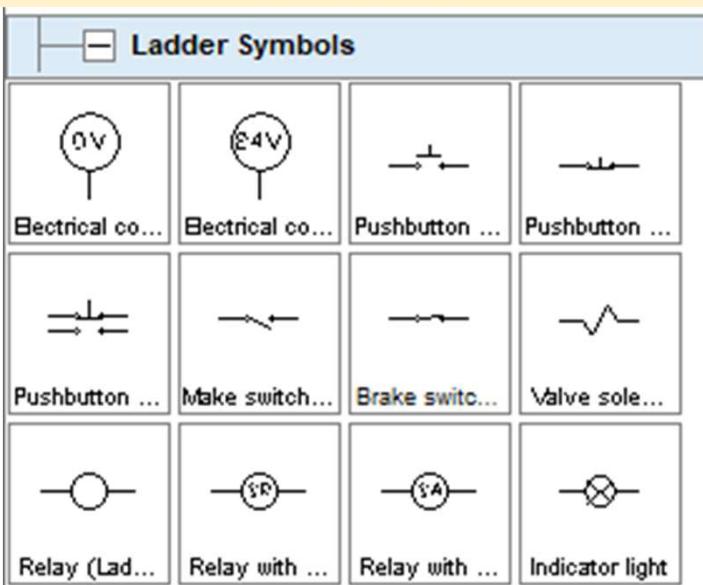


A Normal Closed contact (NC)

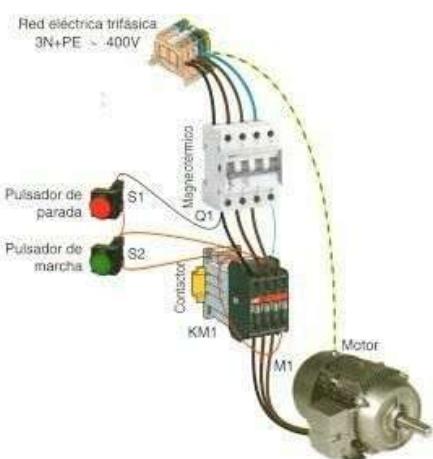
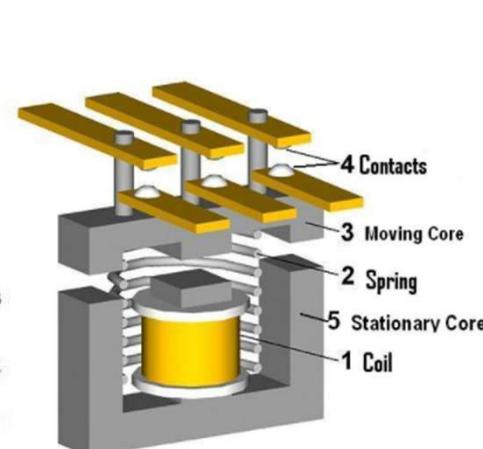
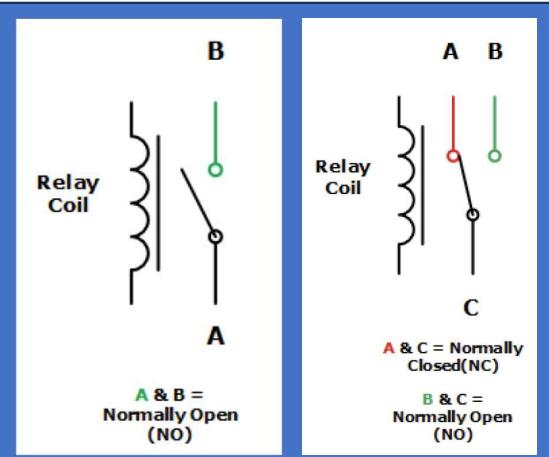
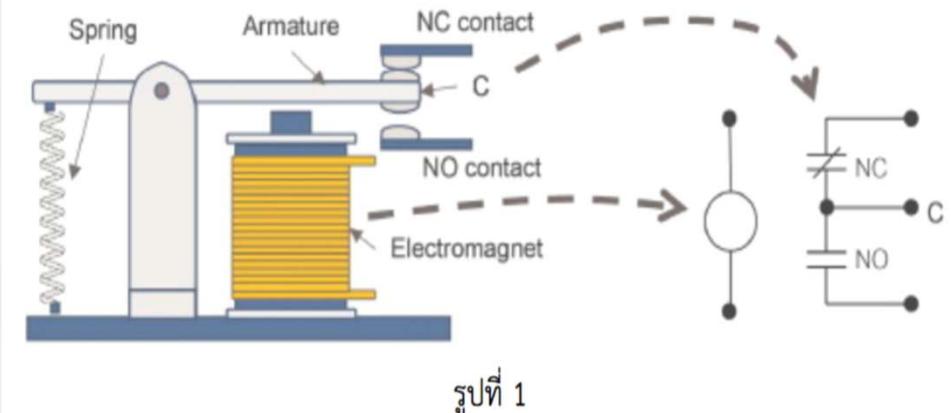
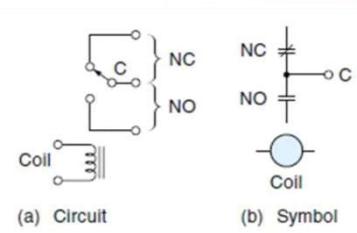
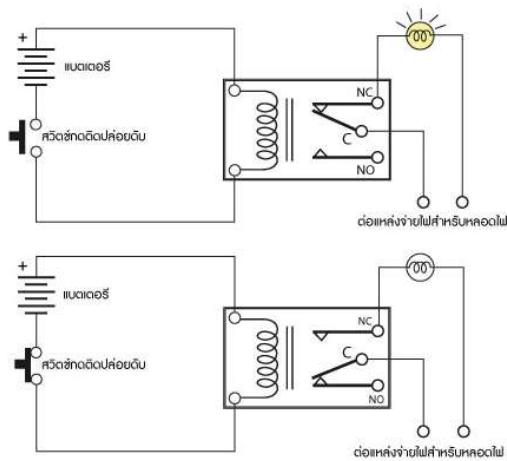
ปกติหน้าสัมผัสปิด

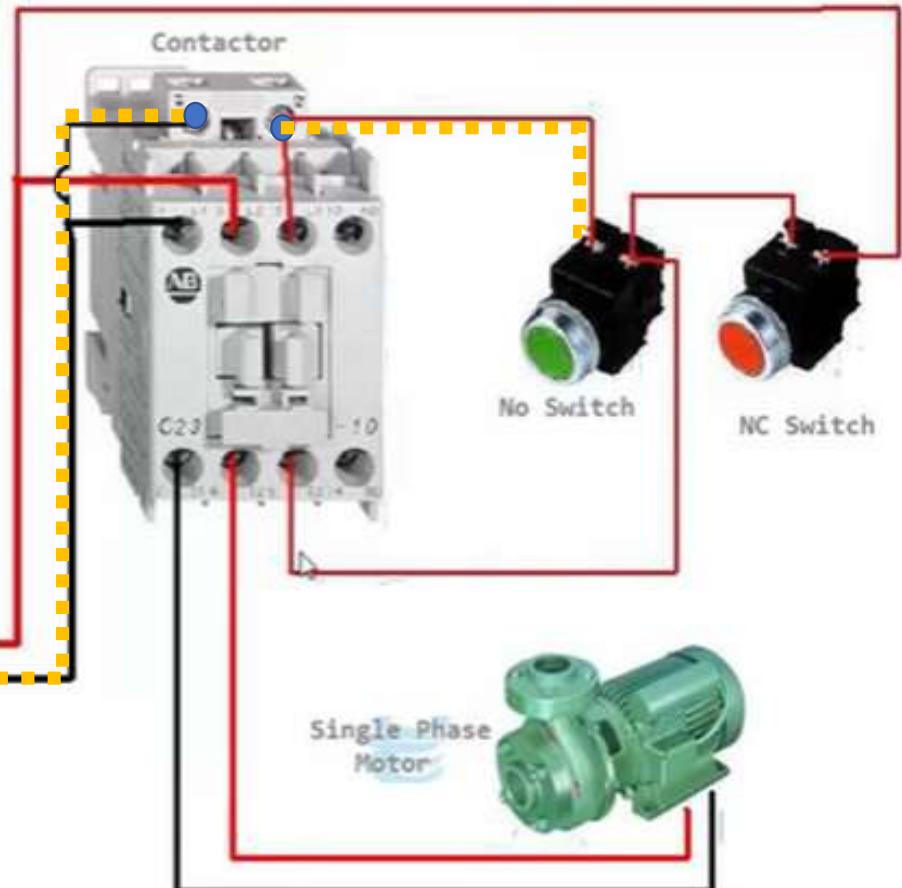
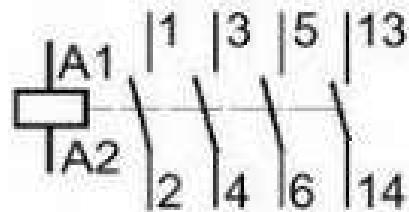
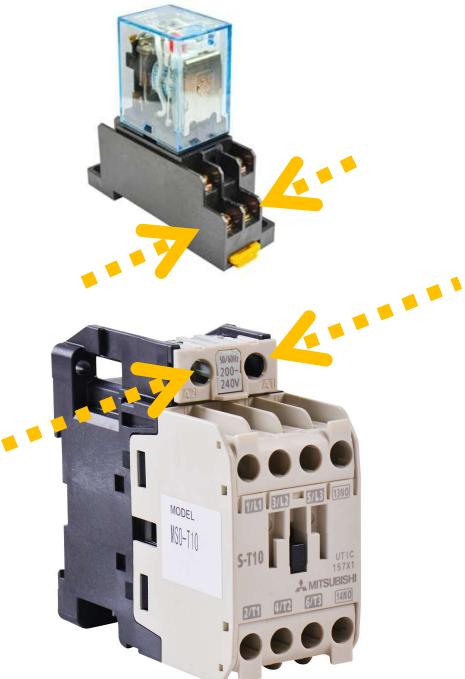


Basic 01 - Switch Control (NO-NC) youtube

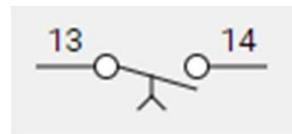
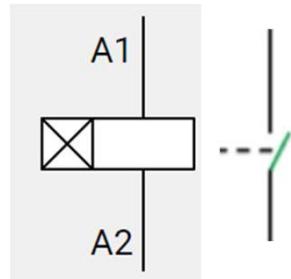


รีเล耶 Relay (สวิตช์ ที่ใช้กระแสไฟฟ้าในสั่งงาน หน้าสัมผัสเปิดปิด)

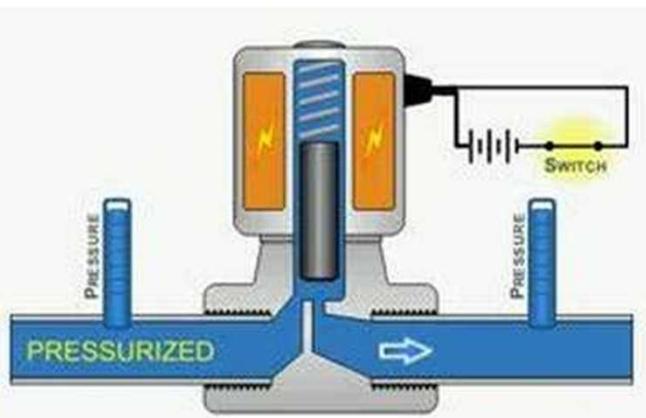
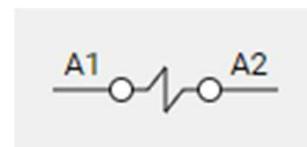
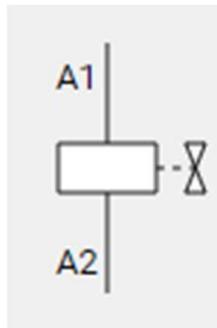




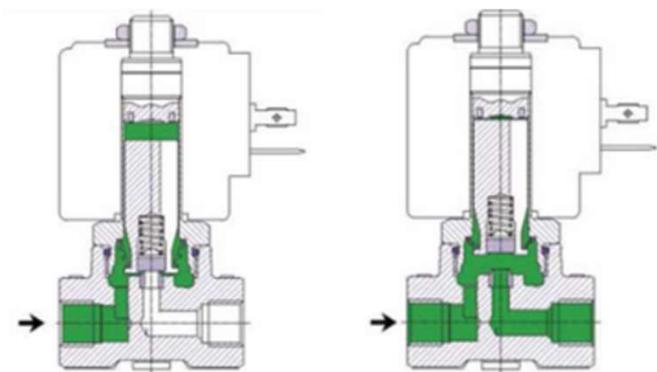
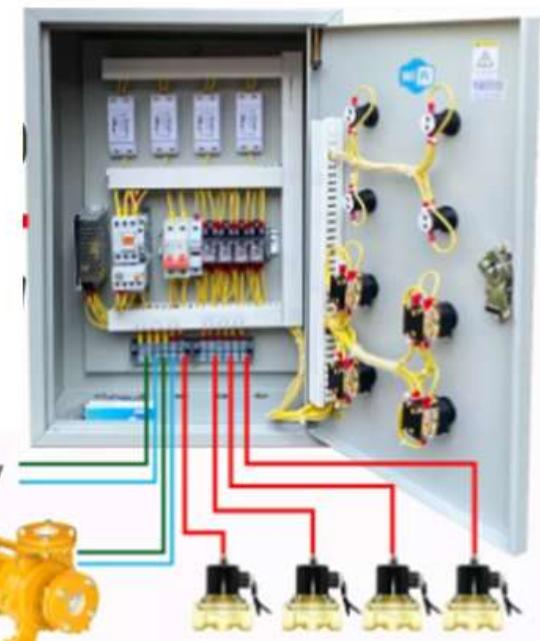
ตัวตั้งเวลา Timer



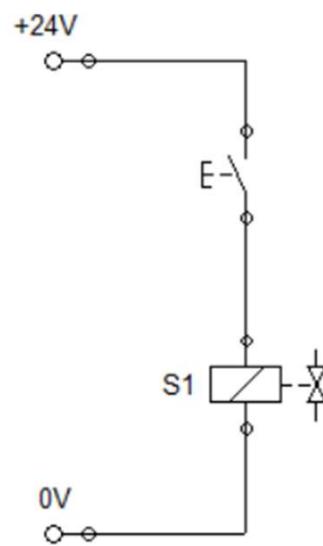
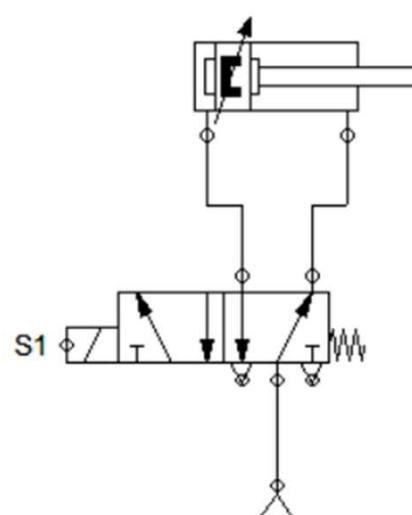
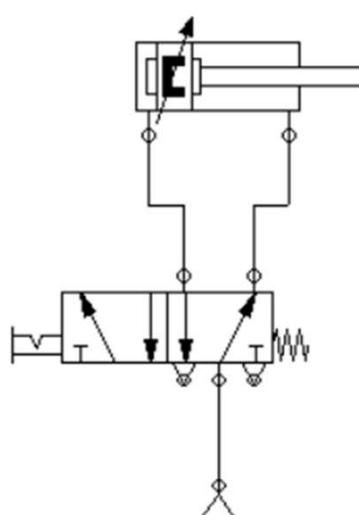
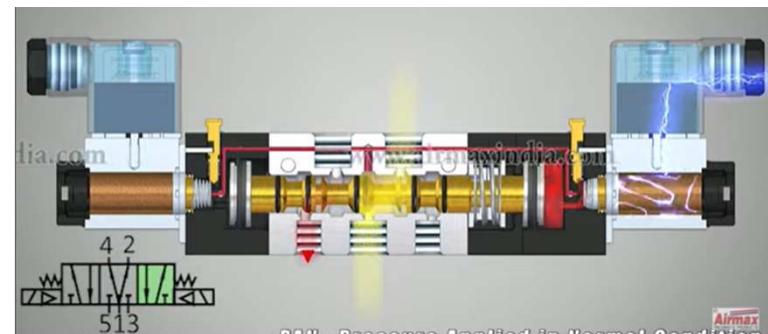
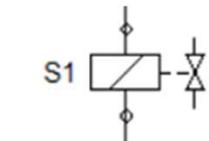
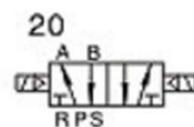
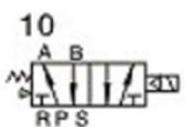
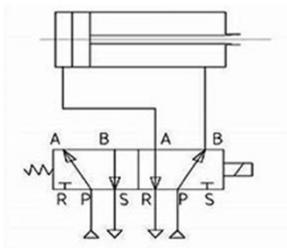
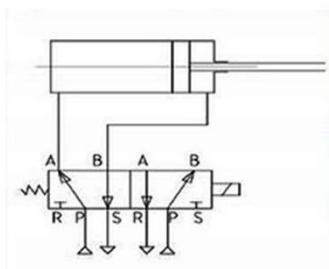
Solenoid Valves

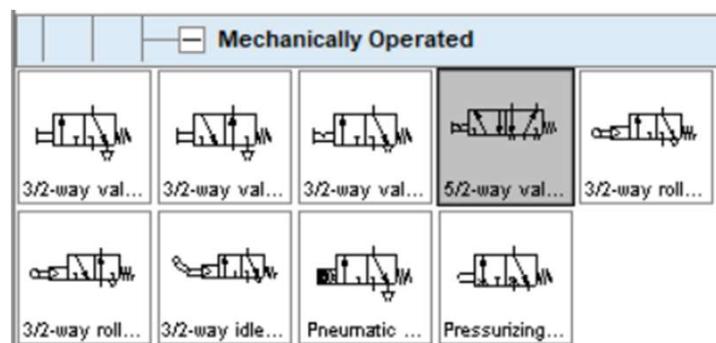
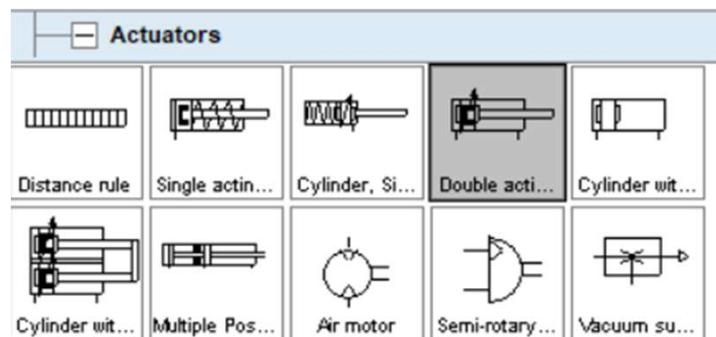


ระบบบาน้ำอัตโนมัติ 4 โซน



Solenoid Valves





Configure Way Valve

Left Actuation

Spring-returned
 Piloted
 External supply
 Pneumatic spring
 External supply

Description

5/2-way valve, with selection switch

Valve Body

Reversible

Manually
 Mechanically
 Pneumatically/
 Electrically

Initial Position

Left Dominant Signal Right

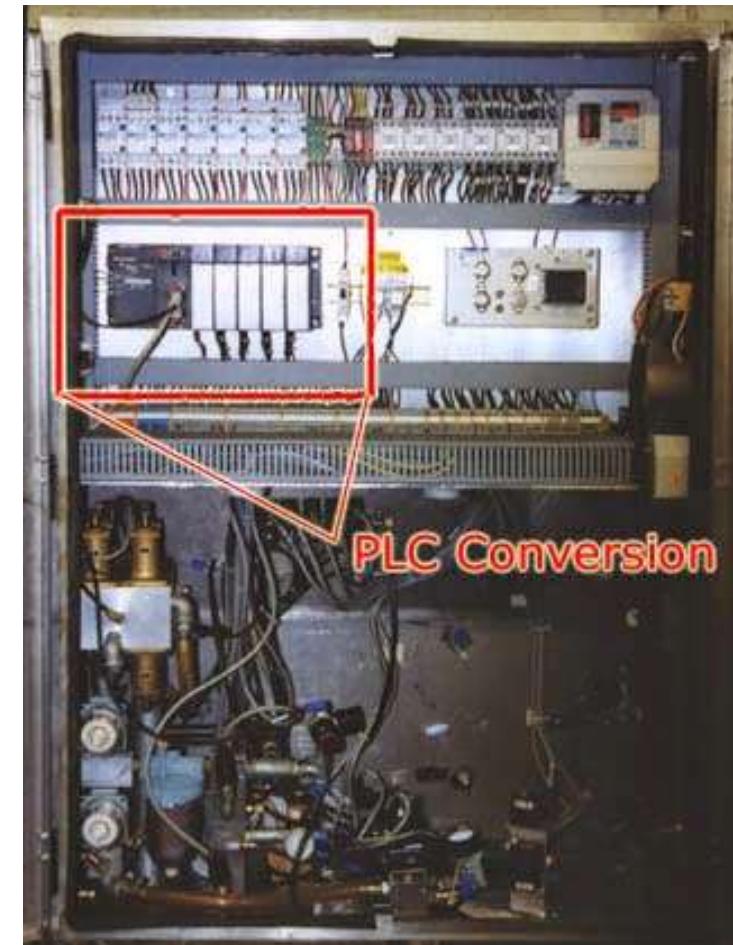
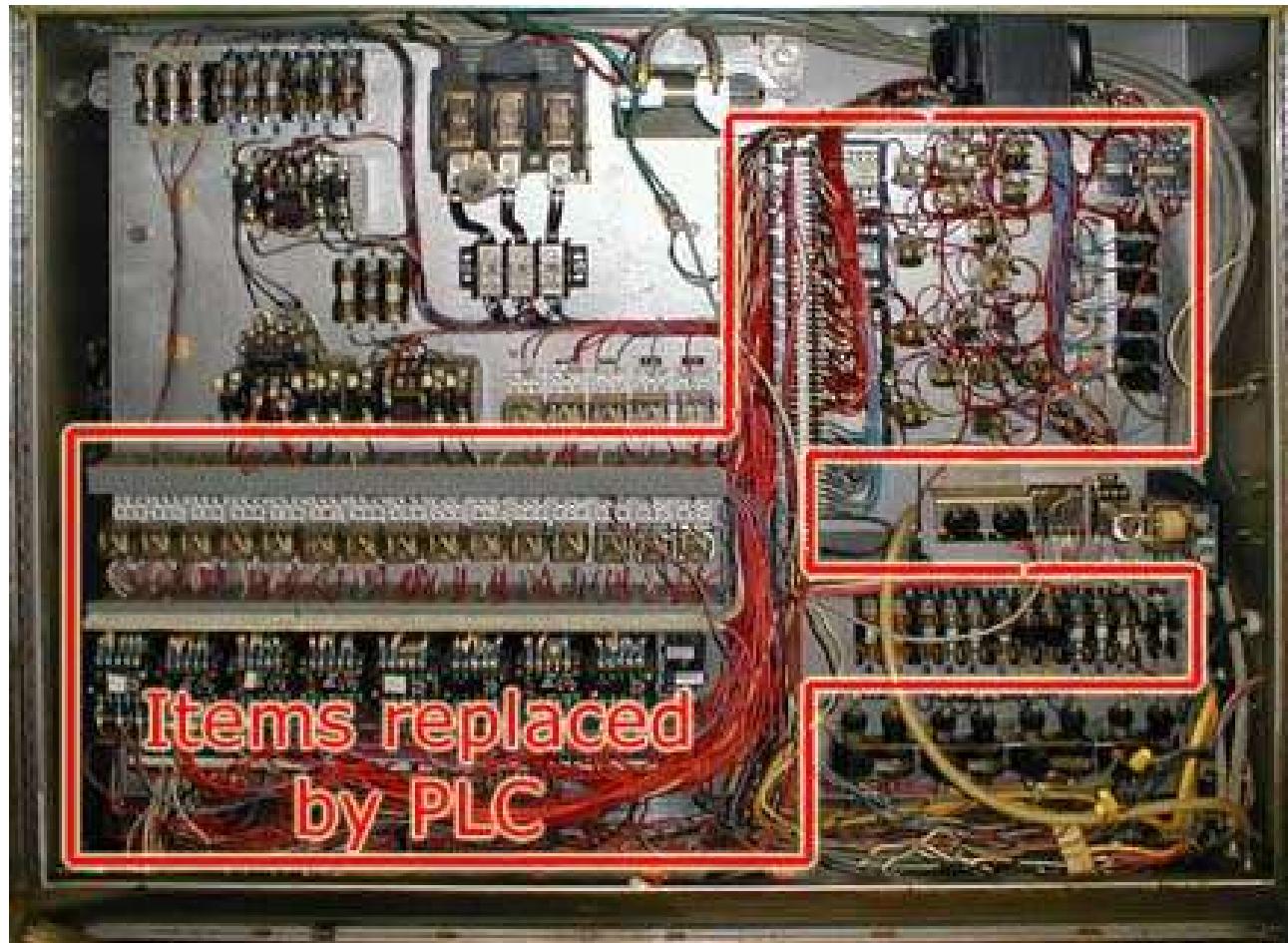
Standard Nominal Flow Rate l/min (0.1..5000)

Mirror

Horizontal
 Vertical

Buttons

OK Cancel Help





控制规模: 16 ~ 384点(包含CC-Link I/O在内)

(基本单元: 16/32/48/64/80/128点)

新产品
第三代微型可编程控制器。

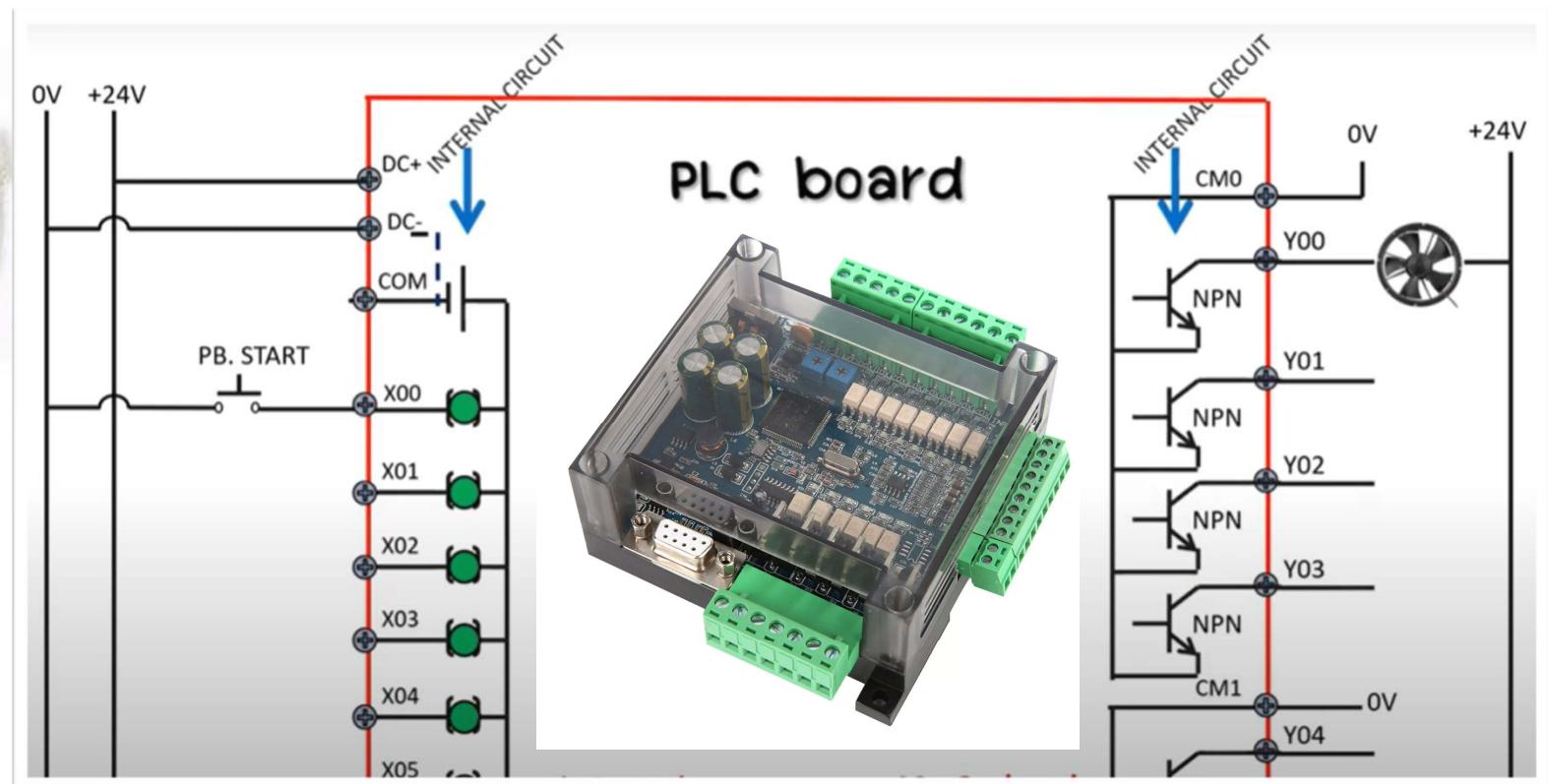
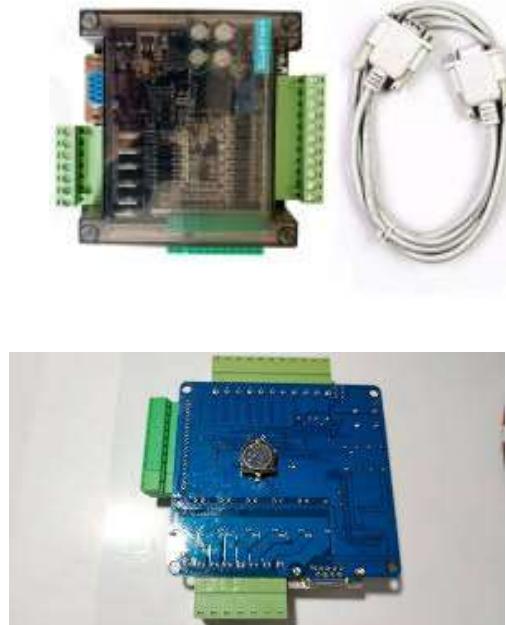
具有速度、容量、性能、功能的新型、高性能机器。
业内最高水平的高速处理，内置定位功能得到大幅
提升。



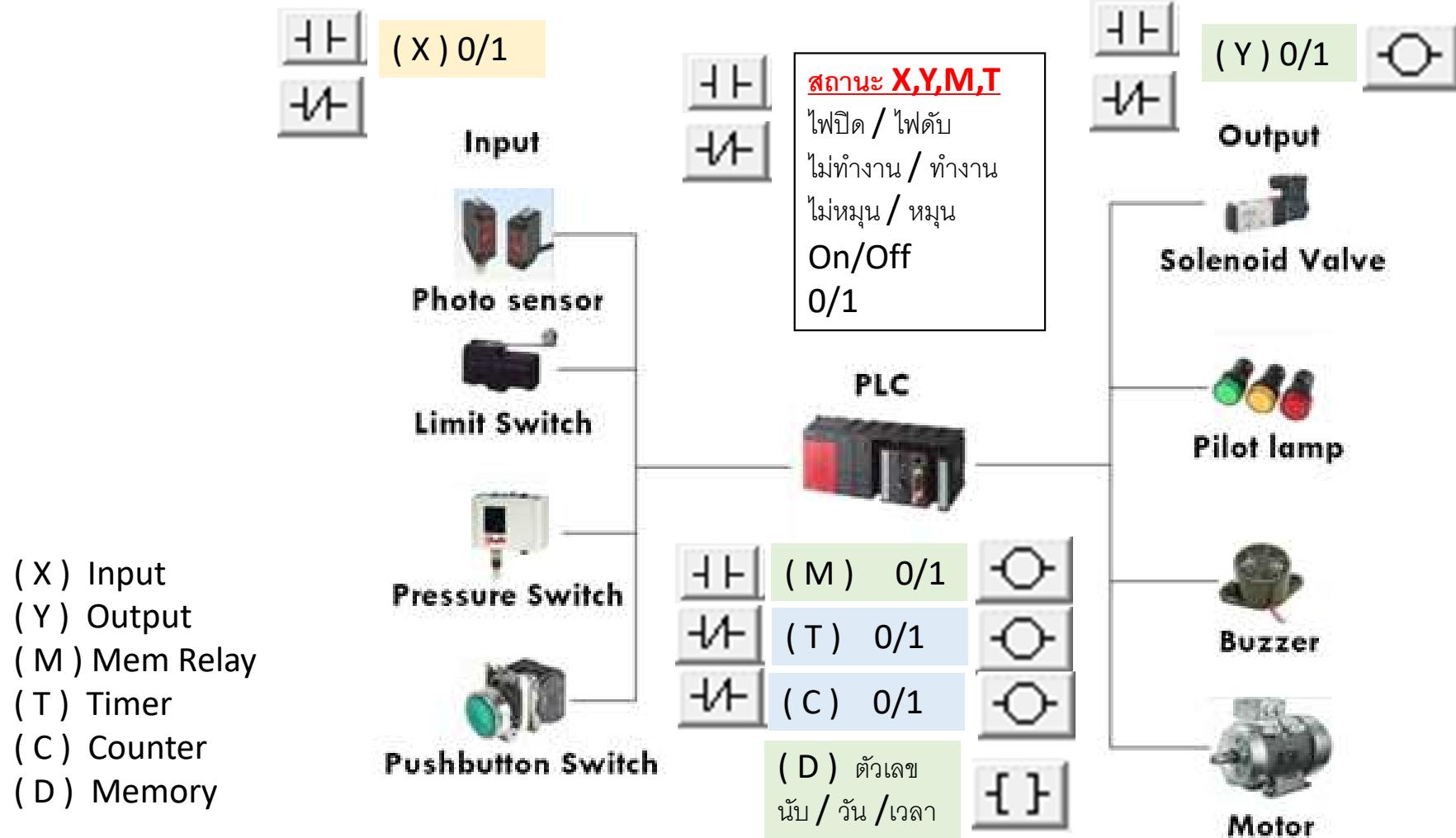
www.lk186.com

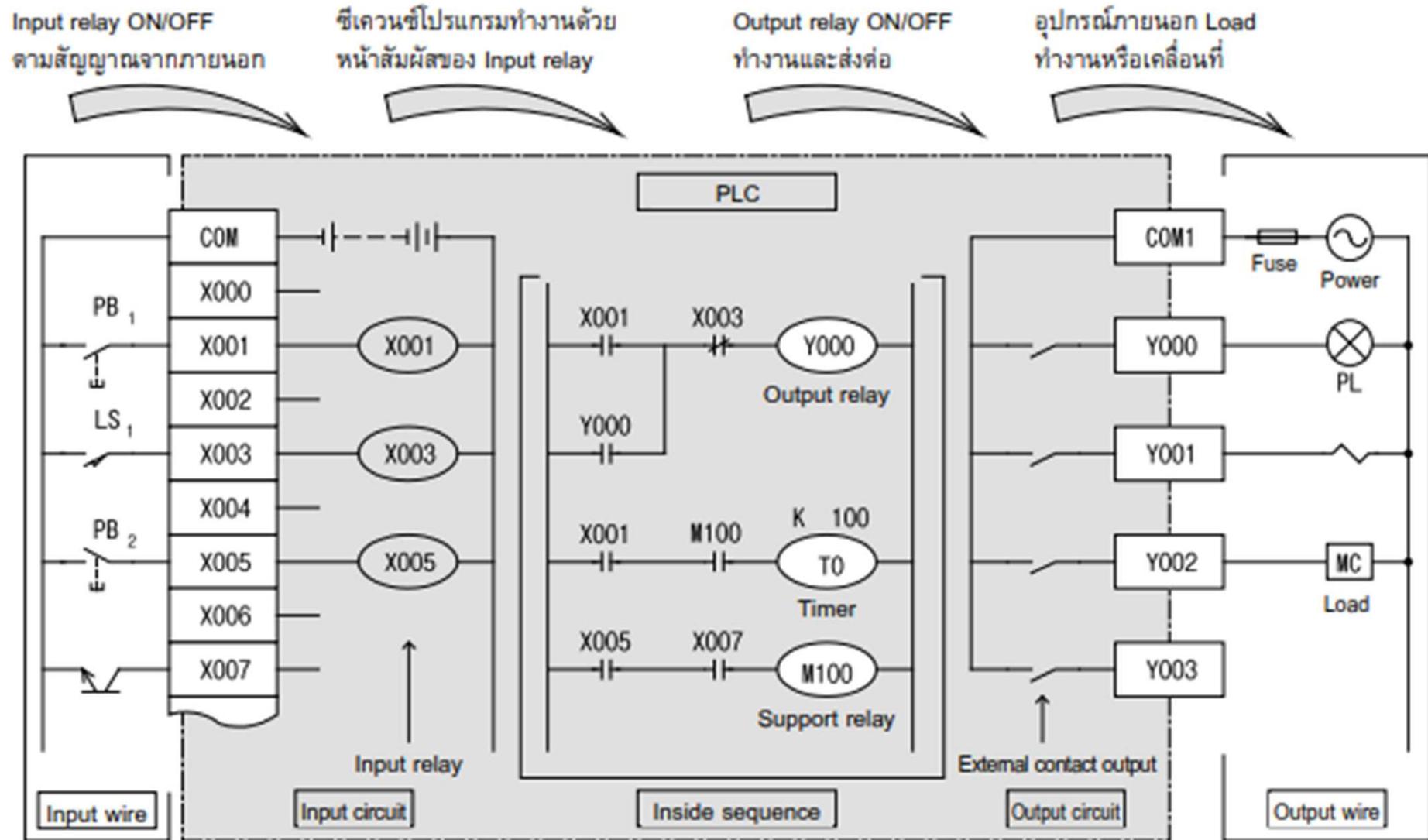


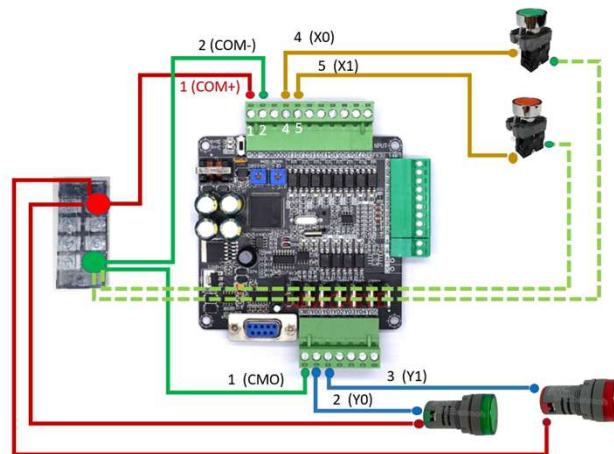
FX3U 24MT (RTC)



PLC (Programmable Logic Control)







[A] Let's Learn the FX Series PLC! [B] Let's Study the Basics [C] Easy Does It! [D] Beginner Challenge [E] Intermediate Challenge [F] A ↻

B-1. Basic I/O Program Learn input and output programs. ★	B-2. Standard Program Learn a latched output program and SET/RST program. ★
B-3. Control Precedence Program Learn an interlock program which controls conflicting operations. ★	B-4. Reading the Input Status Learn how to initiate instructions at the detection of rising or falling edge of a pulse. ★★

SW05C-FXTRN-BEG-E

File Edit Simulation Tools Help

Basic I/O Program

Chapter 1 Description of Inputs and Outputs

Ch 1 Ch 2 Ch 3 Ch 4

Light the output lamps using the input switches.

CAUTION

Click the ladder program area to enable operation. The title bar will turn blue.

Key operations are not enabled when the title bar and menu items are grayed out.

1 Click [Edit Ladder] button on the remote control.

2 Only the 'END' symbol is displayed on the screen.
An END rung at the top of the program signals that no other

Operating Y0
Stop Y1
Error Y2

Project Edit Convert View Online Tools

x020 0 → (Y020)
x021 2 → (Y021)
4 → [END]

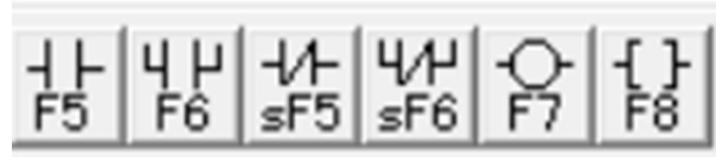
Lamp display

Operation panel

Ready 5/8000 OW

IN X DUTY Y

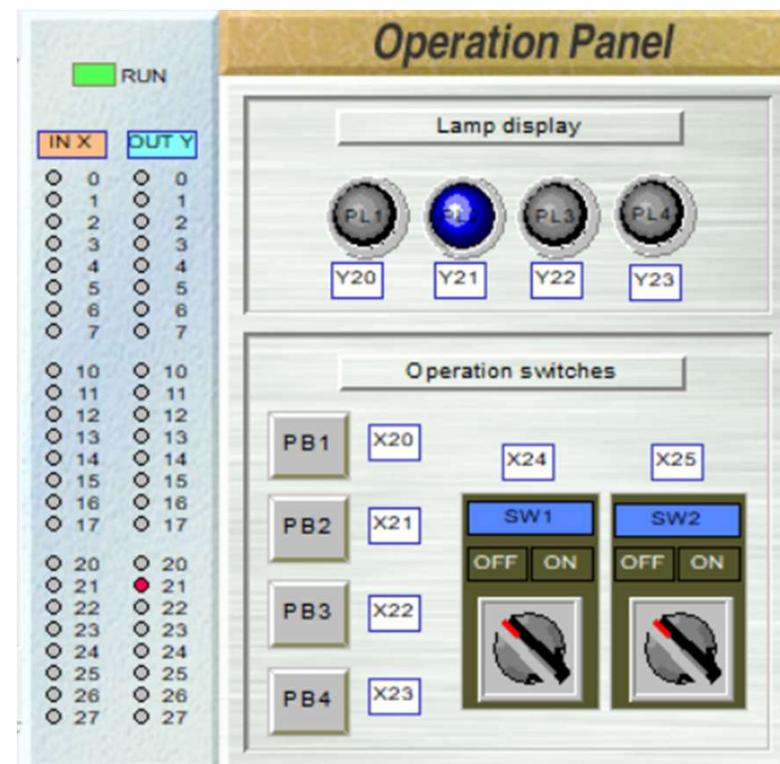
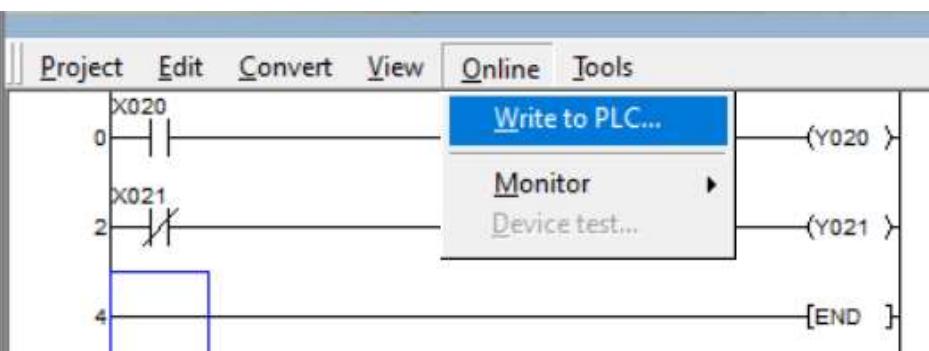
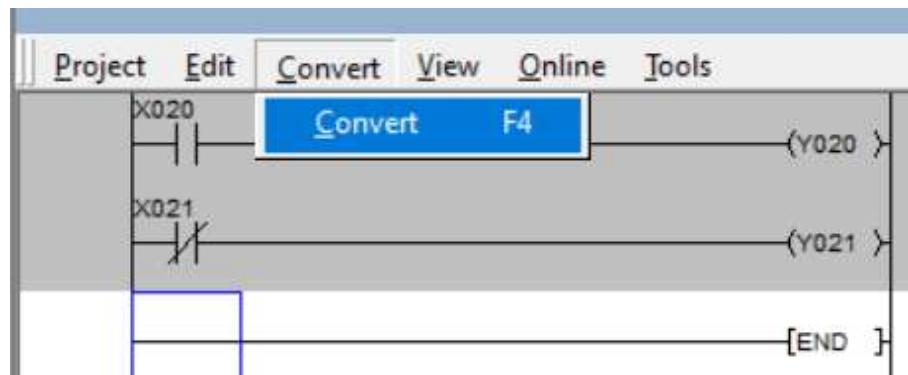
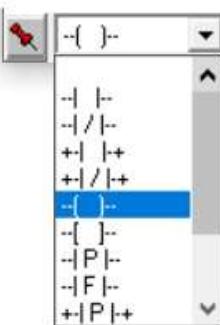
0	0	1
1	1	2
2	2	3
3	3	4
4	4	5
5	5	6
6	6	7
7	7	8
8	8	9
9	9	10
10	10	11
11	11	12
12	12	13
13	13	14
14	14	15
15	15	16
16	16	17
17	17	18
18	18	19
19	19	20
20	20	21
21	21	22
22	22	23
23	23	24
24	24	25
25	25	26
26	26	27
27	27	28



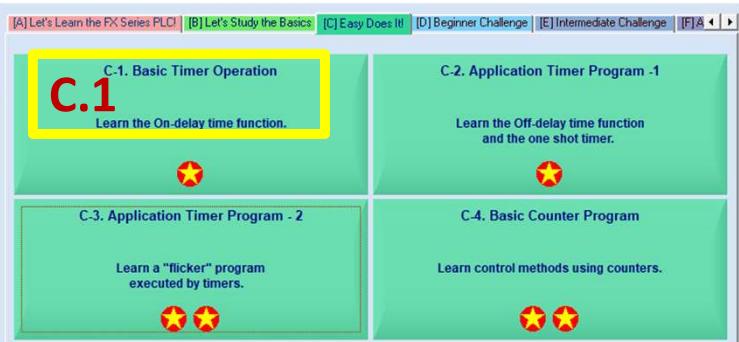
Enter symbol

X

-|- -| X20



PLC 04 – Open and Close Door YouTube



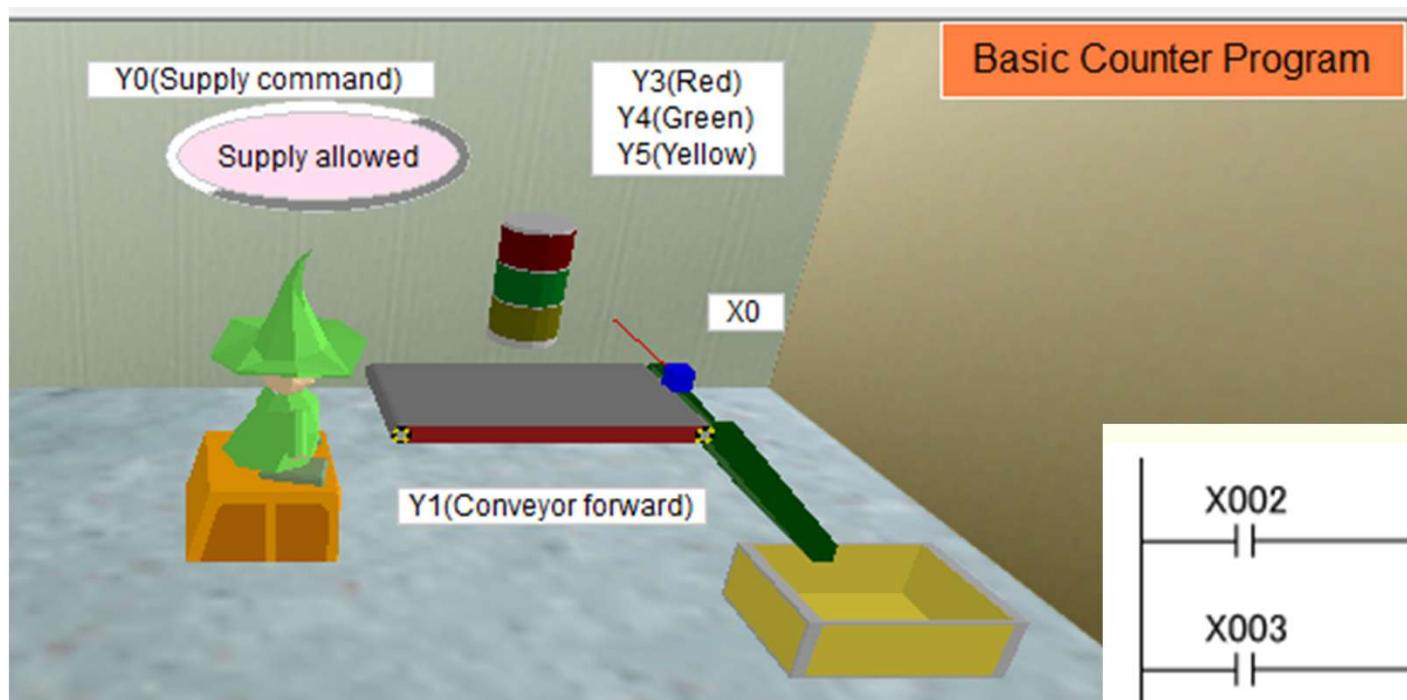
This screenshot shows a ladder logic program in a PLC simulation environment. The program consists of two parallel rungs:

- Rung 1: Input X020 (normally open) and input X001 (normally closed) are connected in series. The output of this series connection is connected to coil Y000.
- Rung 2: Input X021 (normally open) and input X000 (normally closed) are connected in series. The output of this series connection is connected to coil Y001.

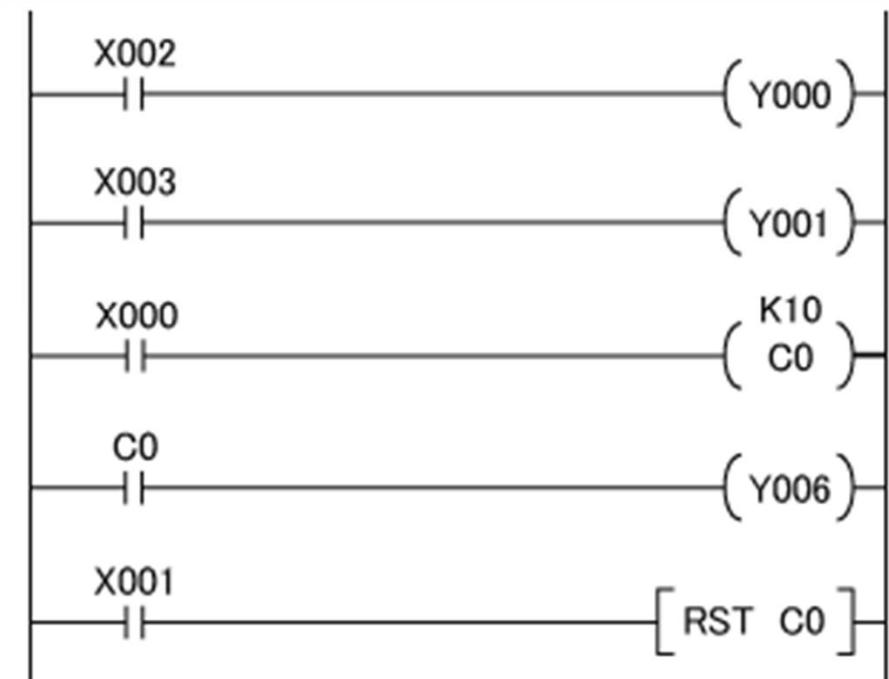
The outputs Y000 and Y001 are shown on the right side of the screen, along with a 3D model of a door mechanism. Labels indicate:

- X1(Upper limit)
- Y5(Red)
- Y6(Green)
- Y7(Yellow)
- Y0(Door up command)
- Y1(Door down command)
- X0(Lower limit)

On the left, there is a toolbar with a cartoon character, buttons for 'Edit Ladder', 'Write to PLC', 'Reset', and 'RUN'.



C.4



PLC 03 – Basic Timer youtube

File Edit Simulation Tools Help

Basic Timer Operation

X020 () K30 T0 (Y000)

T0 () Y000

X021 () K40 T1 (Y001)

T1 () Y001

3 Press the [F4] key to convert the program you have input.

X1(Upper limit)

X0(Lower limit)

Y5(Red)
Y6(Green)
Y7(Yellow)

Y0(Door up command)

Y1(Door down command)

PB1 X20

PB2 X21

Timer

Enter symbol

-()-

T0 K30

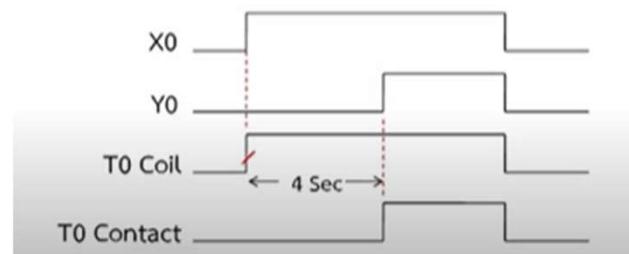
X0

Y0

T0 Coil

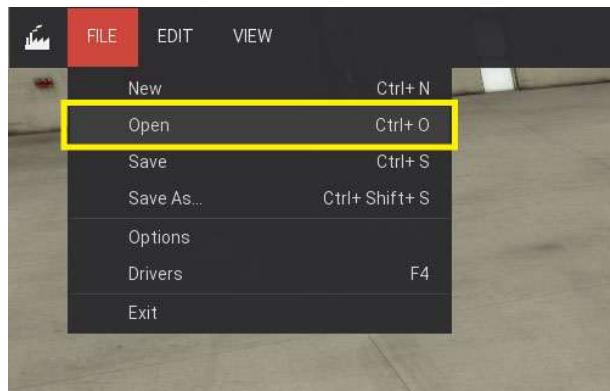
4 Sec

T0 Contact



[A] Let's Learn the FX Series PLC | [B] Let's Study the Basics | [C] Easy Does It! | [D] Beginner Challenge | [E] Intermediate Challenge | [F] / < >

C.1. Basic Timer Operation	C.2. Application Timer Program - 1
Learn the On-delay time function.	Learn the Off-delay time function and the one shot timer.
C.1	C.2
Learn a "flicker" program executed by timers.	Learn control methods using counters.



← Open Scene

My Scenes

Scenes

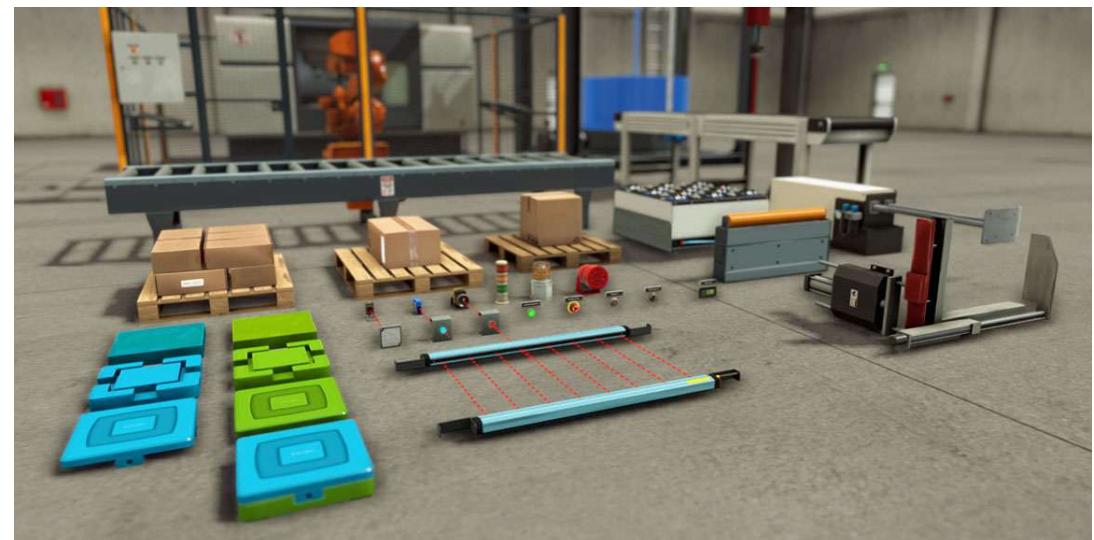
These are scenes inspired by common industrial applications which different challenges ranging from beginner to advanced. They can be edited and used as a base for your own scenes.

 1 - From A to B
Transport a box until it reaches a sensor.

 2 - From A to B (Set and Reset)
Transport a box from sensor A to sensor B.

 3 - Filling Tank (Timers)
Fill and empty a tank using timers.

 4 - Queue of Items (Counters)
Load and unload three boxes onto a conveyor.

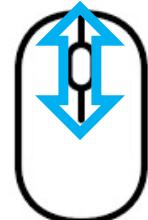


Dock All Tags

Conveyor	:	0	I	X	
Sensor	:	1	O	X	
Start Button 1	:	0	O	X	Move
Start Button 1 (Light)	:	1	I	X	FORCED
Stop Button 1	:	2	O	X	
Stop Button 1 (Light)	:	2	I	X	



Zoom In/Out



Rotate



Operators

Search

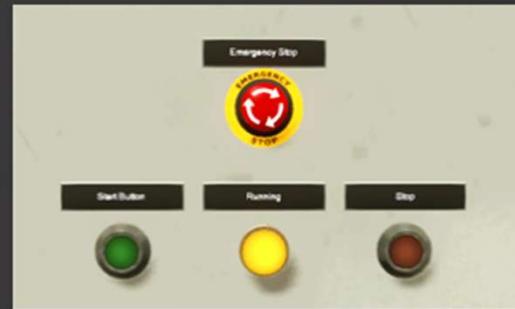


[← WELCOME](#)[Documentation and Tutorials](#)[New](#)[Open](#)[Scenes](#)

Scenes

[Update Checker](#)

Documentation



Getting Started

Introductory guide that walks you through the basics of working with FACTORY I/O.



Manual

The complete FACTORY I/O guide.



Parts

A list of all available parts in FACTORY I/O, including detailed information about each one.



Scenes

Relevant information for all included scenes.

Show this window at startup.



← Open Scene

My Scenes

Scenes



Level Control

Control the liquid level (or flow) of a tank using a Proportional-Integral-Derivative (PID) controller.

These are scenes inspired by common industrial applications which present different challenges ranging from simple to advanced.

They can be edited and used as a base for your own scenes.



1 - From A to B

Transport a box until it reaches a sensor.



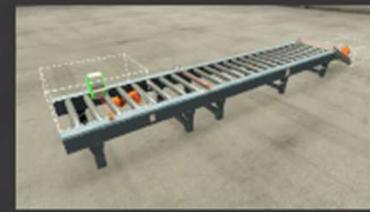
2 - From A to B (Set and Reset)

Transport a box from sensor A to sensor B.



3 - Filling Tank (Timers)

Fill and empty a tank using timers.



4 - Queue of Items (Counters)

Load and unload three boxes onto a conveyor.



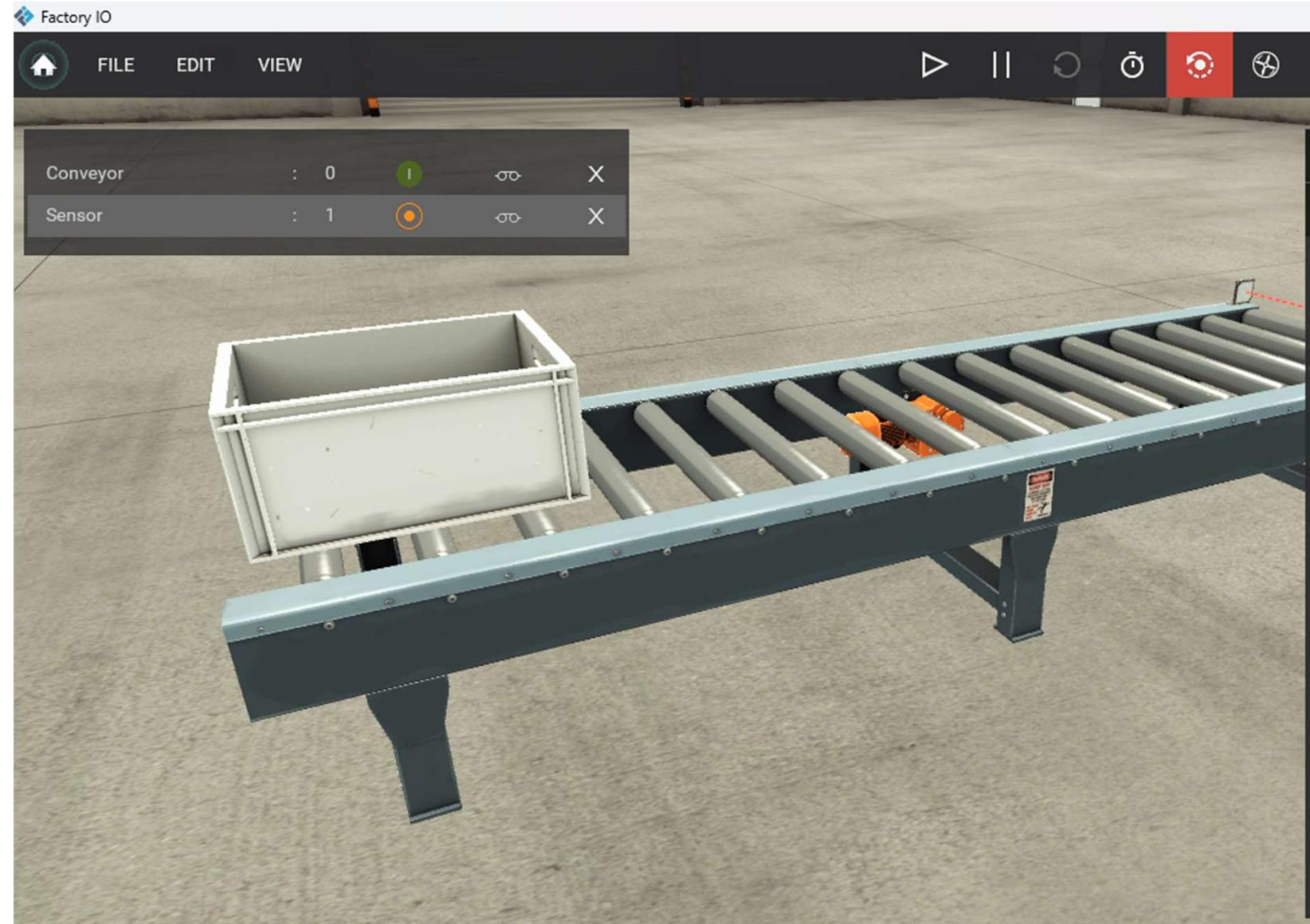
Assembler

Assemble parts made of lids and bases using a two-axis pick and place.



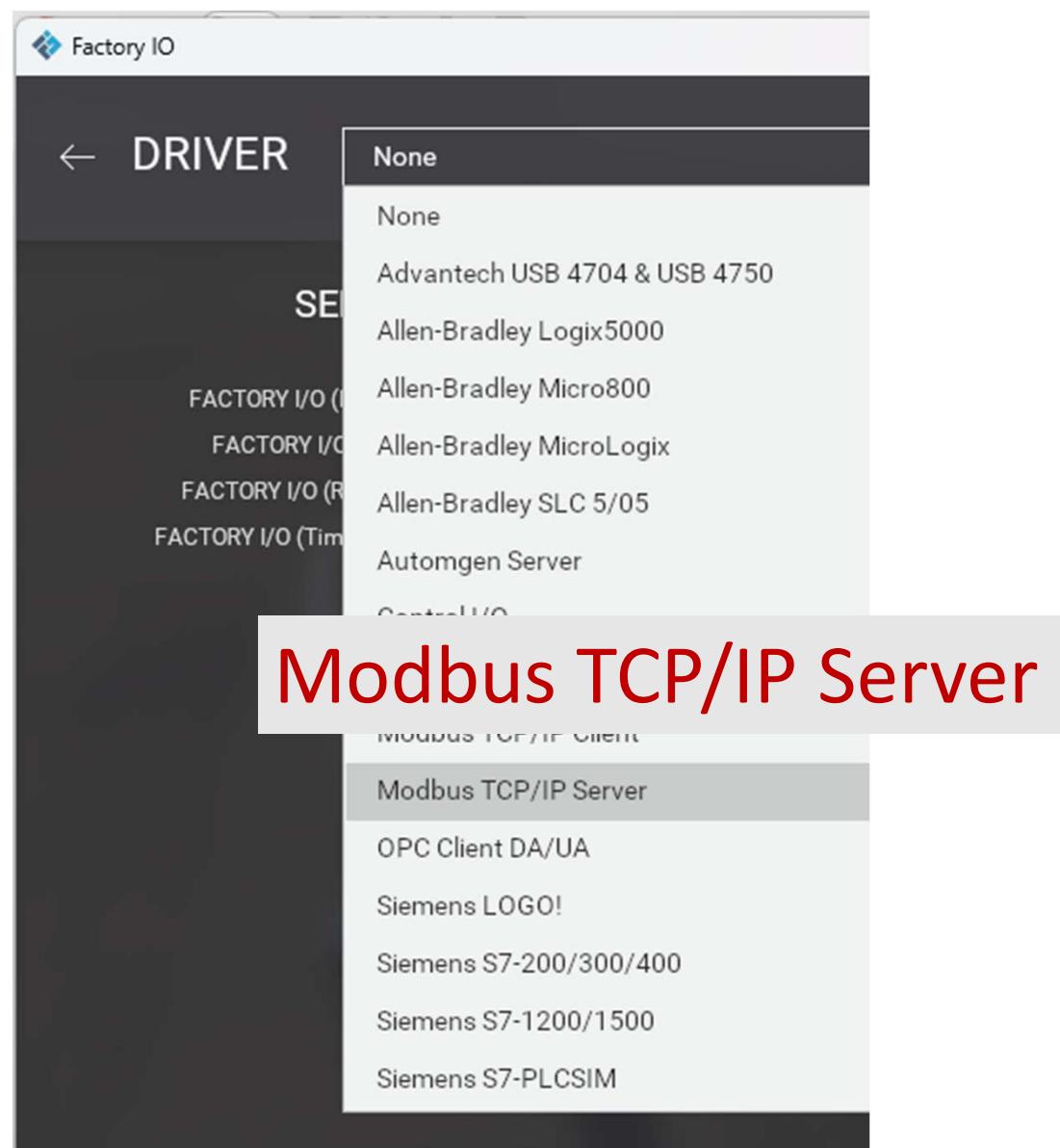
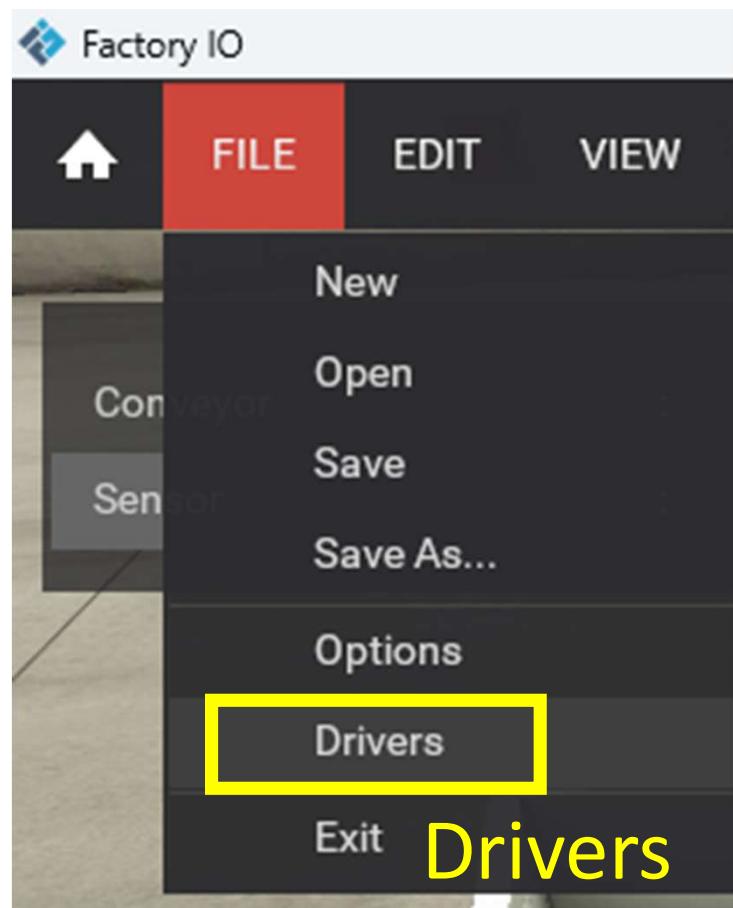
Assembler (Analog)

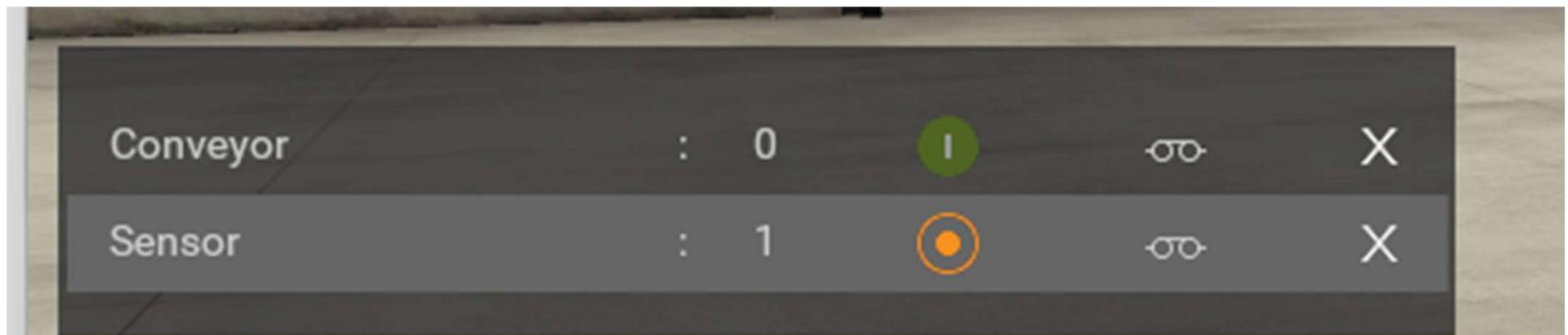
Assemble parts made of lids and bases using a two-axis pick and place with analog values.



The image displays three views of the Factory IO software interface:

- Top Left:** A 3D simulation of a conveyor system. On the left, a control panel shows two tags: "Conveyor" (green circle) and "Sensor" (orange circle). The conveyor belt has a white bin at one end and an orange object on it. A "Sensor" tag is placed near the end of the conveyor.
- Top Right:** A "VIEW" menu with several options:
 - Palette
 - Cameras
 - Camera Navigation
 - Sensors Tags
 - Actuators Tags
 - Show Tags AddressesA yellow box highlights the "Dock All Tags" and "Clear Docked Tags" buttons.
- Bottom:** The main application window.
 - FILE:** A menu with options: New (Ctrl+N), Open (Ctrl+O), Save (Ctrl+S), Save As... (Ctrl+Shift+S), Options, Drivers (highlighted with a yellow box), and Exit.
 - DRIVER:** Set to "Modbus TCP/IP Server".
 - SENSORS:** A list of I/O configurations:
 - FACTORY I/O (Paused)
 - FACTORY I/O (Reset)
 - FACTORY I/O (Running)
 - FACTORY I/O (Time Scale)Each entry includes a color-coded icon (green for Paused, orange for Reset, blue for Running, grey for Time Scale), a status indicator (Sensor or Coil), and an input/output identifier (e.g., Input 0, Input 1, Coil 0).
 - ACTUATORS:** A list of I/O configurations:
 - Conveyor
 - FACTORY I/O (Camera Position)
 - FACTORY I/O (Pause)
 - FACTORY I/O (Reset)
 - FACTORY I/O (Run)Each entry includes a color-coded icon (green for Conveyor, orange for Camera Position, blue for Pause, red for Reset, grey for Run).
 - Buttons:** STOP, CONFIGURATION, and CLEAR.





Modbus TCP/IP Server

Machine IP Address

XXX.XXX.XXX.XXX : 502

(192.168.1.50:502)

Slave ID:1

Sensor	Input 0	Coil 0	Conveyor
Sensor	Input 1		

SENSORS

- I/O (Paused) █
- RY I/O (Reset) █
- I/O (Running) █
- (Time Scale) █
- FACTORY I/O (Running) █
- Sensor █

Conveyor

: 0

I

∞

X

Sensor

: 1

•

∞

X



I

FORCED

•

∞

I

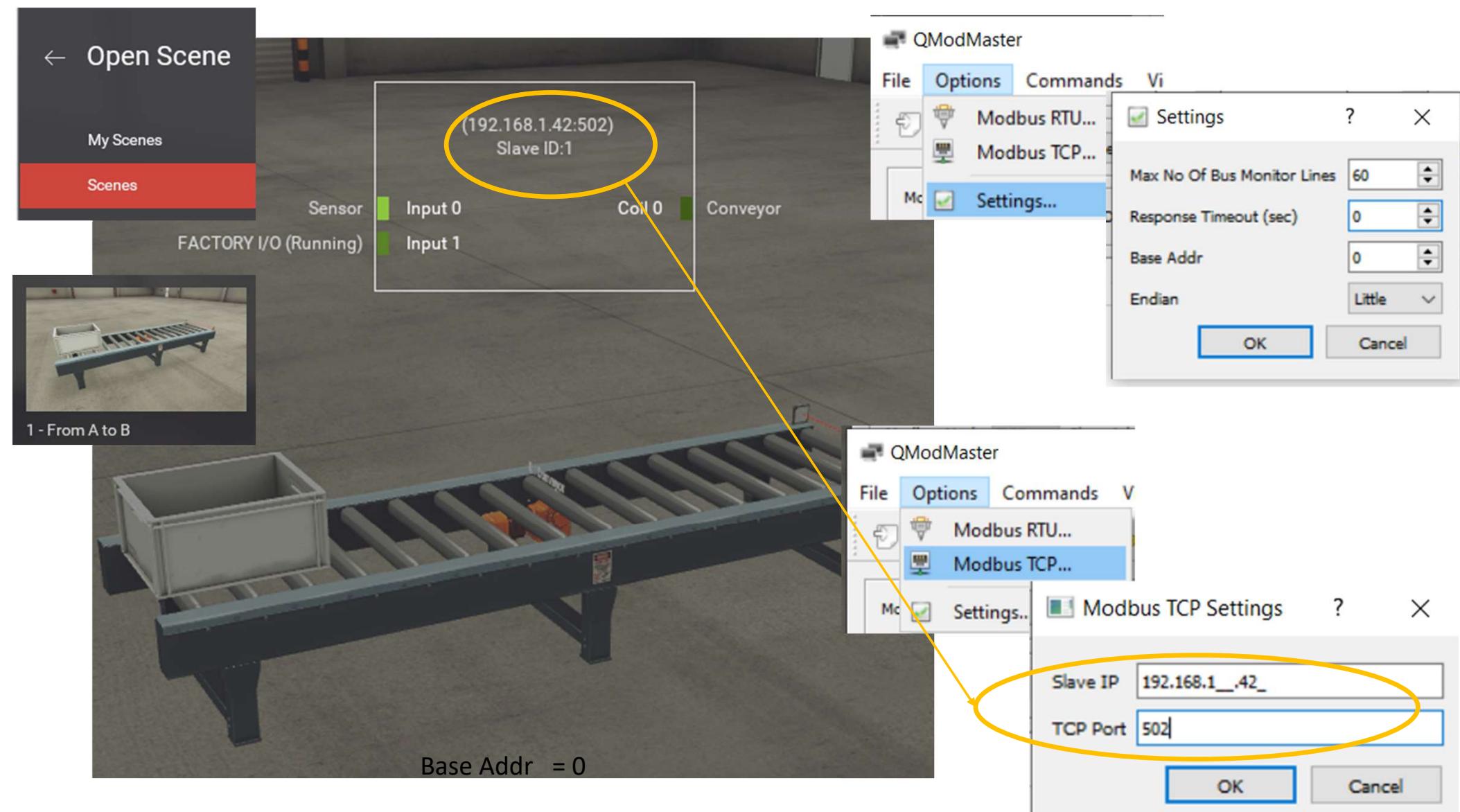
∞

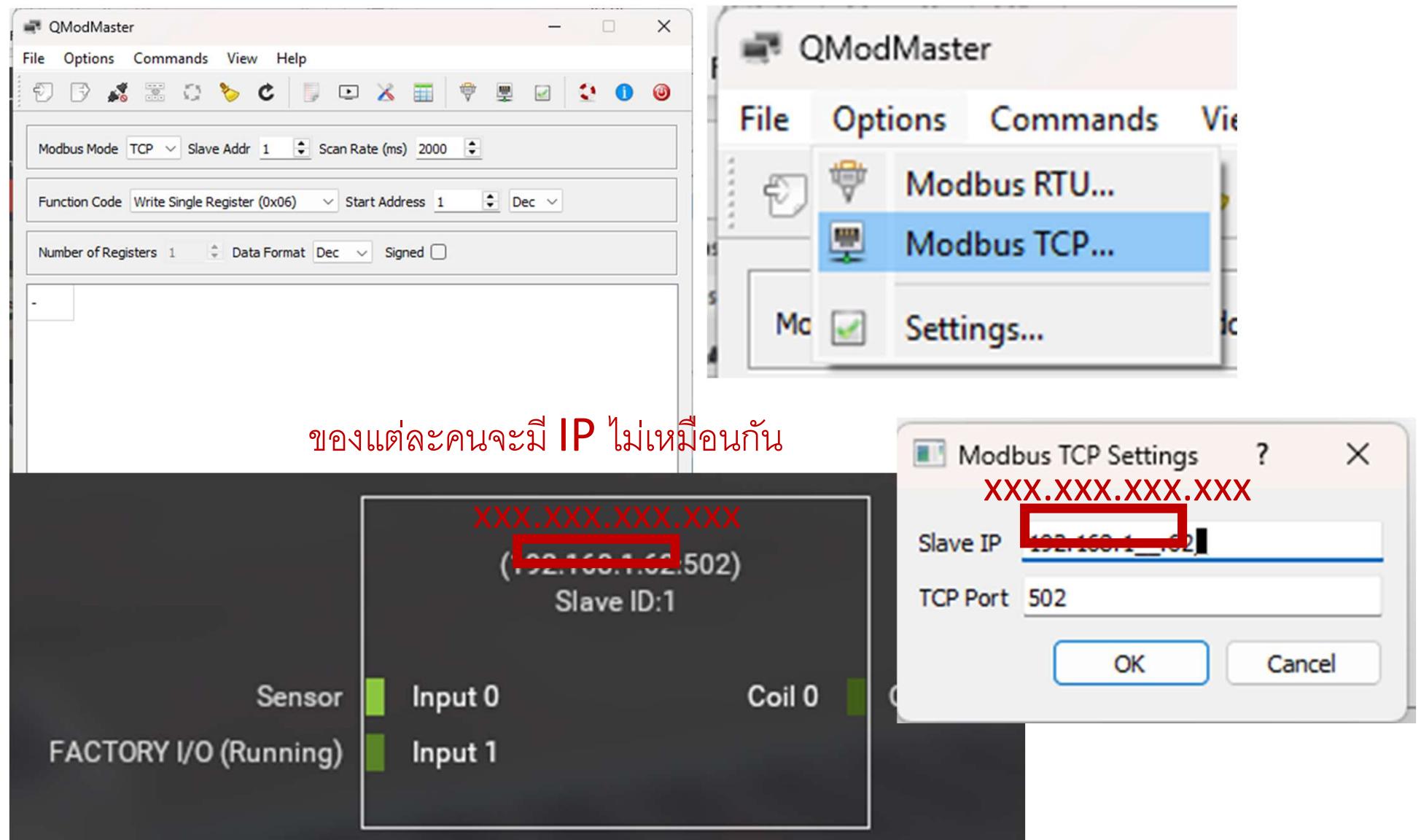
X

•

∞

X





ของเดิมคนจะมี IP ไม่เหมือนกัน

XXX.XXX.XXX.XXX
(192.168.1.52,502)

Slave ID:1

Sensor

Input 0

Coil 0

FACTORY I/O (Running)

Input 1

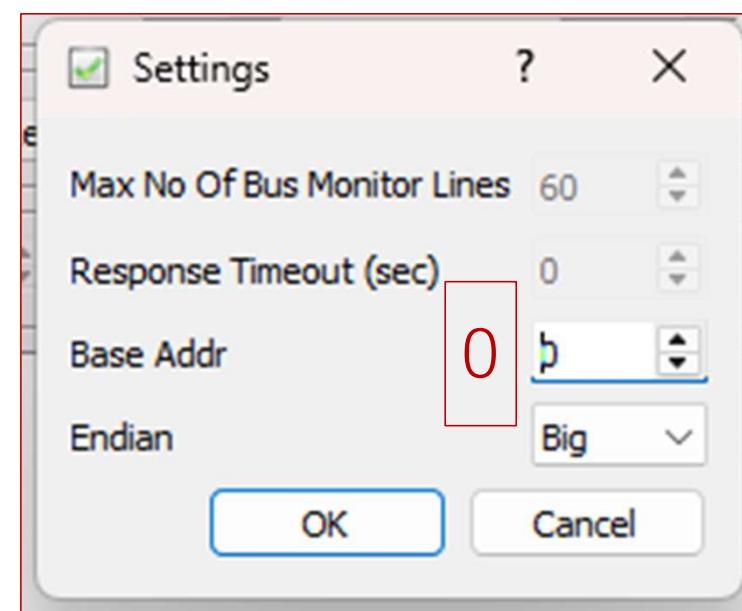
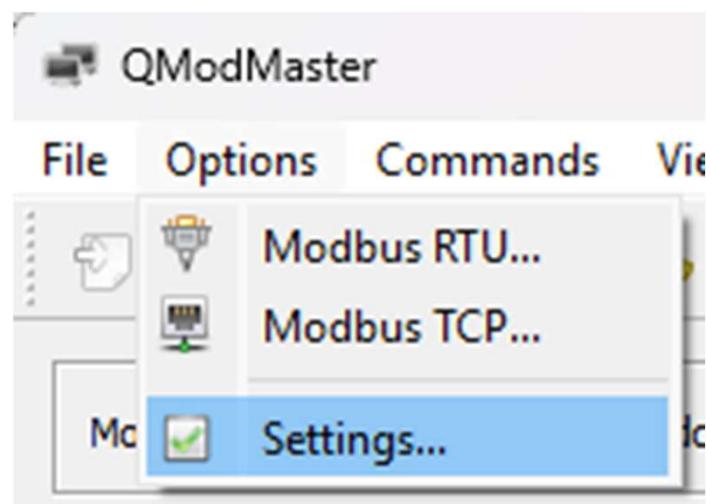
XXX.XXX.XXX.XXX

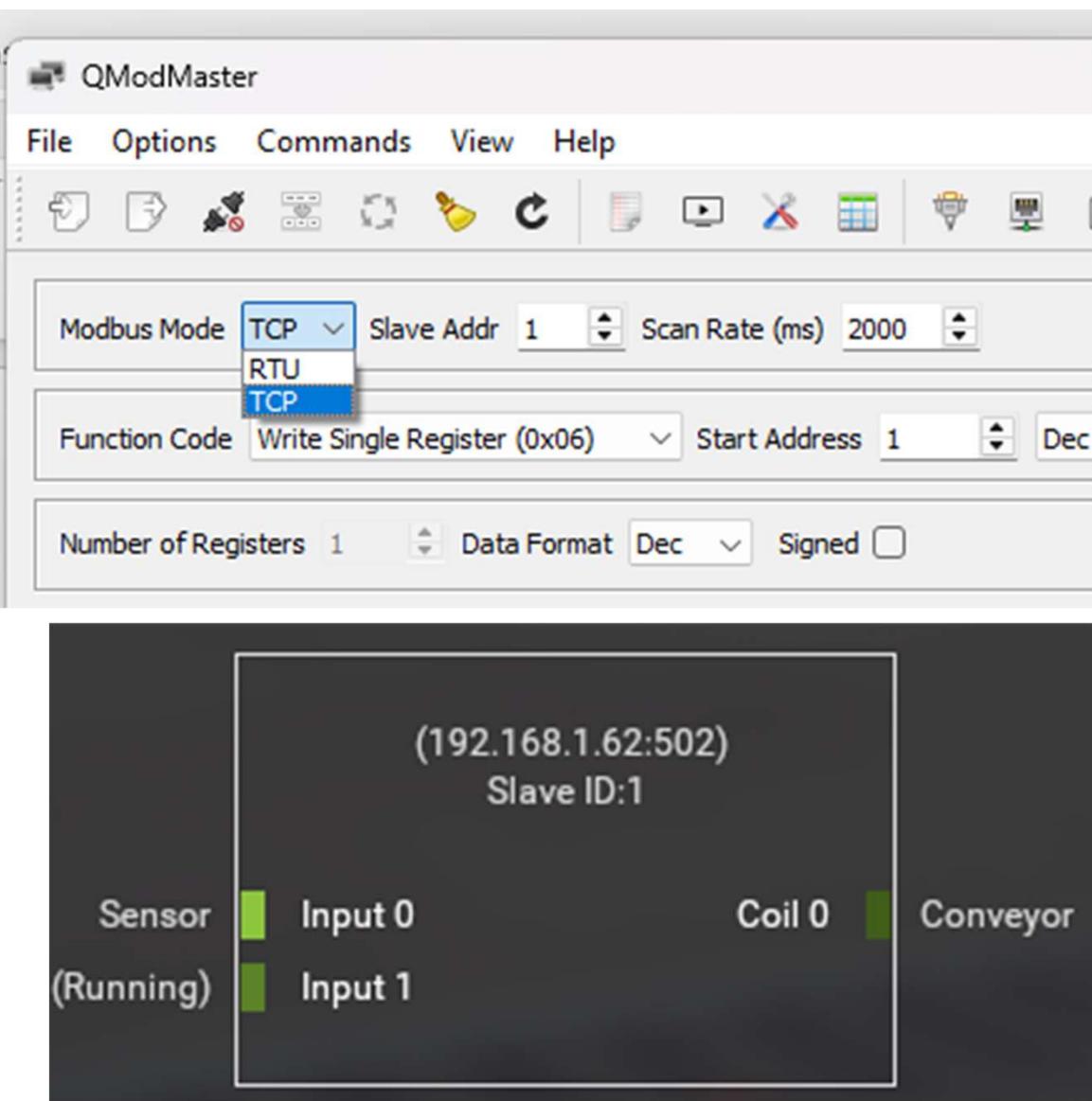
Slave IP

TCP Port 502

OK

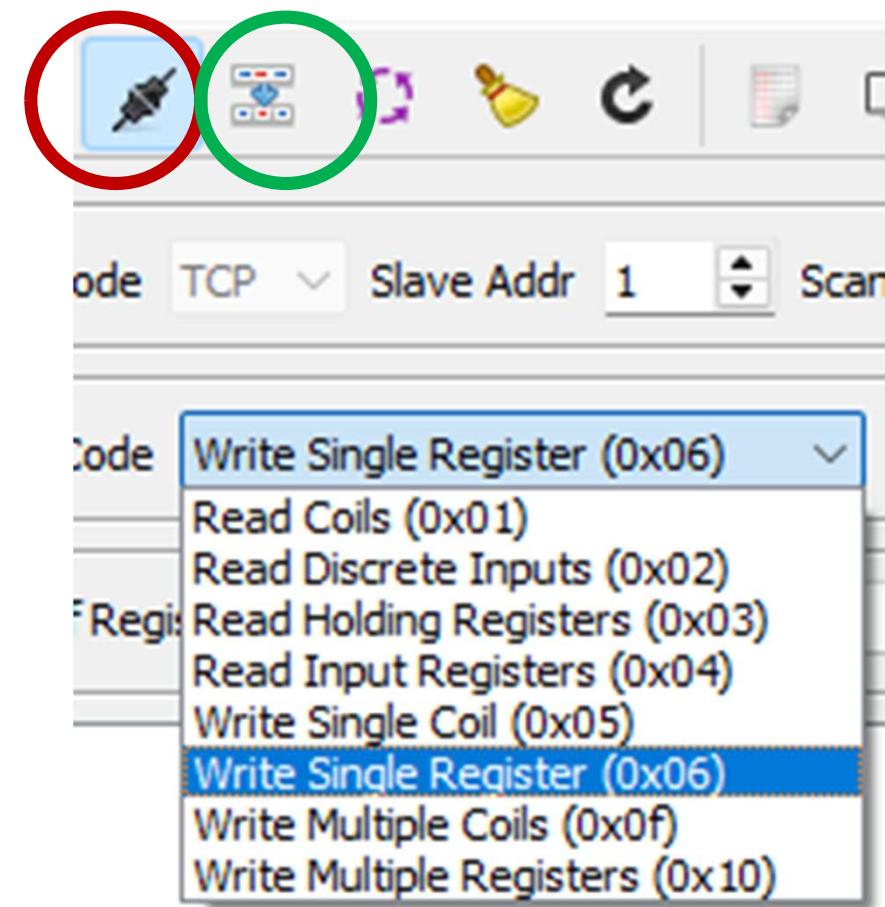
Cancel

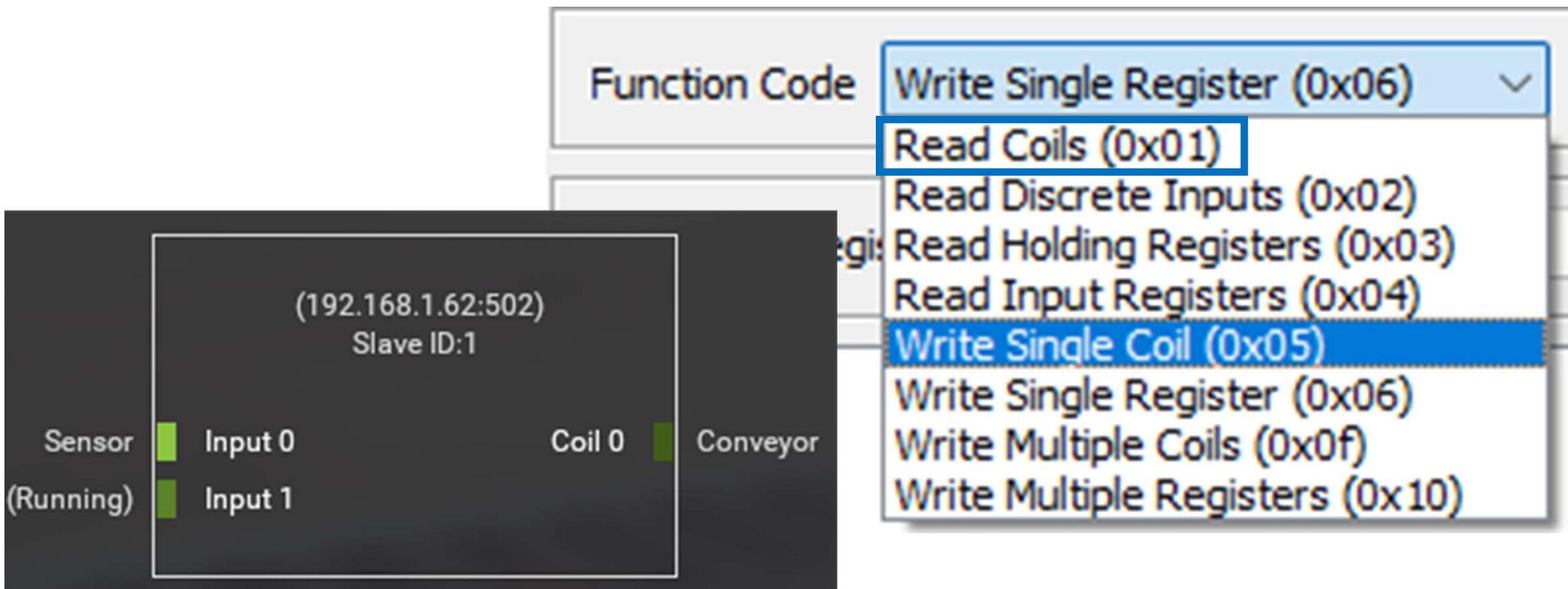




1 Connect ติดต่ออุปกรณ์

2 ส่งคำสั่งไปหาอุปกรณ์

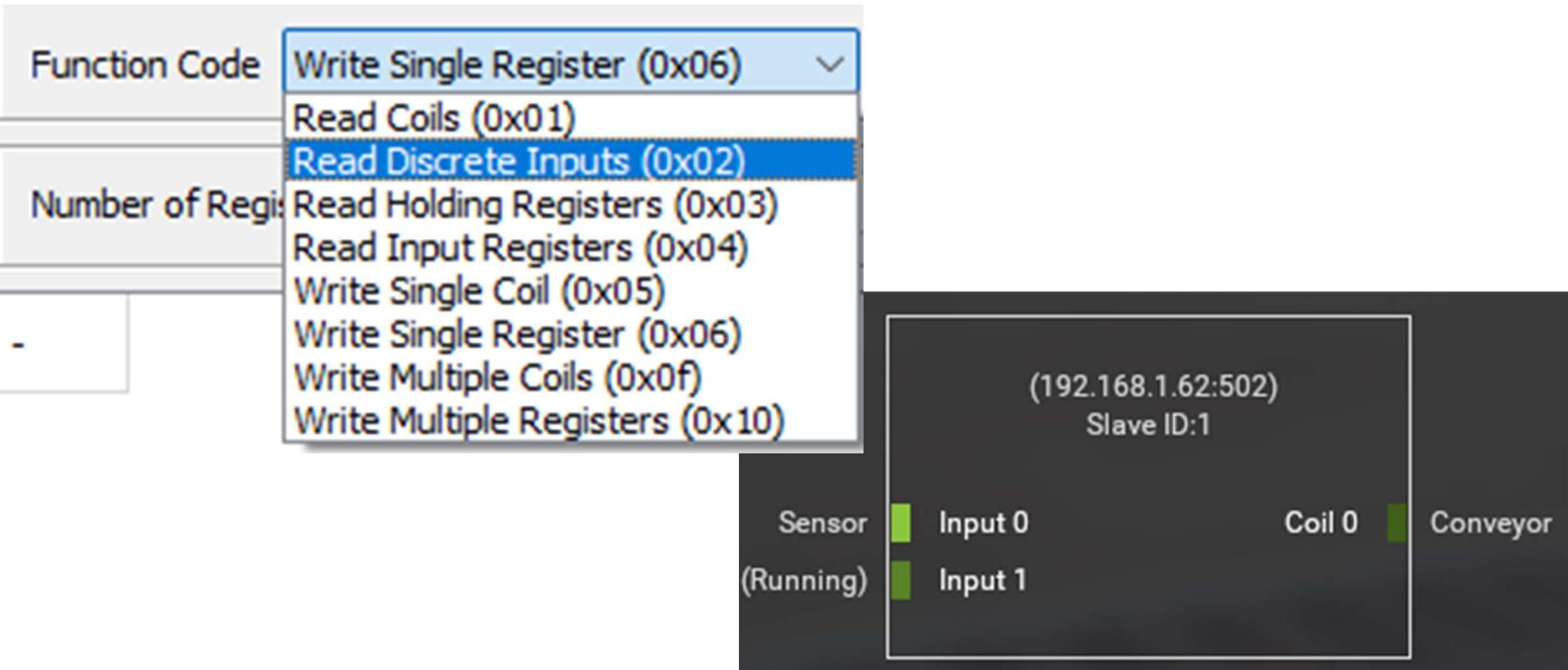


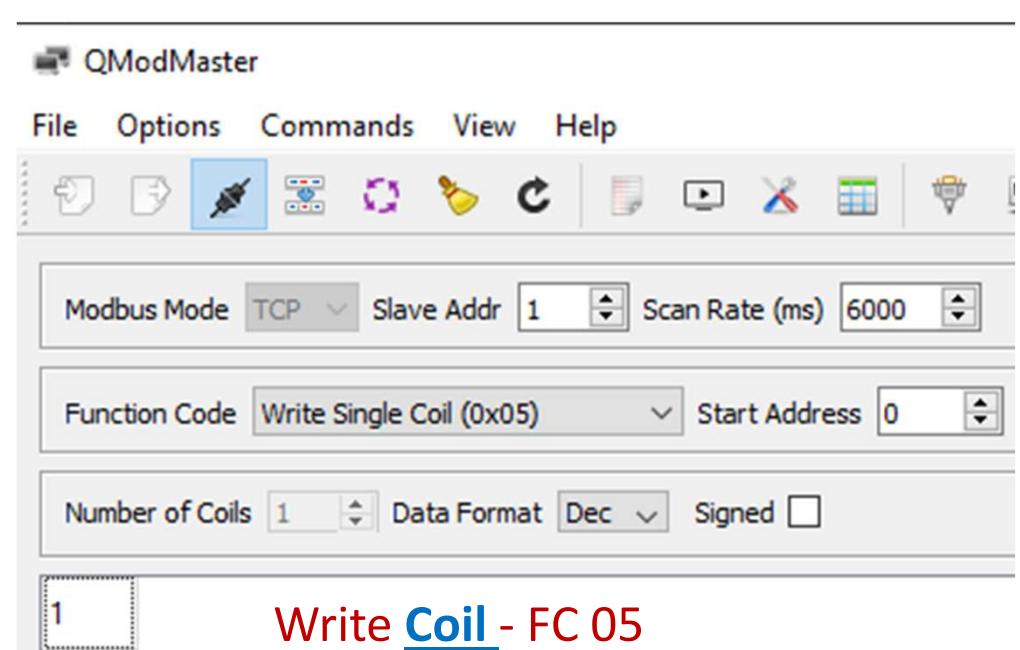


Read Coils (0x01) อ่านค่า

Write Signgle Coil (0x05) เขียนค่า 0/1

Read Discrete Inputs (0x02) อ่านค่าได้อป่องเดียว

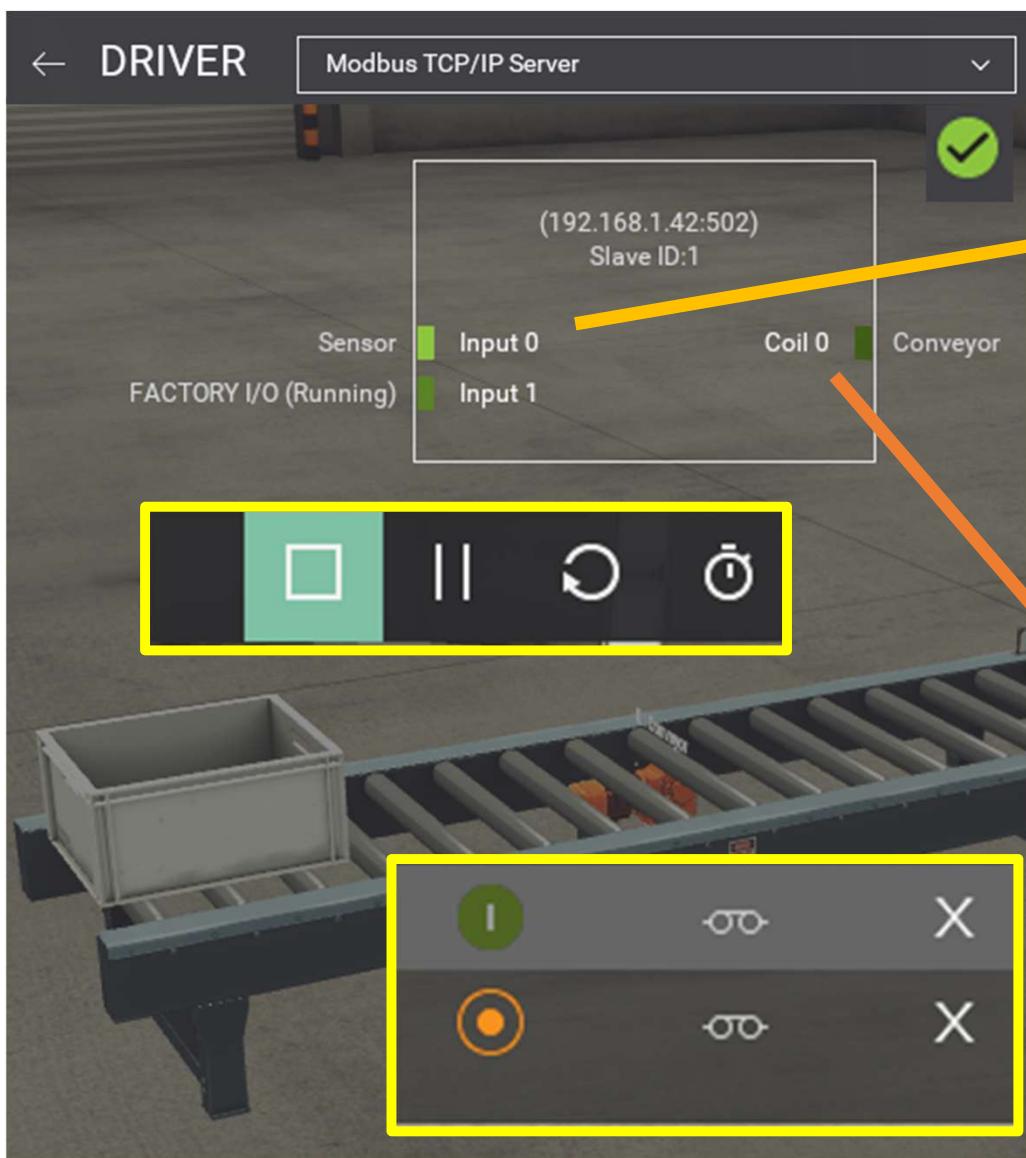




Write Coil - FC 05
Start Address 0

(1 = on, 0 = off)

Write 0 Stop , 1 Start



Modbus Mode TCP Slave Addr 1 Scan Rate (ms) 6000

Function Code Read Discrete Inputs (0x02) Start Address 0 0

Number of Inputs 1 Data Format Dec Signed

1 **Read Sensor**

Read Input - FC 01 (1 = on, 0 = off)

Start Address 0 Number of Input 1

QModMaster

File Options Commands View Help

Modbus Mode TCP Slave Addr 1 Scan Rate (ms) 6000

Function Code Read Coils (0x01) Start Address 0 0 Dec

Number of Coils 1 Data Format Dec Signed

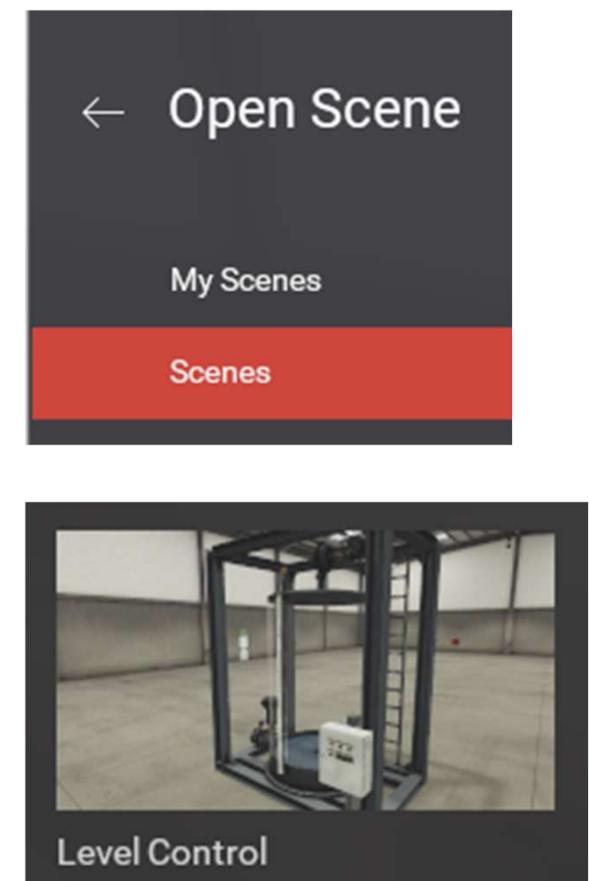
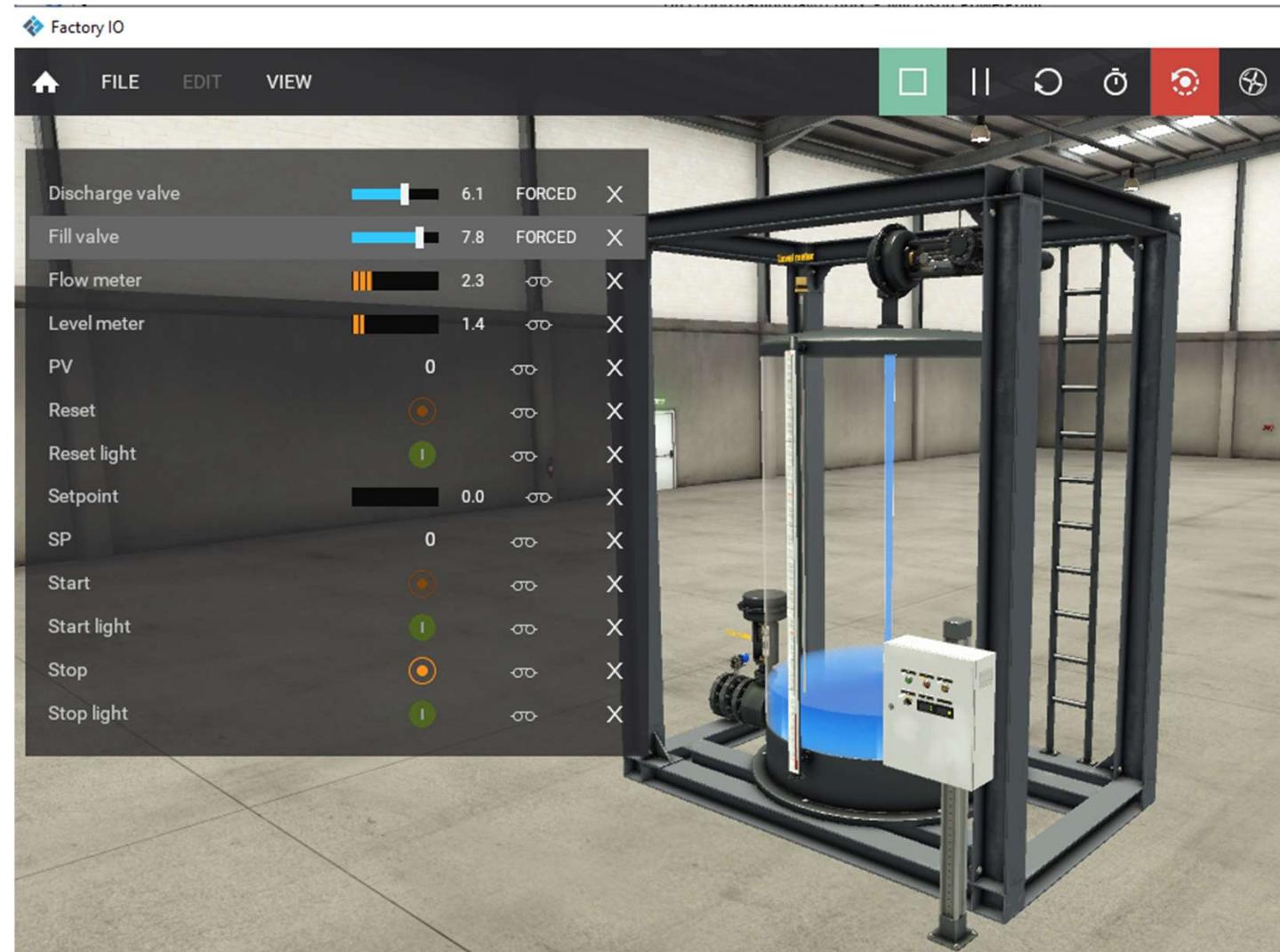
0 **Read Conveyer**

Read Coil - FC 01 (1 = on, 0 = off)

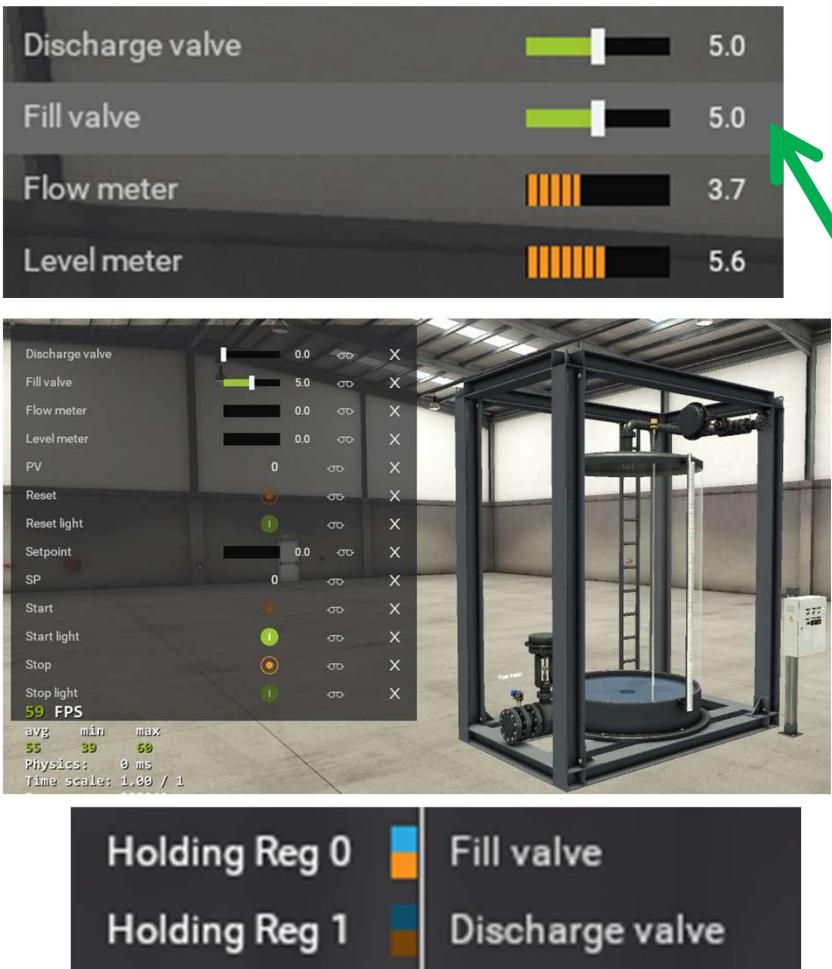
Start Address 0 Number of Input 1

0/1

Advanced Control with Machine Simulator (FactoryIO)



FC 06 Write Single (HR)



Control : Fill Valve Holding Req 0

Modbus Mode TCP Slave Addr 1 Scan Rate (ms) 6000

Function Code Write Single Register (0x06) Start Address 0

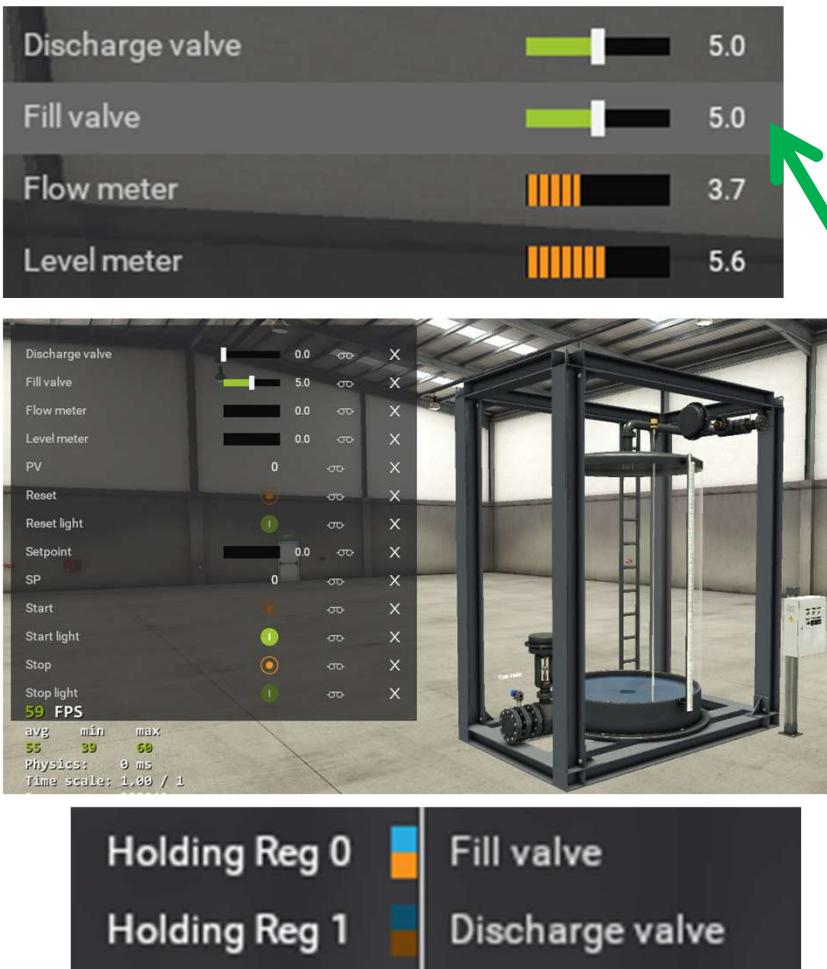
Number of Registers 1 Data Format Dec Signed

500

(192.168.1.62:502)
Slave ID:1

Start	Coil 0	Start light
Reset	Coil 1	Reset light
Stop	Coil 2	Stop light
FACTORY I/O (Running)	Holding Reg 0	Fill valve
Level meter	Holding Reg 1	Discharge valve
Flow meter	Holding Reg 2	SP
Setpoint	Holding Reg 3	PV
Input 0	Coil 0	Start light
Input 1	Coil 1	Reset light
Input 2	Coil 2	Stop light
Input 3	Holding Reg 0	Fill valve
Input Reg 0	Holding Reg 1	Discharge valve
Input Reg 1	Holding Reg 2	SP
Input Reg 2	Holding Reg 3	PV

FC 06 Write Single (HR)



Control : Discharge Valve Holding Req 1

Modbus Mode: TCP Slave Addr: 1 Scan Rate (ms): 6000

Function Code: Write Single Register (0x06) Start Address: 1 Dec

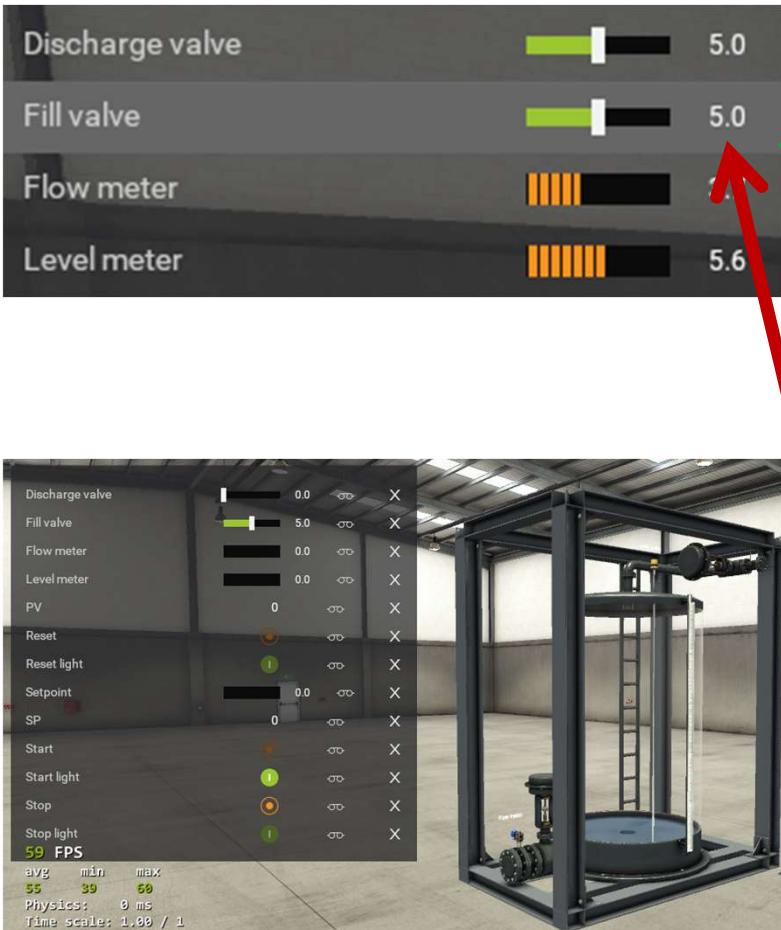
Number of Registers: 1 Data Format: Dec Signed:

500

(192.168.1.62:502)
Slave ID:1

Start	Coil 0	Start light
Reset	Coil 1	Reset light
Stop	Coil 2	Stop light
FACTORY I/O (Running)		
Input 0	Holding Reg 0	Fill valve
Input 1	Holding Reg 1	Discharge valve
Input 2	Holding Reg 2	SP
Input 3	Holding Reg 3	PV
Level meter		
Flow meter		
Setpoint		

FC 03 Read / FC 06 Write Single (HR) - Read Fill Valve Read Holding Reg (0x03)



Modbus Mode TCP Slave Addr 1 Scan Rate (ms) 6000

Function Code Read Holding Registers (0x03) Start Address 0

Number of Registers 1 Data Format Dec Signed

500

Holding Reg 0 Fill valve
Holding Reg 1 Discharge valve

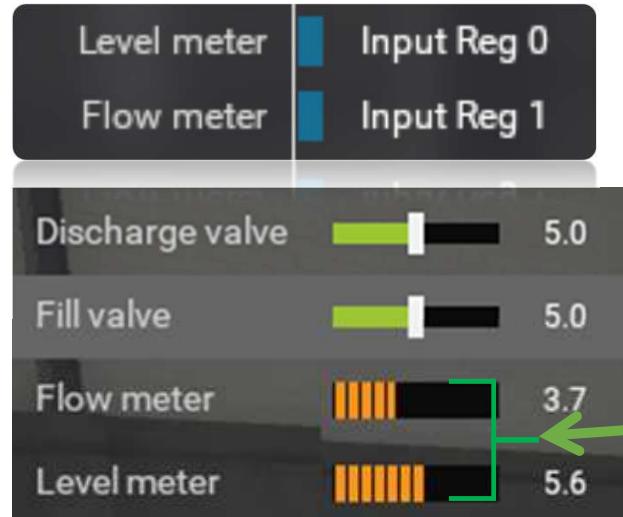
Modbus Mode TCP Slave Addr 1 Scan Rate (ms) 6000

Function Code Write Single Register (0x06) Start Address 0 Dec

Number of Registers 1 Data Format Dec Signed

500

Control : Fill Valve Write Single Reg (0x06)



Modbus Mode TCP Slave Addr 1 1 Scan Rate (ms) 6000

Function Code Read Input Registers (0x04) Start Address 0 0

Number of Registers 2 Data Format Dec Signed

591	384	x	x	x	x	x	x	x	x	x
-----	-----	---	---	---	---	---	---	---	---	---

+0 +1

SENSORS

FACTORY I/O (Paused)	
FACTORY I/O (Reset)	
FACTORY I/O (Running)	
FACTORY I/O (Time Scale)	
Flow meter	
Level meter	
Reset	
Setpoint	
Start	
Stop	

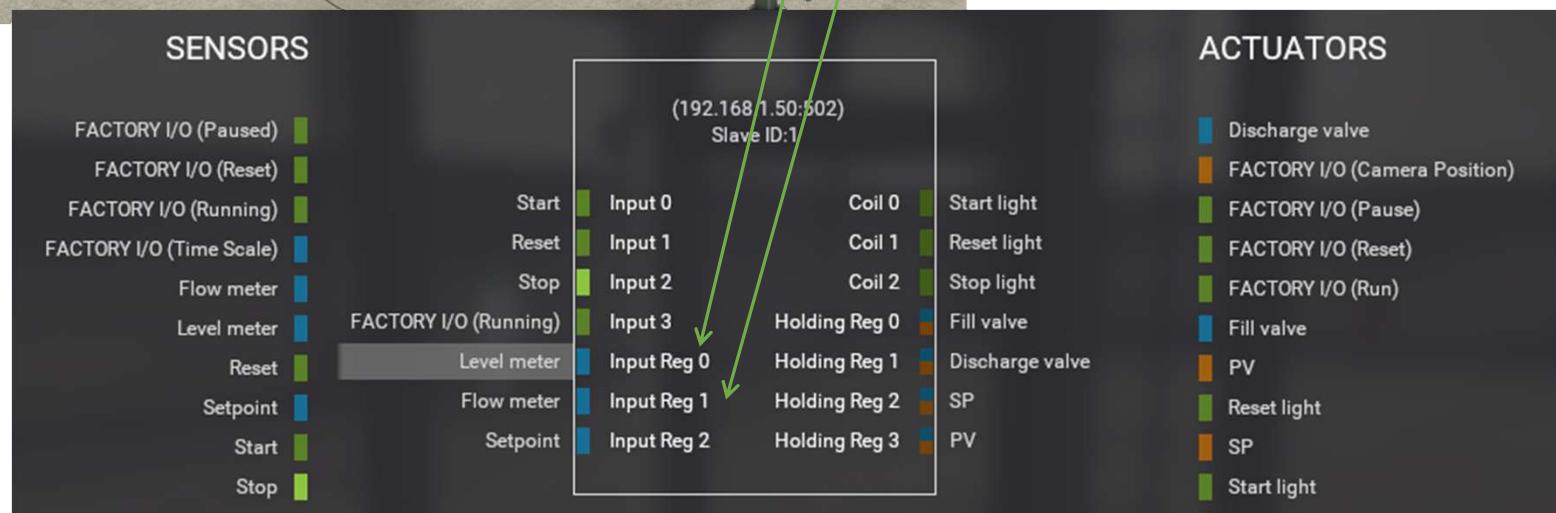
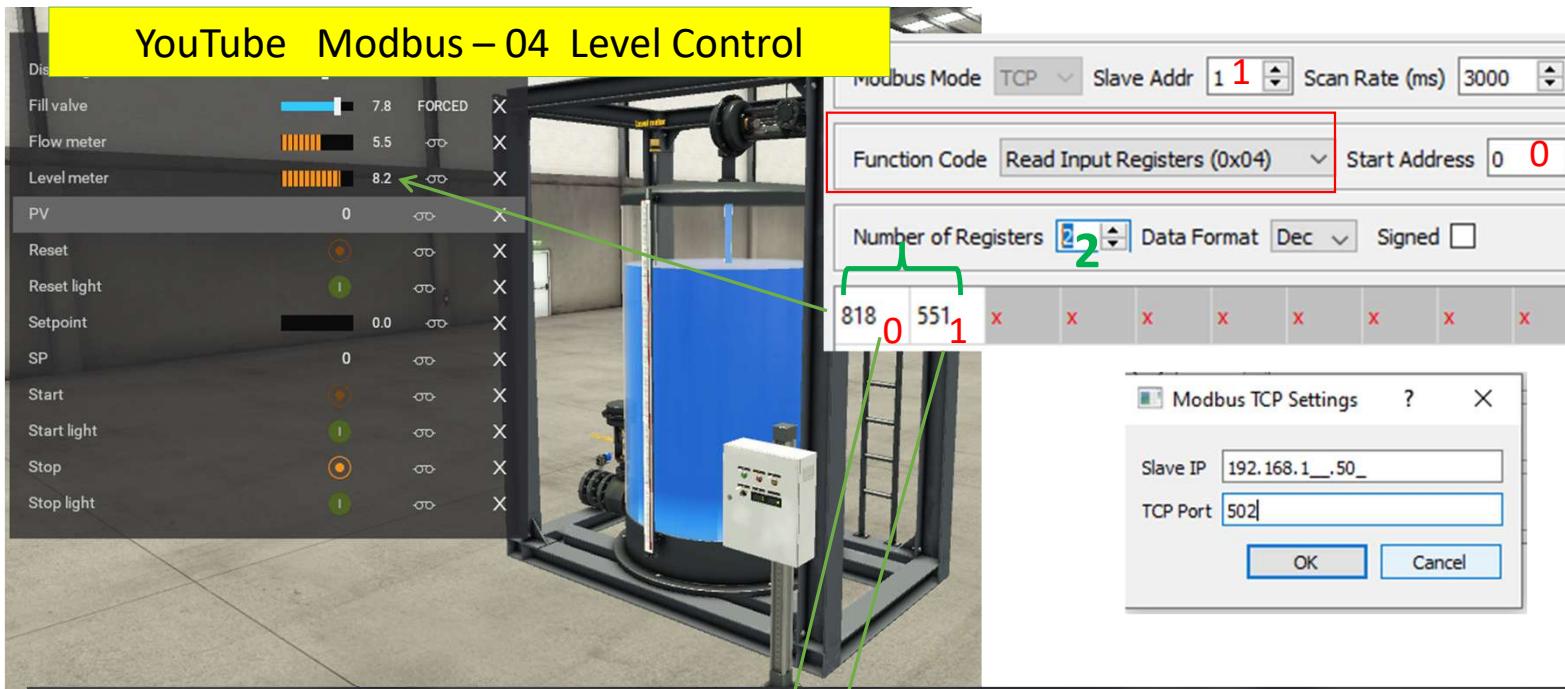
(192.168.1.50:502)
Slave ID: 1

Start	Input 0	Coil 0	Start light
Reset	Input 1	Coil 1	Reset light
Stop	Input 2	Coil 2	Stop light
FACTORY I/O (Running)	Input 3	Holding Reg 0	FACTORY I/O (Run)
Level meter	Input Reg 0	Holding Reg 1	Fill valve
Reset	Flow meter	Holding Reg 2	Discharge valve
Setpoint	Setpoint	Holding Reg 3	PV
Start			SP
Stop			Reset light

ACTUATORS

Discharge valve
FACTORY I/O (Camera Position)
FACTORY I/O (Pause)
FACTORY I/O (Reset)
FACTORY I/O (Run)
Fill valve
PV
Reset light
SP
Start light

YouTube Modbus – 04 Level Control

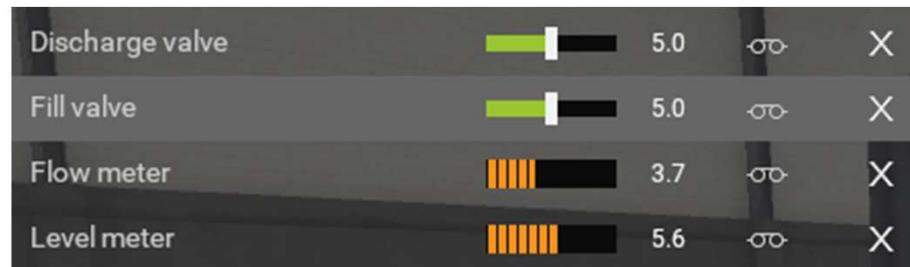


การติดต่อ Modbus Machine with QModMaster



Read Input Reg - FC 04 (ตัวเลข)

Modbus Mode	TCP	Slave Addr	1	Scan Rate (ms)	6000
Function Code	Read Input Registers (0x04)	Start Address	0	Dec	
Number of Registers	2	Data Format	Dec	Signed	<input type="checkbox"/>
591	384	x	x	x	x



Read Coil - FC 01 (1 = on, 0 = off)

		(192.168.1.50:502)		Slave ID:1	
Start	Input 0	Coil 0	Start light		
Reset	Input 1	Coil 1	Reset light		
Stop	Input 2	Coil 2	Stop light		
FACTORY I/O (Running)	Input 3	Holding Reg 0	Fill valve		
Level meter	Input Reg 0	Holding Reg 1	Discharge valve		
Flow meter	Input Reg 1	Holding Reg 2	SP		
Setpoint	Input Reg 2	Holding Reg 3	PV		

Holding Reg - FC 03 (ตัวเลข)

Modbus TCP Settings	?	X
Slave IP	192.168.1.50	
TCP Port	502	
OK	Cancel	

Modbus Mode	TCP	Slave Addr	1	Scan Rate (ms)	6000
Function Code	Read Holding Registers (0x03)	Start Address	0	Dec	
Number of Registers	4	Data Format	Dec	Signed	<input type="checkbox"/>
500	500	0	0	xWrite Coil - FC 05 (1 = on, 0 = off)	

FC 03 Read / FC 06 Write Single (HR)

The screenshot shows a PLC programming environment with a ladder logic editor and configuration parameters.

Ladder Logic Editor:

- Discharge valve: Status 0.0, Control X
- Fill valve: Status 5.0, Control X
- Flow meter: Status 0.0, Control X
- Level meter: Status 0.0, Control X
- PV: Value 0, Control X
- Reset: Control X

Configuration Parameters:

- Modbus Mode: TCP
- Slave Addr: 1
- Scan Rate (ms): 6000
- Function Code: Write Single Register (0x06)
- Start Address: 0
- Number of Registers: 1
- Data Format: Dec
- Signed:

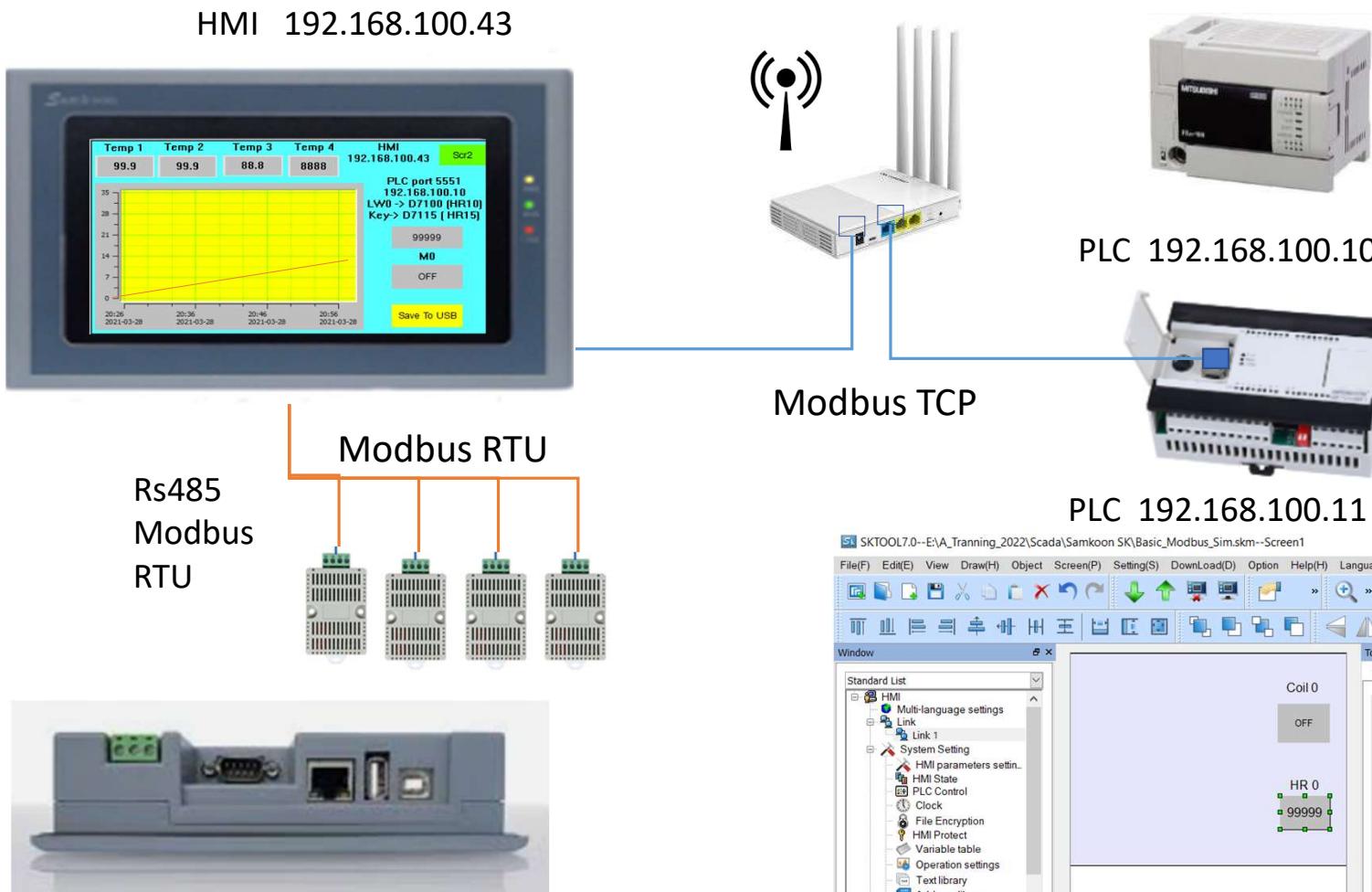
Real-time Clock:

- 500
- 55 39 60
- Physics: 0 ms
- Time scale: 1.00 / 1

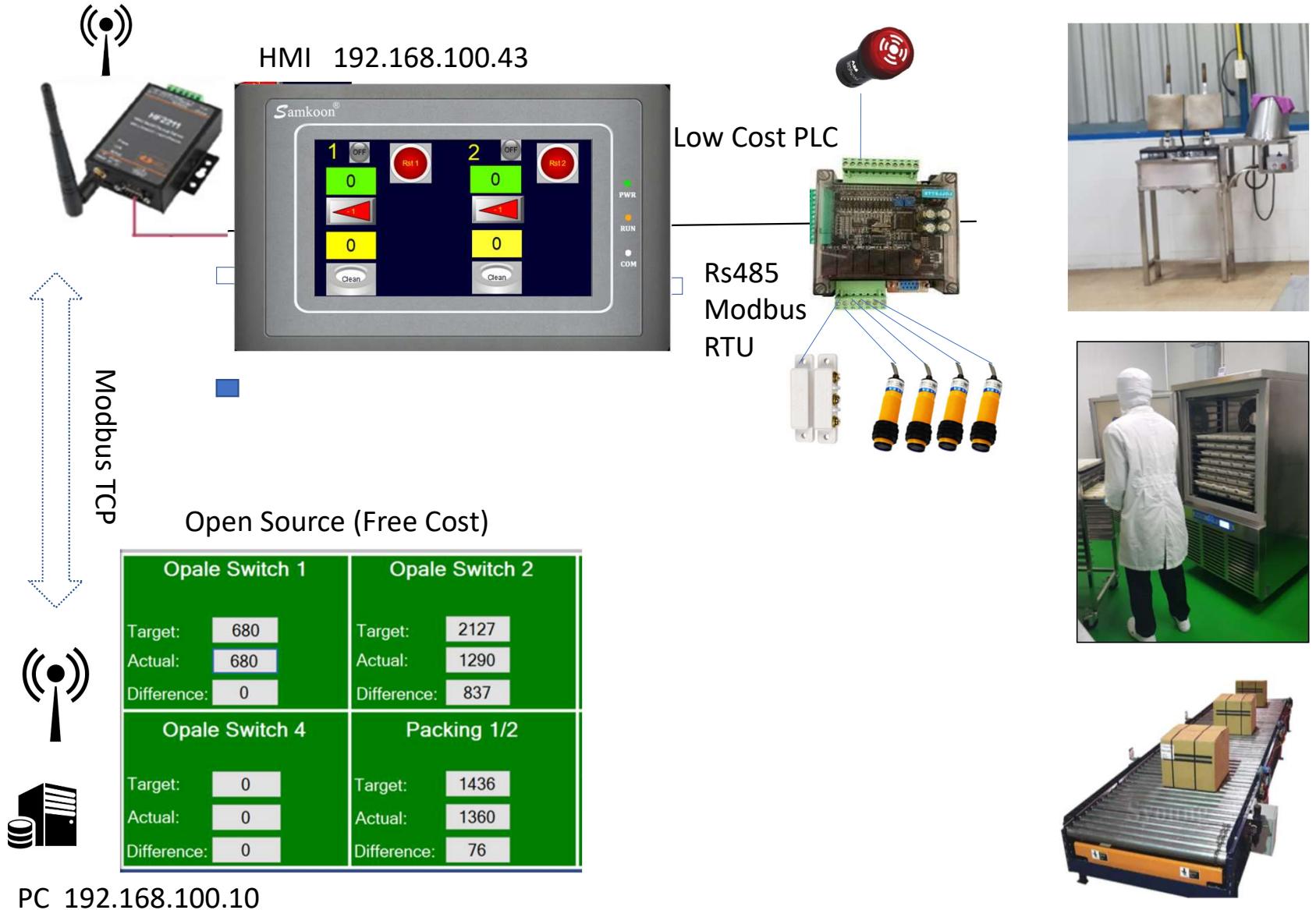
Legend:

- Holding Reg 0: Fill valve (Orange)
- Holding Reg 1: Discharge valve (Blue)

Image: A 3D rendering of a water tank system. A vertical float valve is shown inside the tank, connected to a horizontal pipe. The pipe has a valve and a flow meter. The tank sits on a metal frame in a warehouse setting.

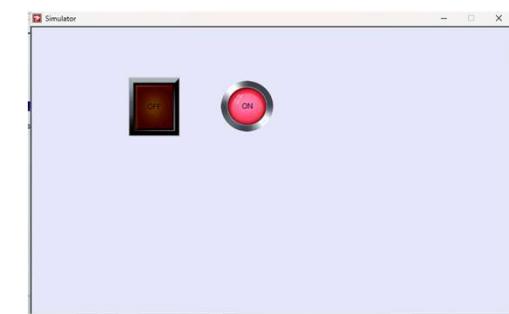
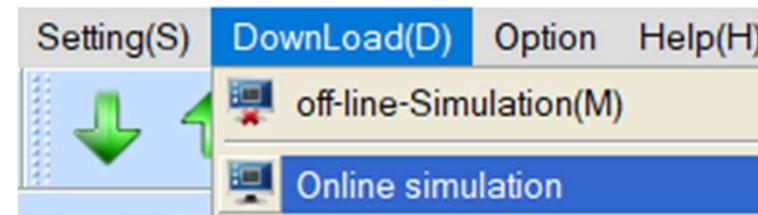
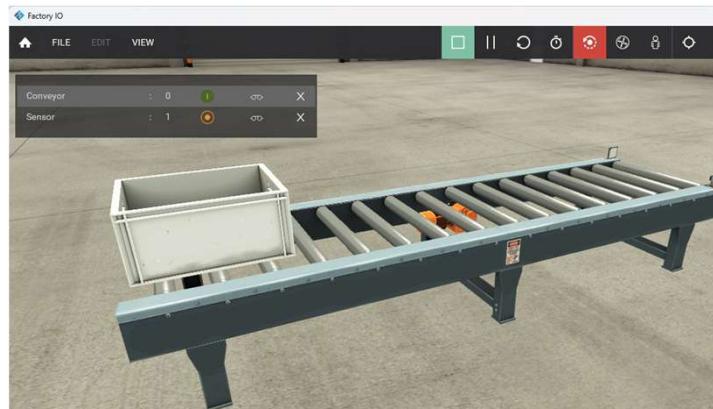
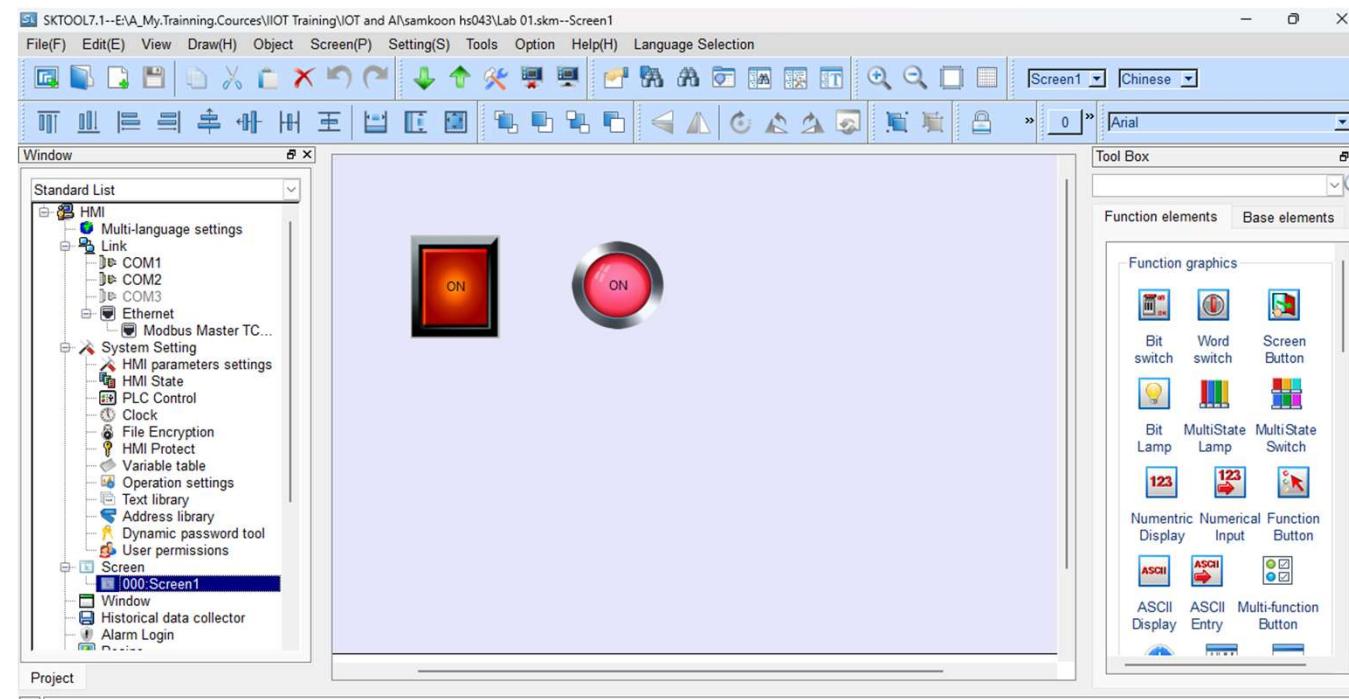
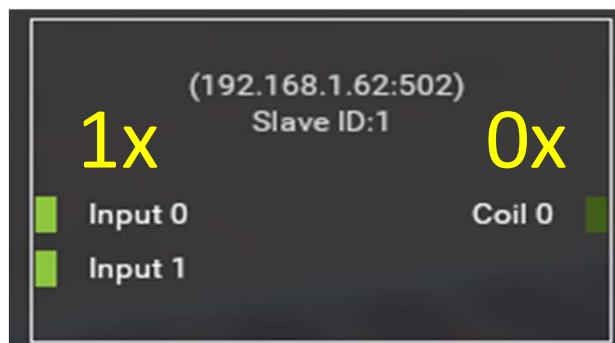


SAMSOOK SK043HS
SKTOOL 7



SAMSOOK SK043HS

SKTOOL 7



SKTOOL7.1--E:\A_My.Ti

File(F) Edit(E) View

New...

Open... Close

New project

Select type

New Project

New Project

Project Properties

Project Name: Lab 01

Path: E:\A_My.Trainning.Cources\IOT Training\IOT and AI\samkoon hs043

Size/Series: 7.0 Model: SK-070HS

Show Model: Horizontal

New Link

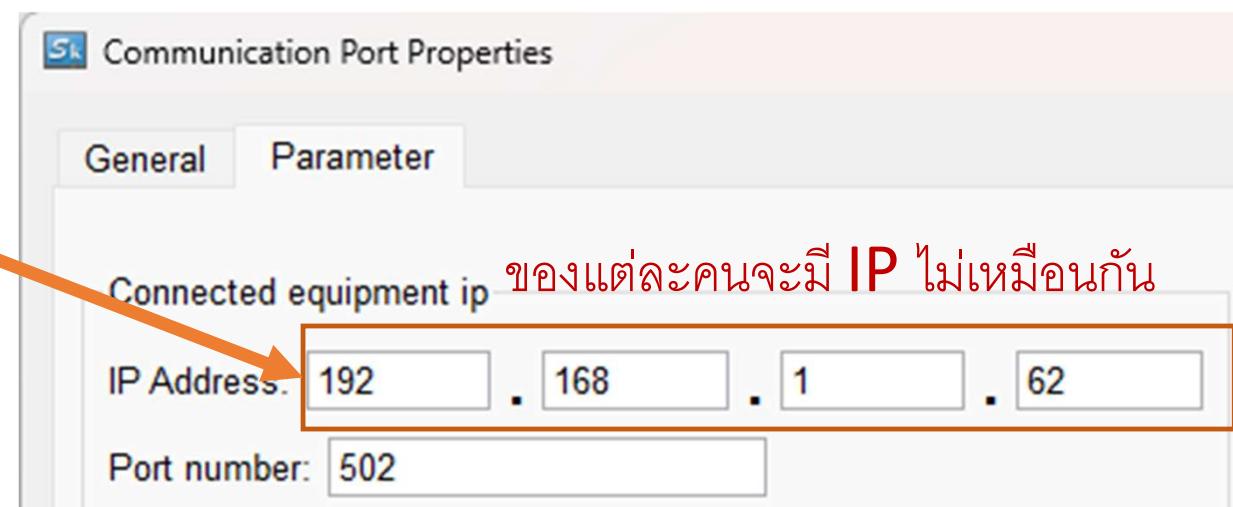
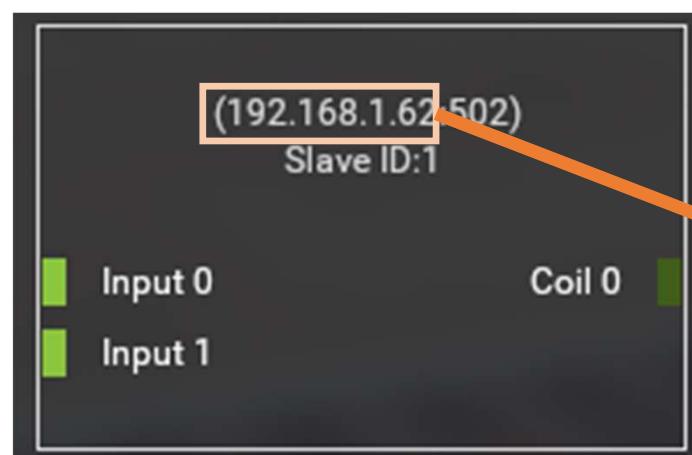
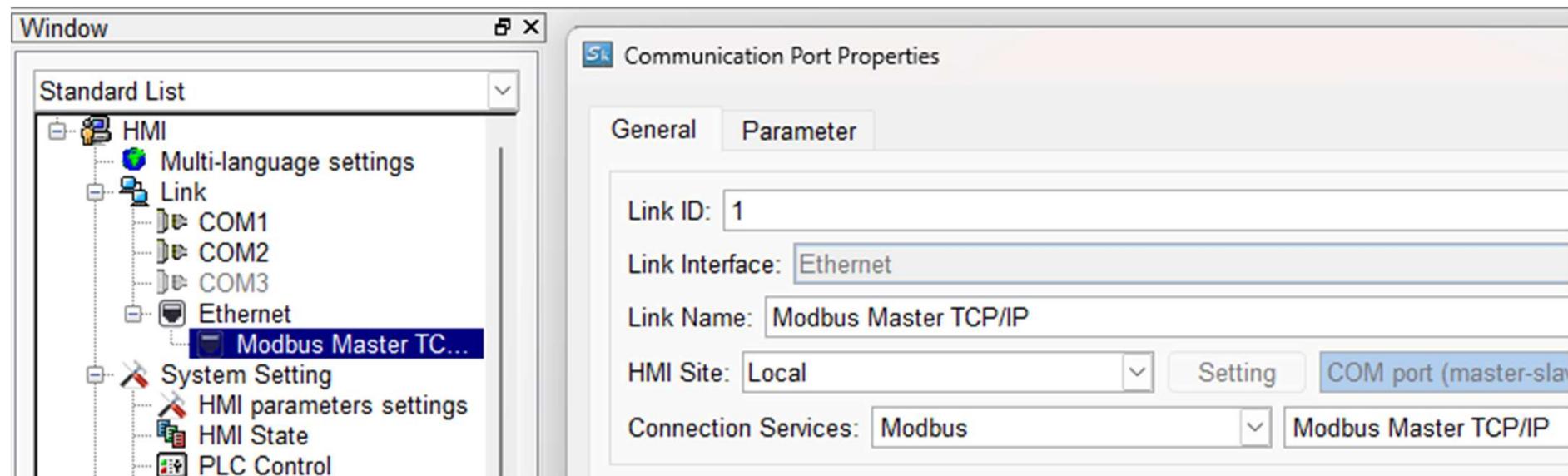
Link ID: 1

Link Name: Ethernet

Link Interface: Ethernet

Device Service: Modbus Modbus Master TCP/IP

ok Cancel





Bit Lamp

Element type: Bit Lamp
ID: BL0

View:



Prompt:
Function: ON / OFF monitoring,
real-time monitoring user settings
changing register values,
Dynamics reactions bit register
values

General Appearance Visibility Shape

State: 1 0

Border Color:

FG Color:

BG Color:

Pattern: Transparent

Data Type: Bit

Monitor Address: 1x0

Offset

Address Entry

Standard

Ethernet
Modbus Master TCP/IP
1x
0

1	2	3	4	5	CLR
6	7	8	9	0	BS
A	B	C	D	E	ESC
F	.	/	:		ENT

The screenshot shows a configuration interface for a Bit Button element. On the left, there is a preview window titled "Function group" showing a red "OFF" button labeled "Switch". The main configuration window has the following details:

- Element type:** Bit Switch
- ID:** BB0
- View:** Shows a red "OFF" button.
- General:** State: 1 0
- Appearance:** Border Color: [Color swatch], BG Color: [Color swatch], FG Color: [Color swatch]. A red box highlights the "Function: Invert" label.
- Advanced:** Pattern: Solid
- Visibility:** Write Address: [Field], Monitor: checked, Monitor Address: [Field], Required the operation: [Checkboxes], Wait Time: 3, Script: [Field]. A red box highlights the "Write Address" field.

A red box highlights the "Function: Invert" label. Another red box highlights the "Write Address" field in the Advanced tab. An orange arrow points from the "Coil 0" label in the preview window to the "Write Address" field in the configuration dialog. A red circle highlights the "Address" icon in the top right corner of the configuration dialog.

Function group

Switch

Bit Button

element type: Bit Switch

ID: BB0

View

General

Appearance

Advanced

Visibility

Shape

Border Color

BG Color

FG Color

Pattern: Solid

Function: Invert

Write Address

Monitor

Monitor Address

Required the operation

Wait Time: 3

Script

Address Entry

Ethernet

Modbus Master TCP/IP

0x

0

ENT

Offset

Address

Offset

Ok

Cancel

help

(192.168.1.62:502)

Slave ID:1

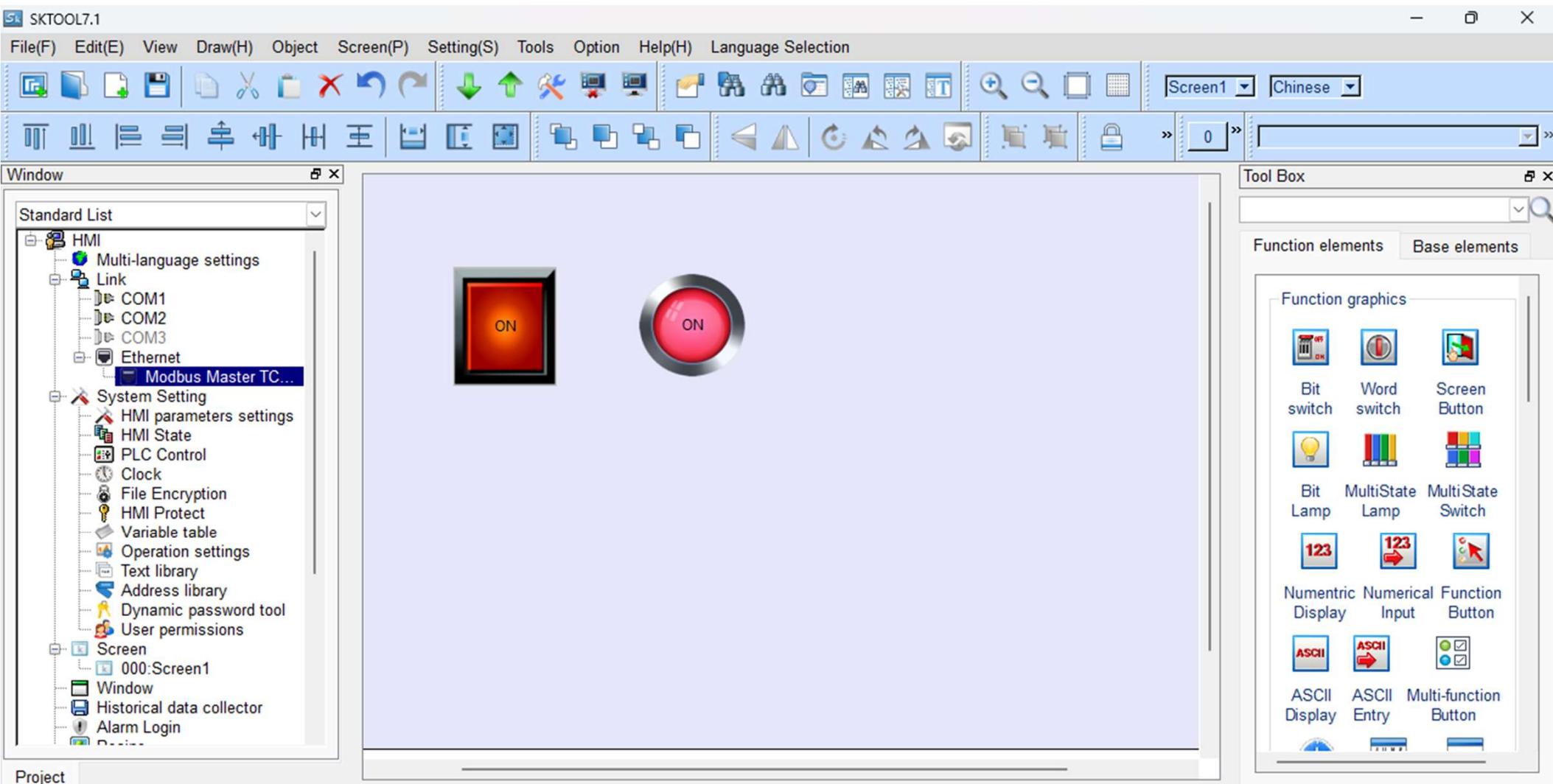
1x

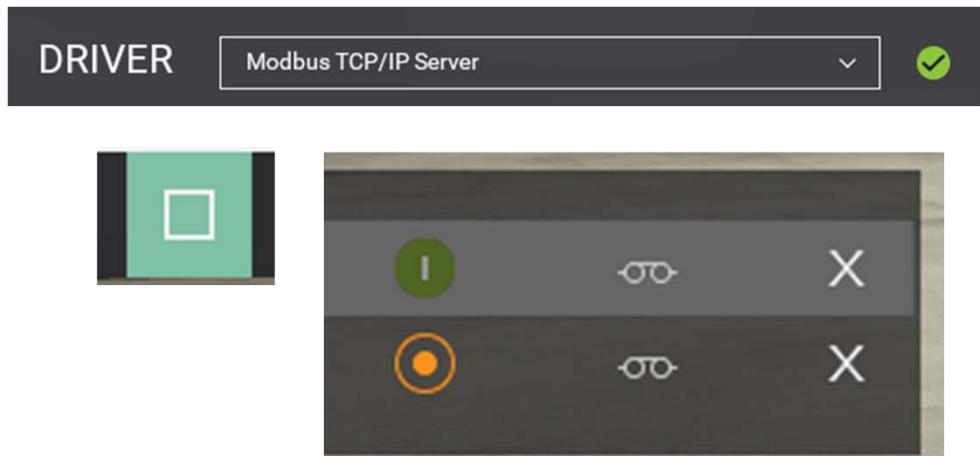
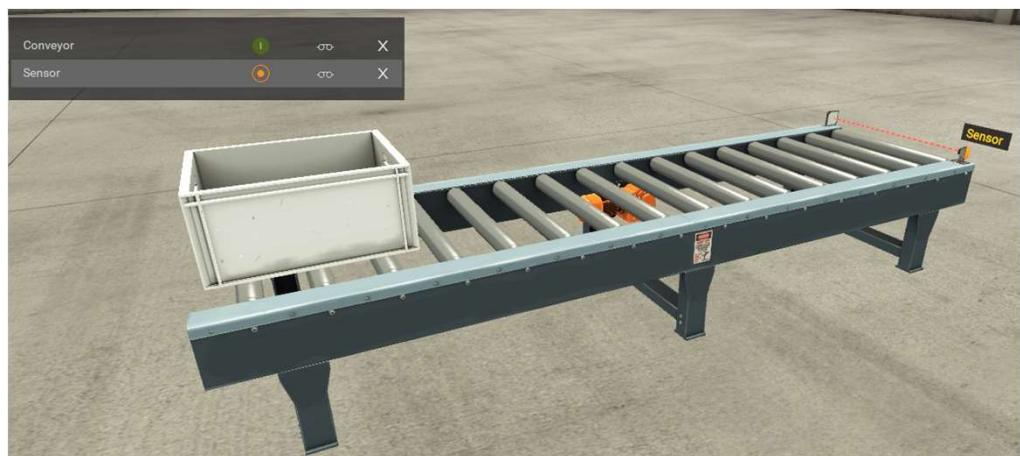
Input 0

Input 1

0x

Coil 0





DRIVER Modbus TCP/IP Server ▾ START CONFIGURATION CLEAR

SENSORS

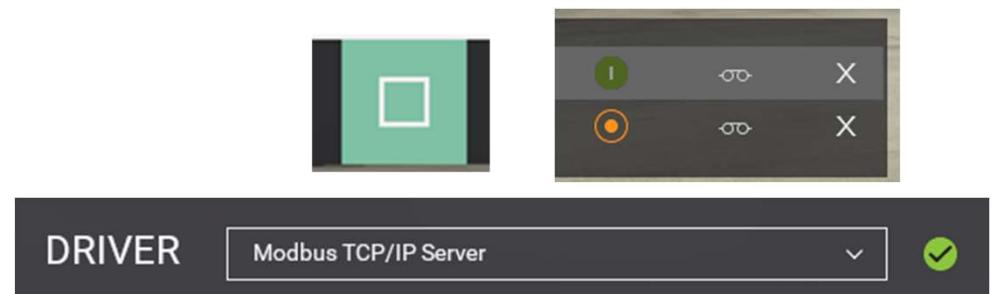
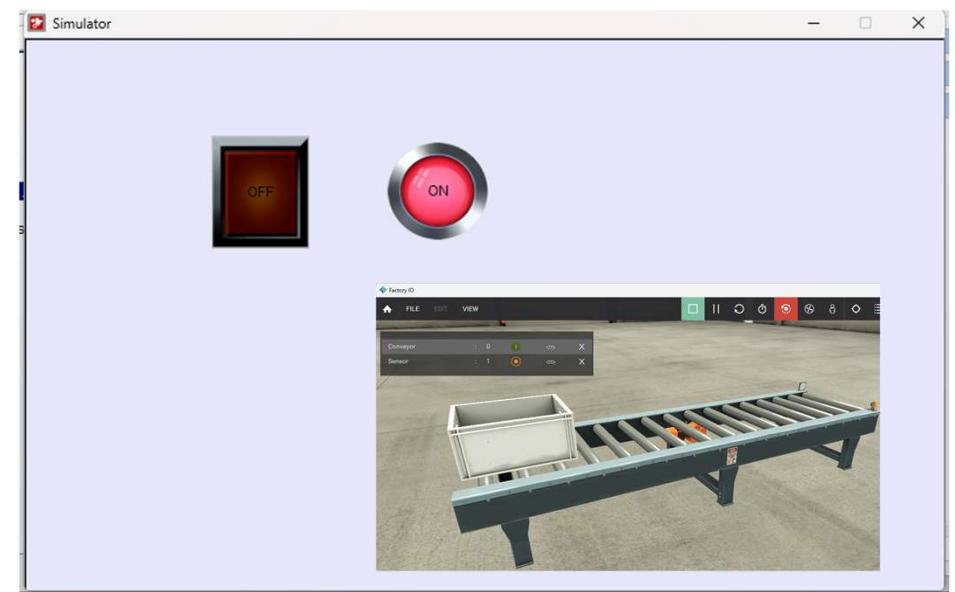
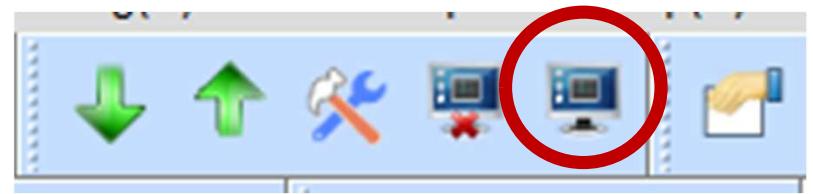
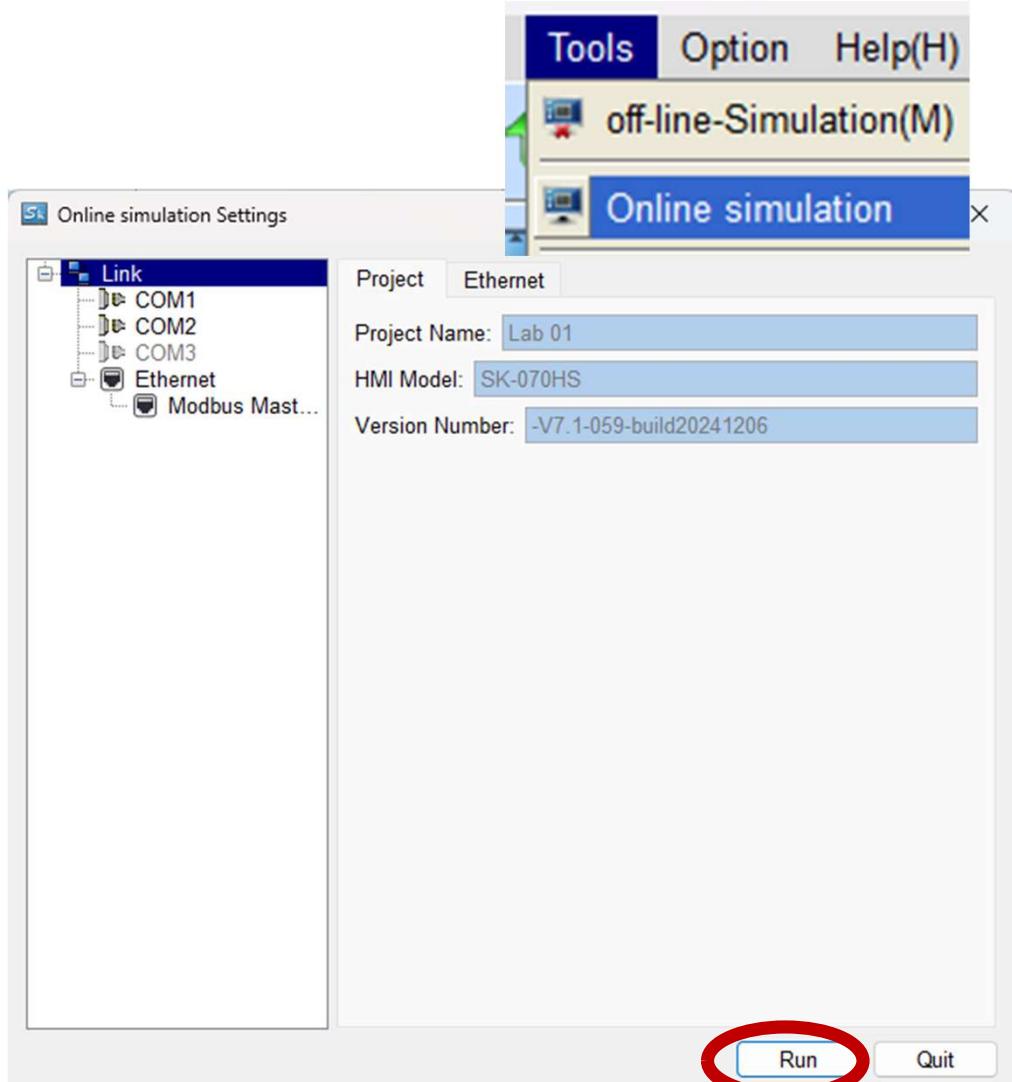
- FACTORY I/O (Paused) █
- FACTORY I/O (Reset) █
- FACTORY I/O (Running) █
- FACTORY I/O (Time Scale) █
- Sensor █
- Sensor █
- FACTORY I/O (Running) █

(192.168.1.50:502)
Slave ID:1

Sensor █ Input 0 █ Input 1	Coil 0 █ Conveyor
--	---

ACTUATORS

- Conveyor █
- FACTORY I/O (Camera Position) █
- FACTORY I/O (Pause) █
- FACTORY I/O (Reset) █
- FACTORY I/O (Run) █



Advanced Control with Machine Simulator (FactoryIO)

Factory IO

FILE EDIT VIEW

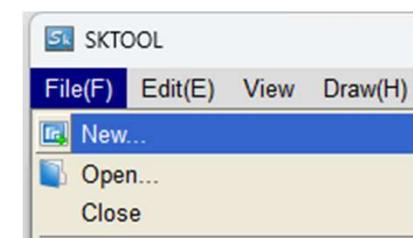
□ II ○ ⏪ ⏹ ⏹

Discharge valve	6.1	FORCED	X
Fill valve	7.8	FORCED	X
Flow meter	2.3	—	X
Level meter	1.4	—	X
PV	0	—	X
Reset	—	—	X
Reset light	—	—	X
Setpoint	0.0	—	X
SP	0	—	X
Start	—	—	X
Start light	—	—	X
Stop	—	—	X
Stop light	—	—	X

← Open Scene

My Scenes

Scenes



New project

← Select type

New Project Case Recent project Unzip



New Project

← Project Properties

Project Name: Lab 02

Path: E:\A_My.Trainning.Courses\IOT Training\IOT and AI\samkoon hs043

Size/Series: 7.0 Model: SK-070FS

Show Model: Horizontal

New Link

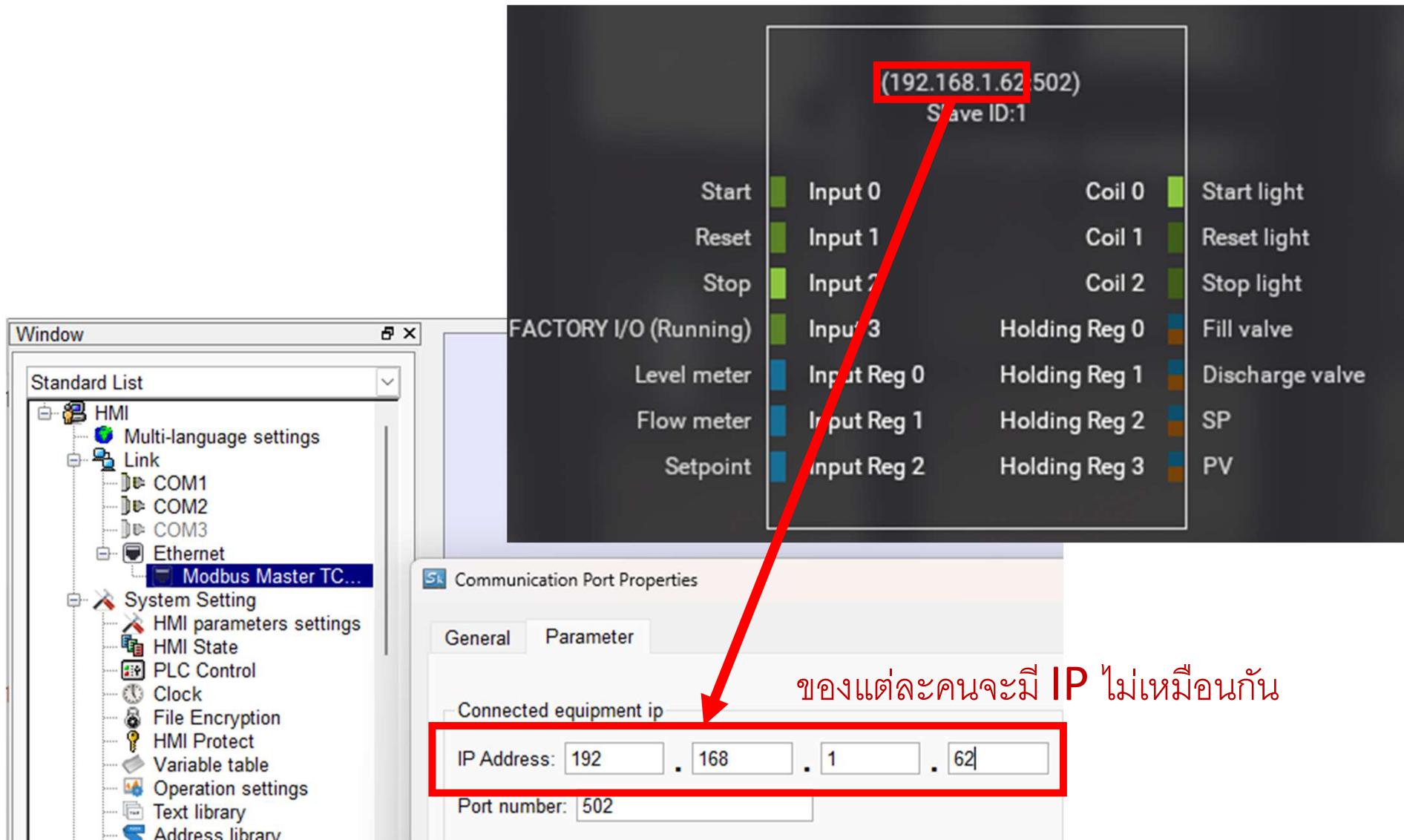
←

Link ID: 1

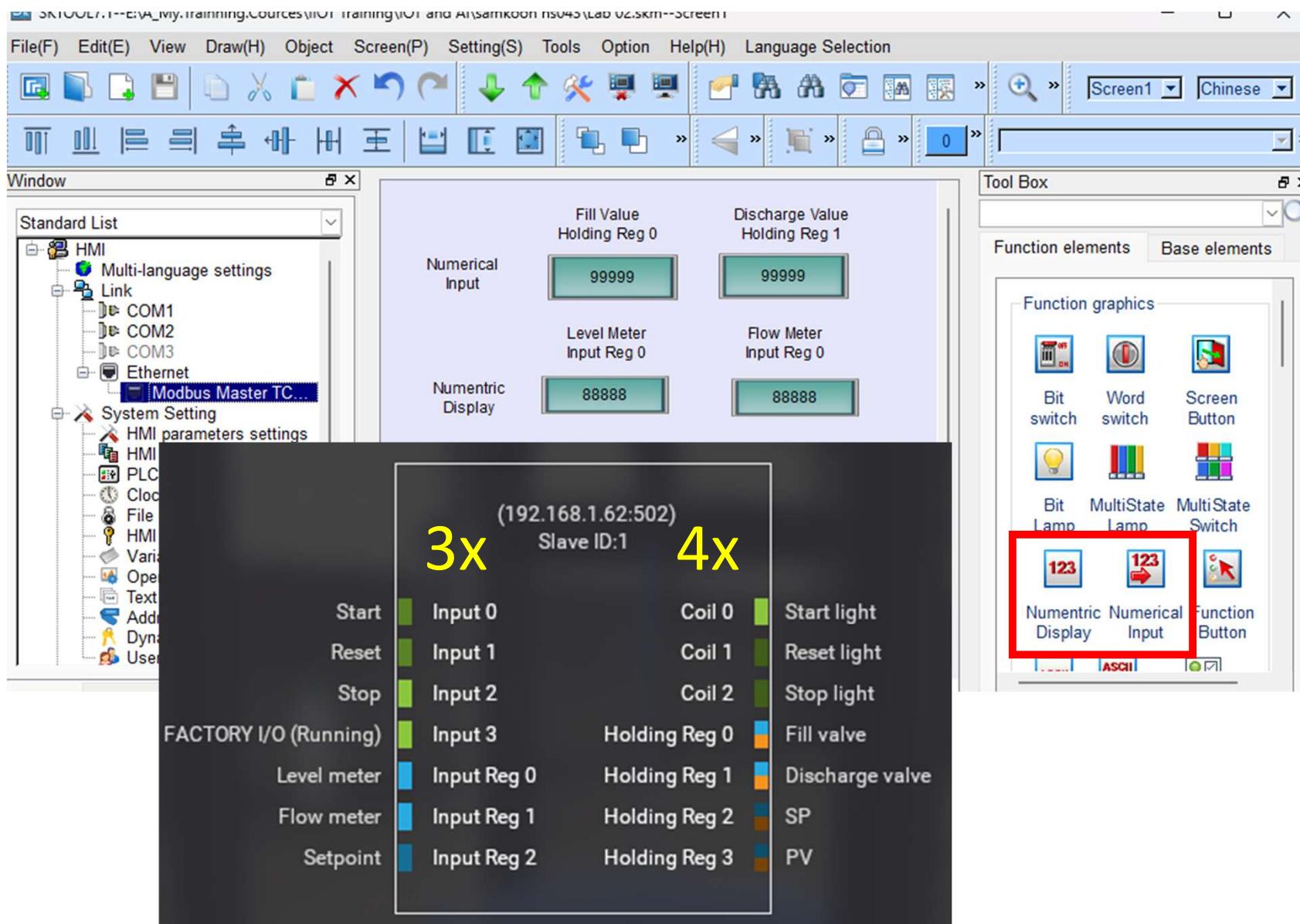
Link Name: Ethernet

Link Interface: Ethernet

Device Service: Modbus Modbus Master TCP/IP



ของแต่ละคนจะมี IP ไม่เหมือนกัน



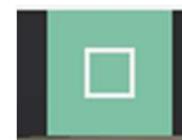
DRIVER

Modbus TCP/IP Server



Simulator

Numerical Input	Fill Value Holding Reg 0	Discharge Value Holding Reg 1
	500	500
Numeric Display	Level Meter Input Reg 0	Flow Meter Input Reg 0
	408	319



Discharge valve	:	1	0.0	X
Fill valve	:	0	0.0	X
Flow meter	:	1	0.0	X
Level meter	:	0	0.0	X



Numerical Input

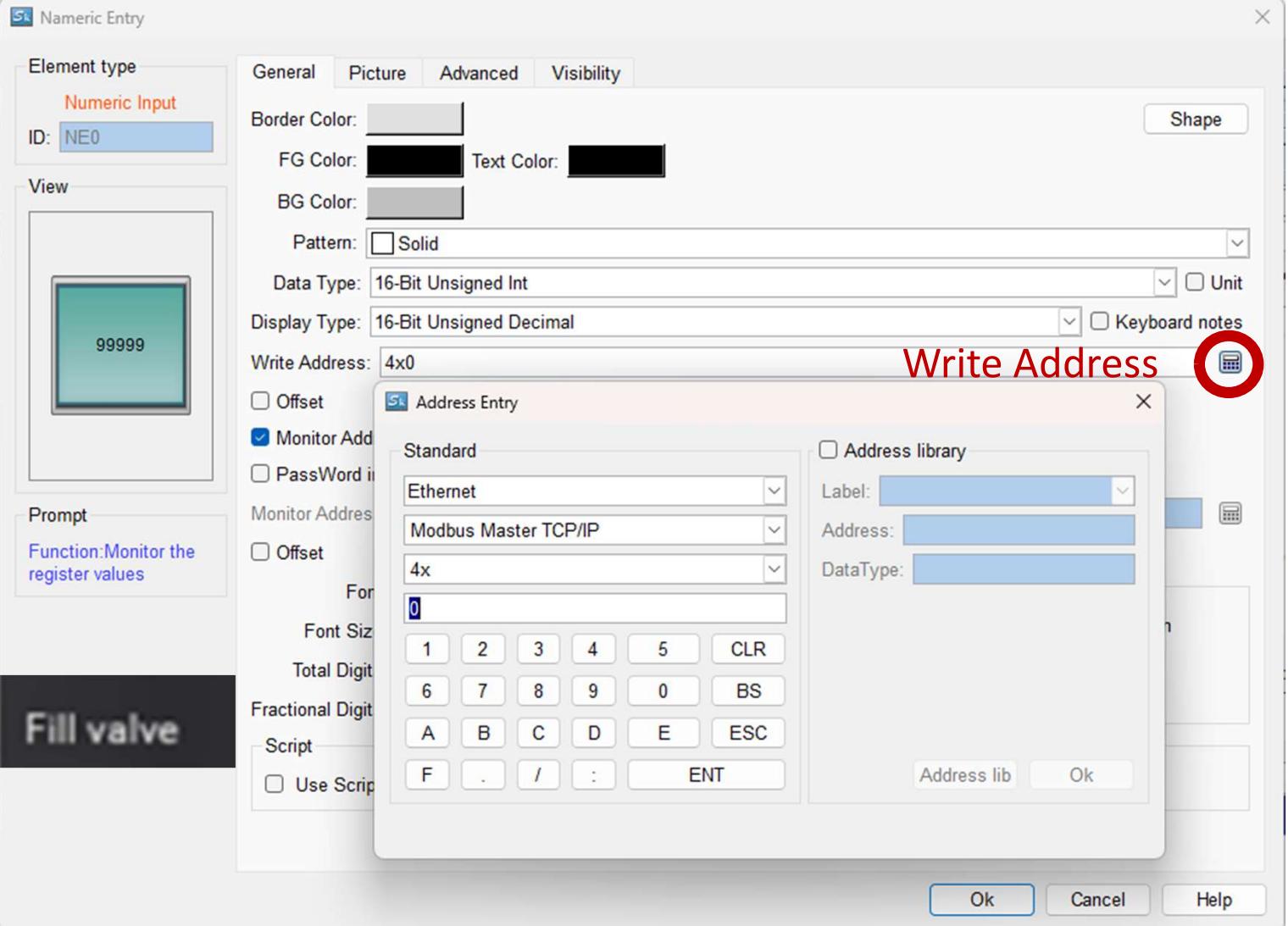
4x0

Holding Reg 0 Fill valve

Numeric Entry

Element type: Numeric Input
ID: NEO

View:



Border Color: FG Color: Text Color: BG Color: Pattern: Solid

Data Type: 16-Bit Unsigned Int
Display Type: 16-Bit Unsigned Decimal
Write Address: 4x0

Offset Monitor Address PassWord i...
Monitor Address Offset For...
Font Size Total Digit Fractional Digit Script Use Script

Address Entry

Standard

Ethernet Modbus Master TCP/IP 4x 0

1 2 3 4 5 CLR
6 7 8 9 0 BS
A B C D E ESC
F . / : ENT

Address lib Ok

Address library Label: Address: DataType:

Unit Keyboard notes

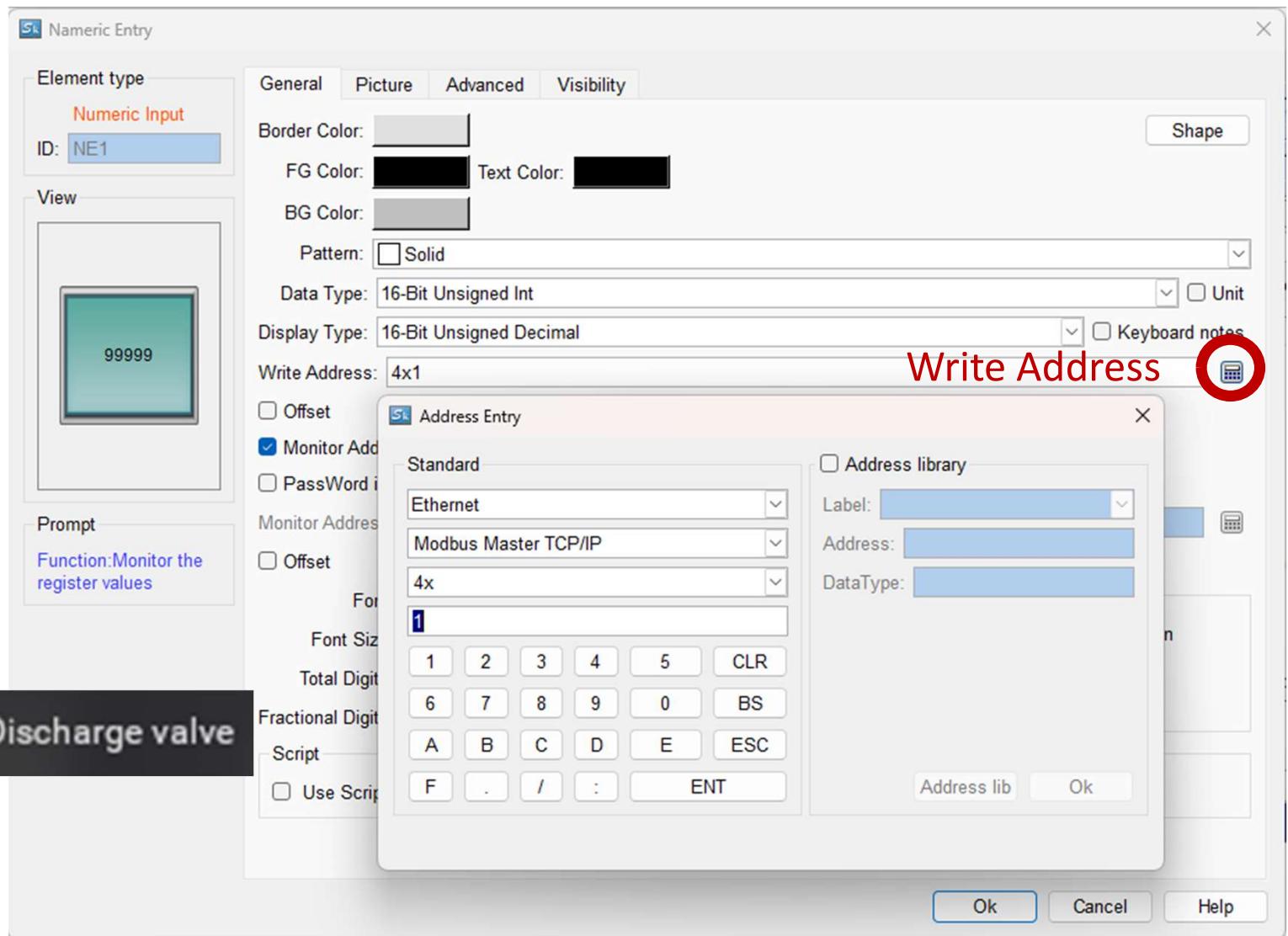
Write Address

123

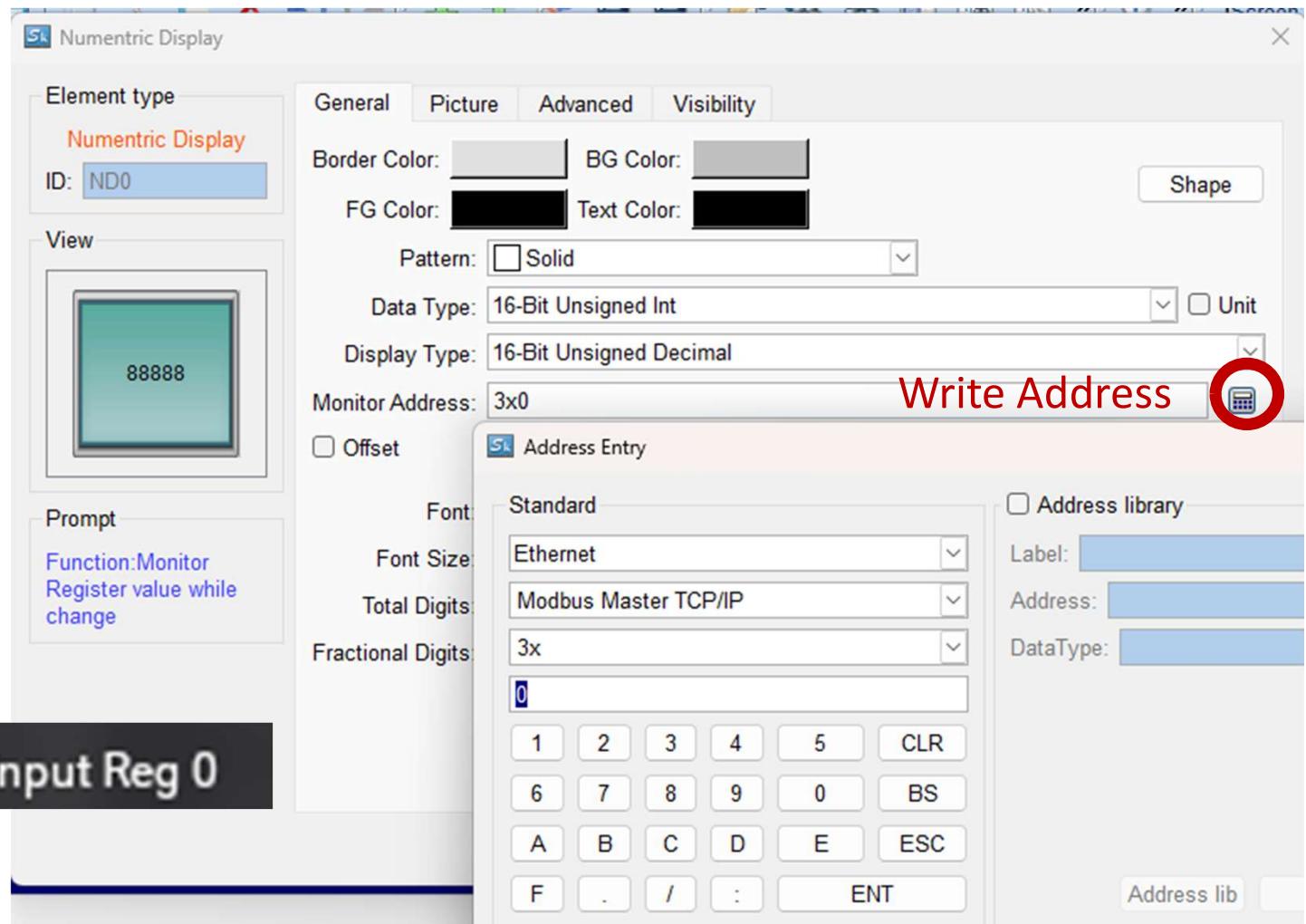
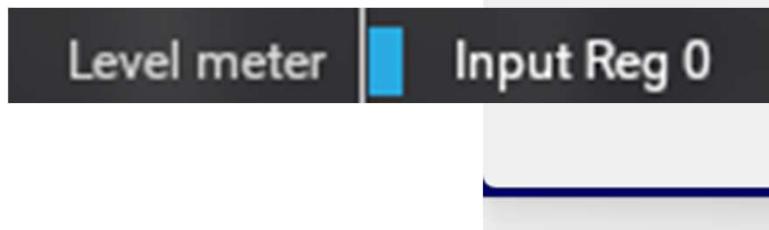
Numeric Display

4x1

Holding Reg 1 Discharge valve

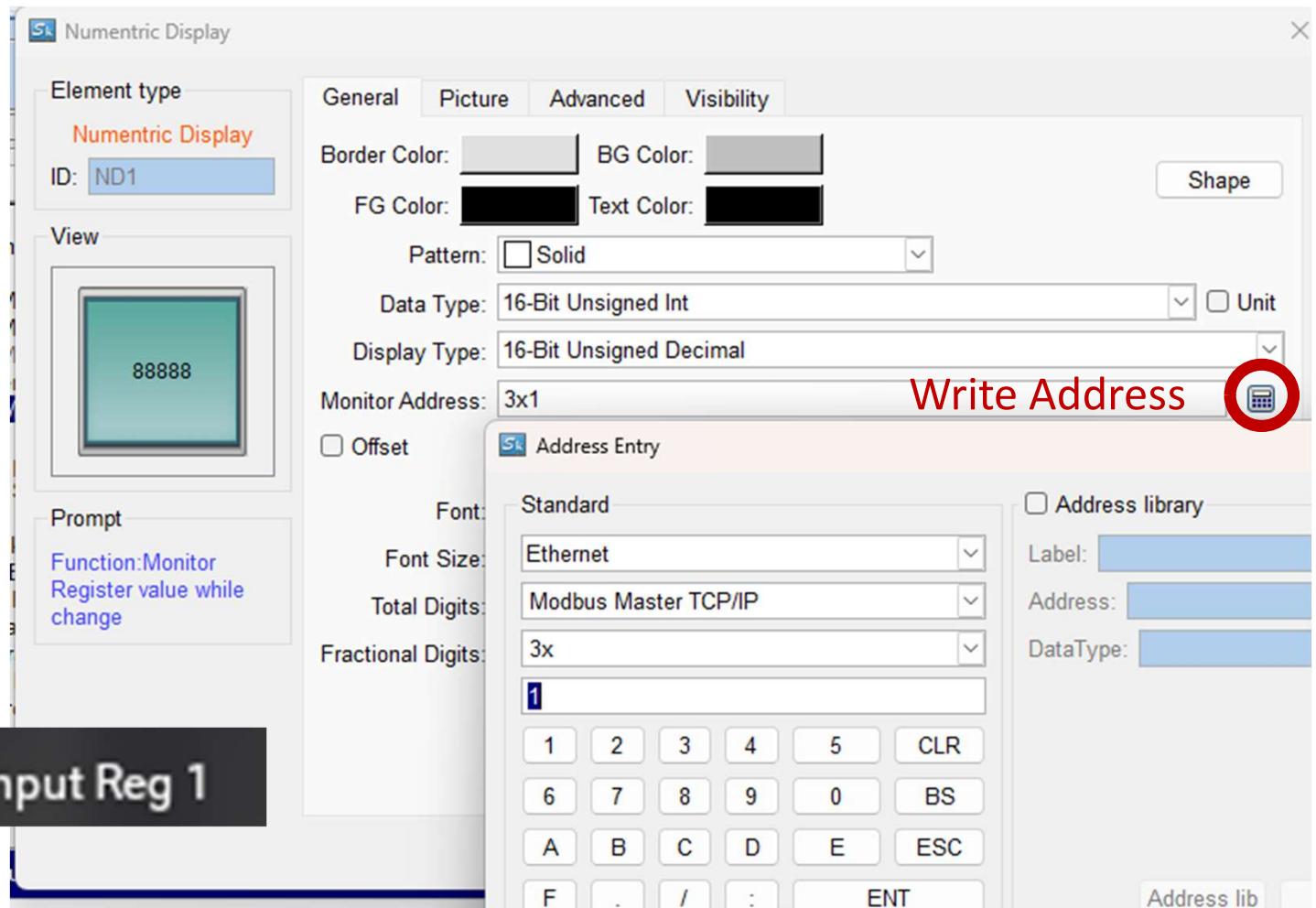


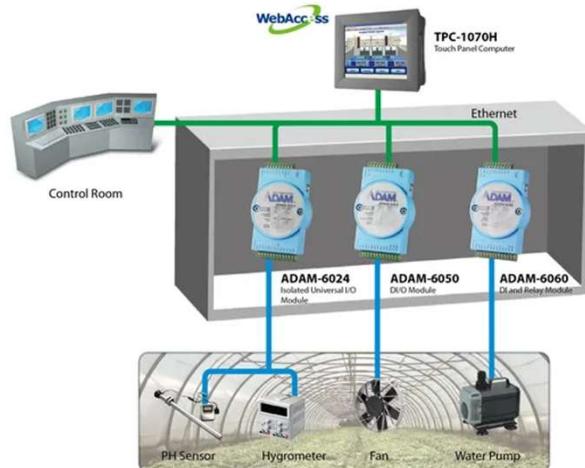
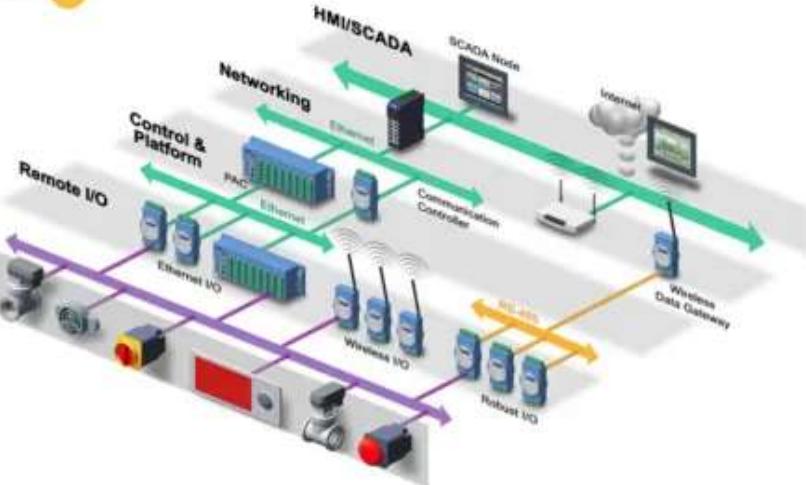
3x0



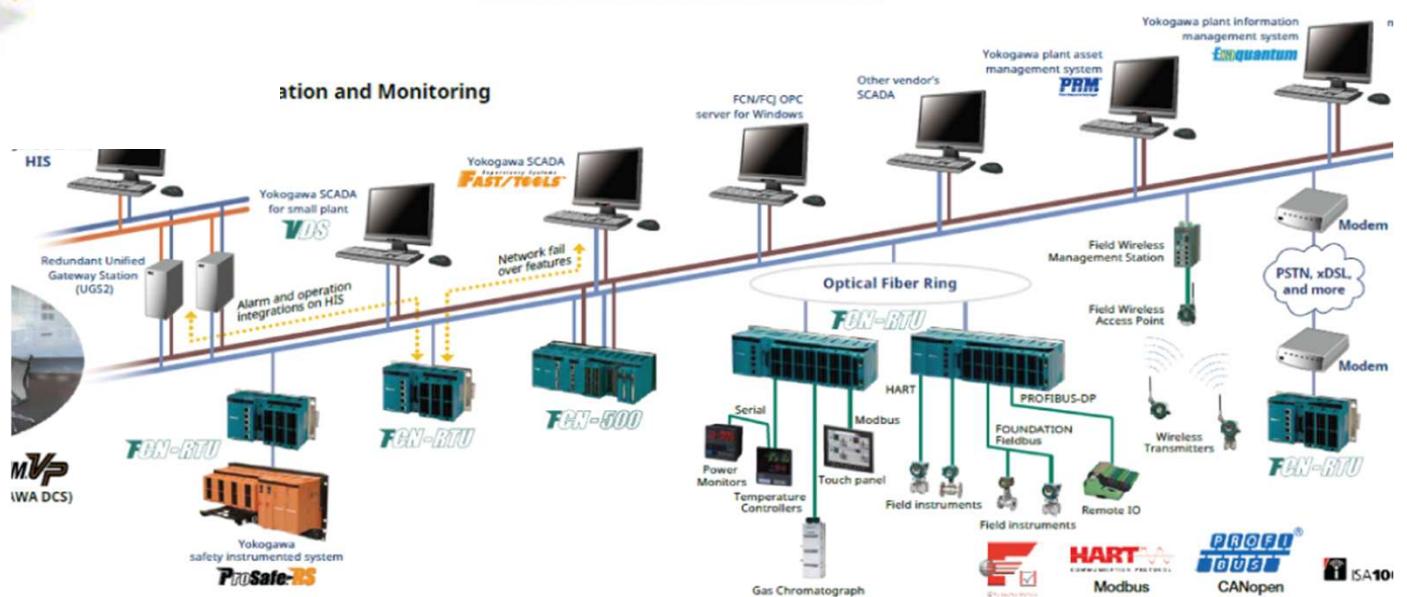
3x1

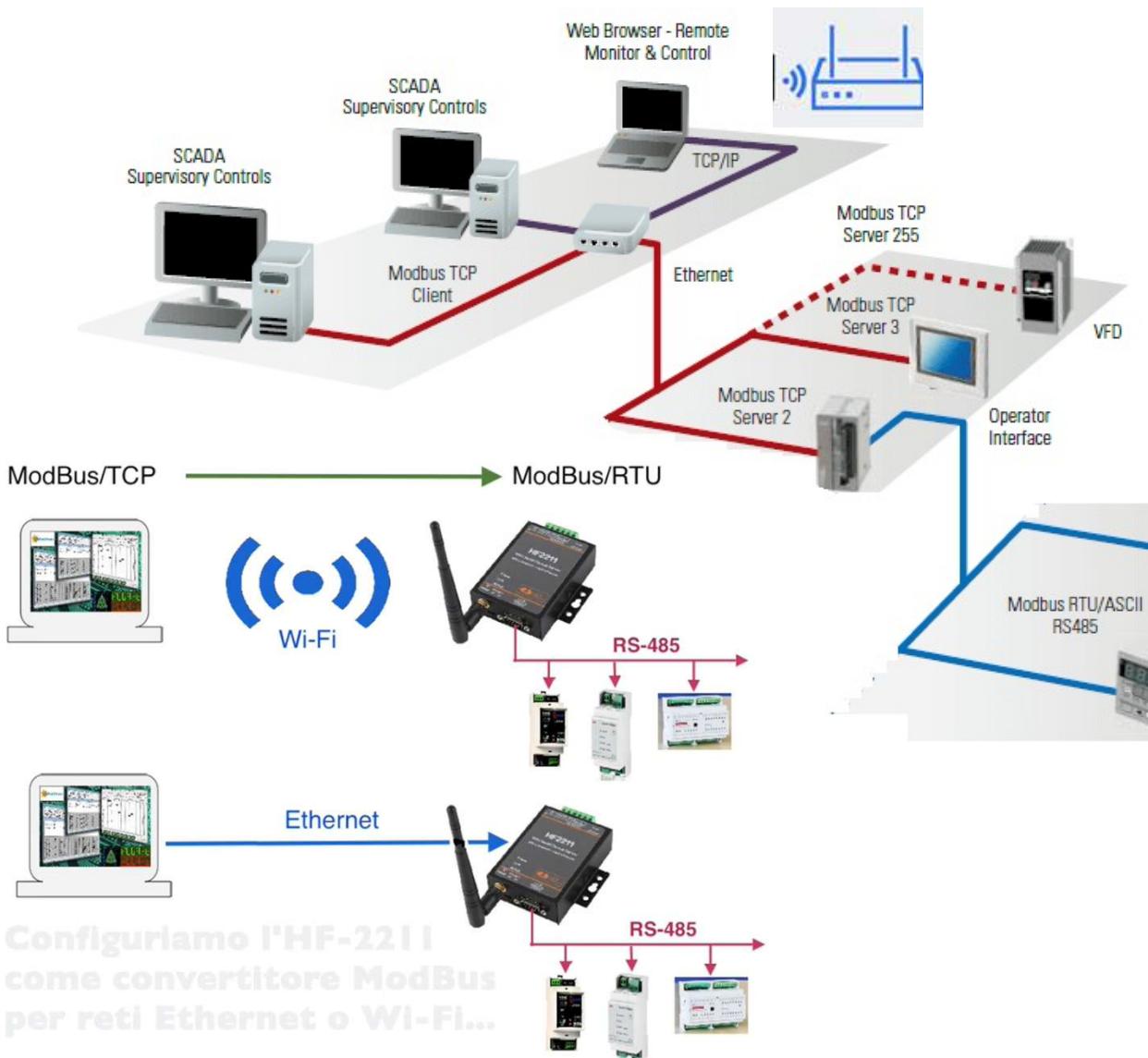
Flow meter | Input Reg 1





Integration and Monitoring



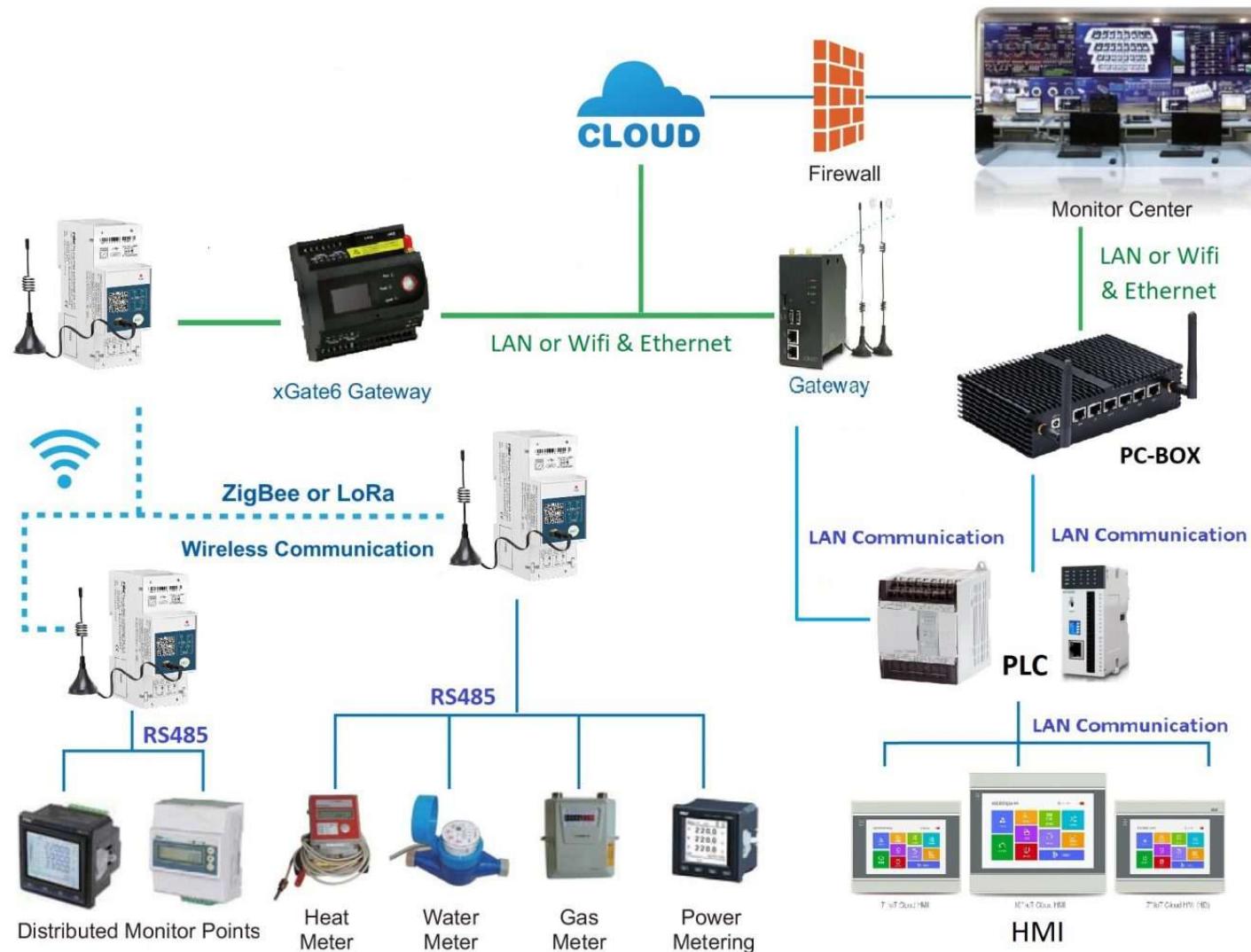


Software & Cloud

Data Collection Gateway

Wireless Comm.
LAN Comm.

Smart Device



<http://www.hi-flying.com/>

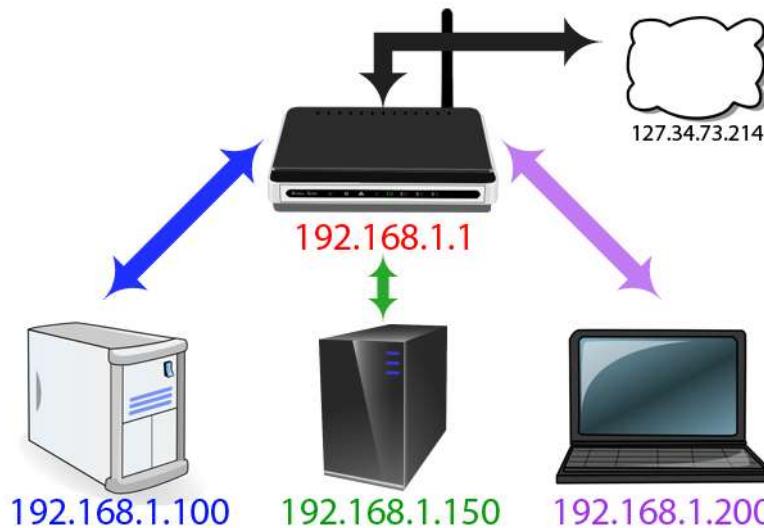
<https://www.youtube.com/watch?v=iSv0HaSmPRO>

Elfin Series Assembly Drawing

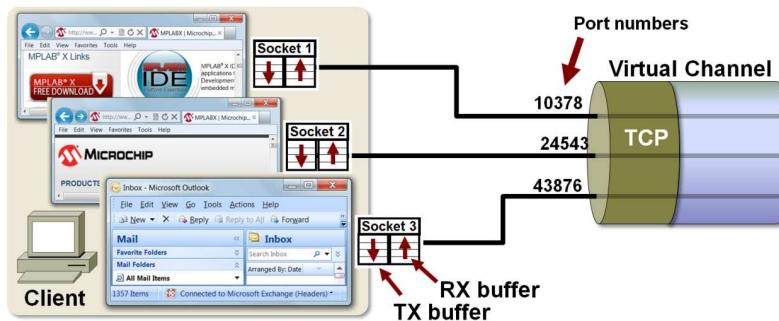


IP Address
192.168.1.1
Subnet Mask
255.255.255.0

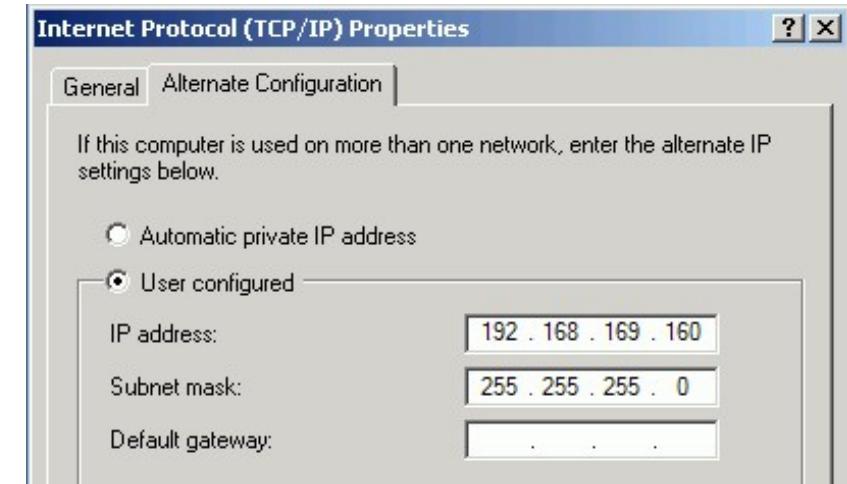
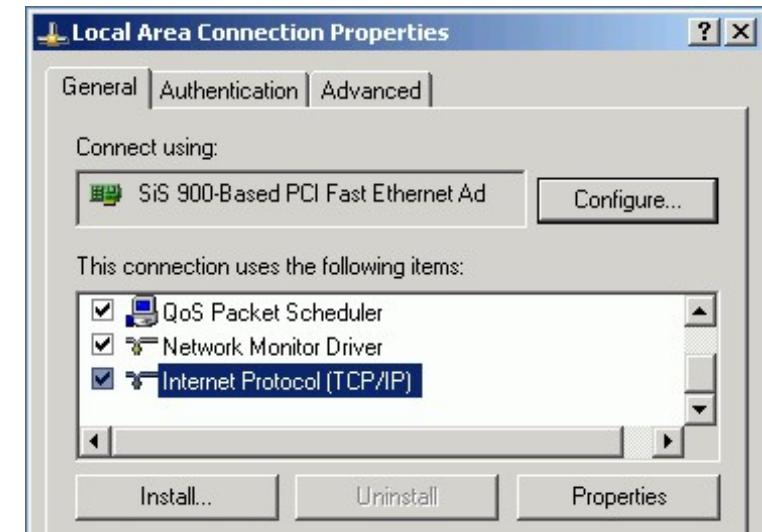
192.168.1.xxx
192.168.1.150
192.168.1.100
192.168.1.200



192.168.1.100



IP : Port



Cmd: ipconfig

การใช้งานโปรแกรม SimModbus 2

Modbus Devices Simulator (Simulating Modbus Client/Slave)



MODBUS Eth. TCP/IP PLC - Simulator (port: 502)

Connected (0/10) : (received/sent) (0/0) Serv. listening. Rx: ● Tx: ●

Address: C H D I/O Holding Regs (40000) Fmt: decimal +/- Prot: MODBUS TCP/IP

Address +0 +3 +4 +5 +6 +7 +8

Address	+0	+3	+4	+5	+6	+7	+8
400001-400010	0	0	0	0	0	0	0
400011-400020	0	0	0	0	0	0	0
400021-400030	0	0	0	0	0	0	0
400031-400040	0	0	0	0	0	0	0
400041-400050	0	0	0	0	0	0	0
400051-400060	0	0	0	0	0	0	0
400061-400070	0	0	0	0	0	0	0
400071-400080	0	0	0	0	0	0	0
400081-400090	0	0	0	0	0	0	0
400091-400100	0	0	0	0	0	0	0
400101-400110	0	0	0	0	0	0	0
400111-400120	0	0	0	0	0	0	0
400121-400130	0	0	0	0	0	0	0
400131-400140	0	0	0	0	0	0	0
400141-400150	0	0	0	0	0	0	0

00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F 0G 0H 0I 0J 0K 0L 0M 0N 0O 0P 0Q 0R 0S 0T 0U 0V

OK Cancel IP Your Com (127.0.0.1) Port 502

Local IP Chalermchon19

Remote IP

Ethernet TCP/IP Settings

Status Supporting 10 simultaneous connections.

Server connections 10

Port (502) 502

Alternate port 501

Socket Timeout (sec) 100 (10 to 1000 sec)

Responsiveness (ms) 0 (0 to 10 000 ms)

Load register values at startup.

การใช้งานโปรแกรม SimModbus 2 จำลอง Modbus Memory Device (TCP)



MODBUS Eth. TCP/IP PLC - Simulator (port: 502)

Connected (0/10) : (received/sent) (0/0) Serv. listening.

Address: H I/O Holding Regs (400000) Fmt:

Address	+0	+1	+2	+3	+4
400001-400010	830	32767	0	0	0
400011-400020	0	0	0	0	0

Rx

400000 – 465535
Holding Reg 4x0

300000 – 365535
Analog Input 3x0

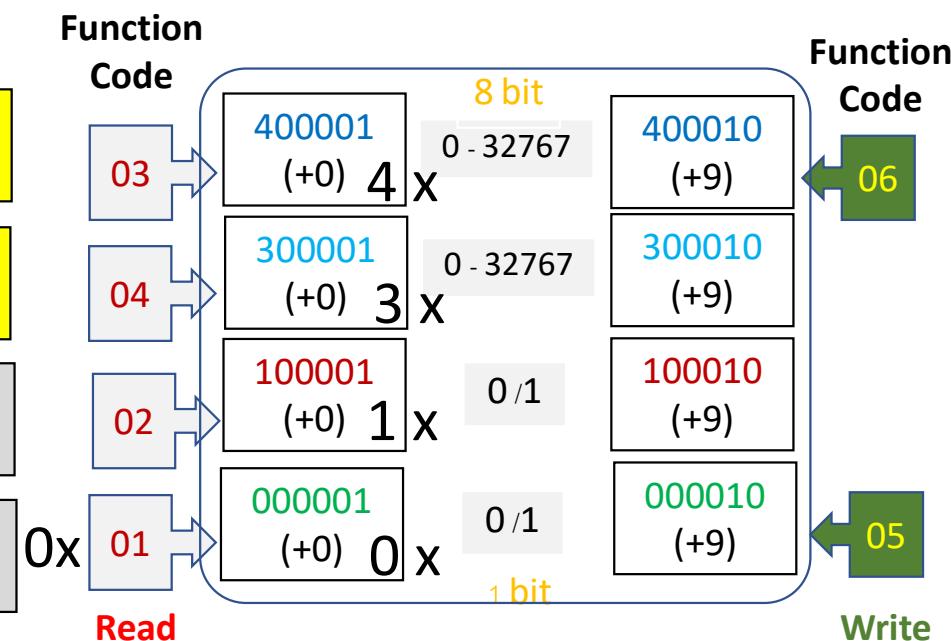
100000 -> 165535
Digital Input 1x0

000001 - 065535
Coil Output 0x0

Connected (0/10) : (received/sent) (0/0) Serv. listening

Address: H I/O Coil Outputs (000000) Fmt:

Address	+0	+1	+2	+3	+4	+5
000001-000016	1	0	1	0	0	0
000017-000032	0	0	0	0	0	0
000033-000048	0	0	0	0	0	0
000049-000064	0	0	0	0	0	0



หน่วยความจำเก็บข้อมูลภายในอุปกรณ์

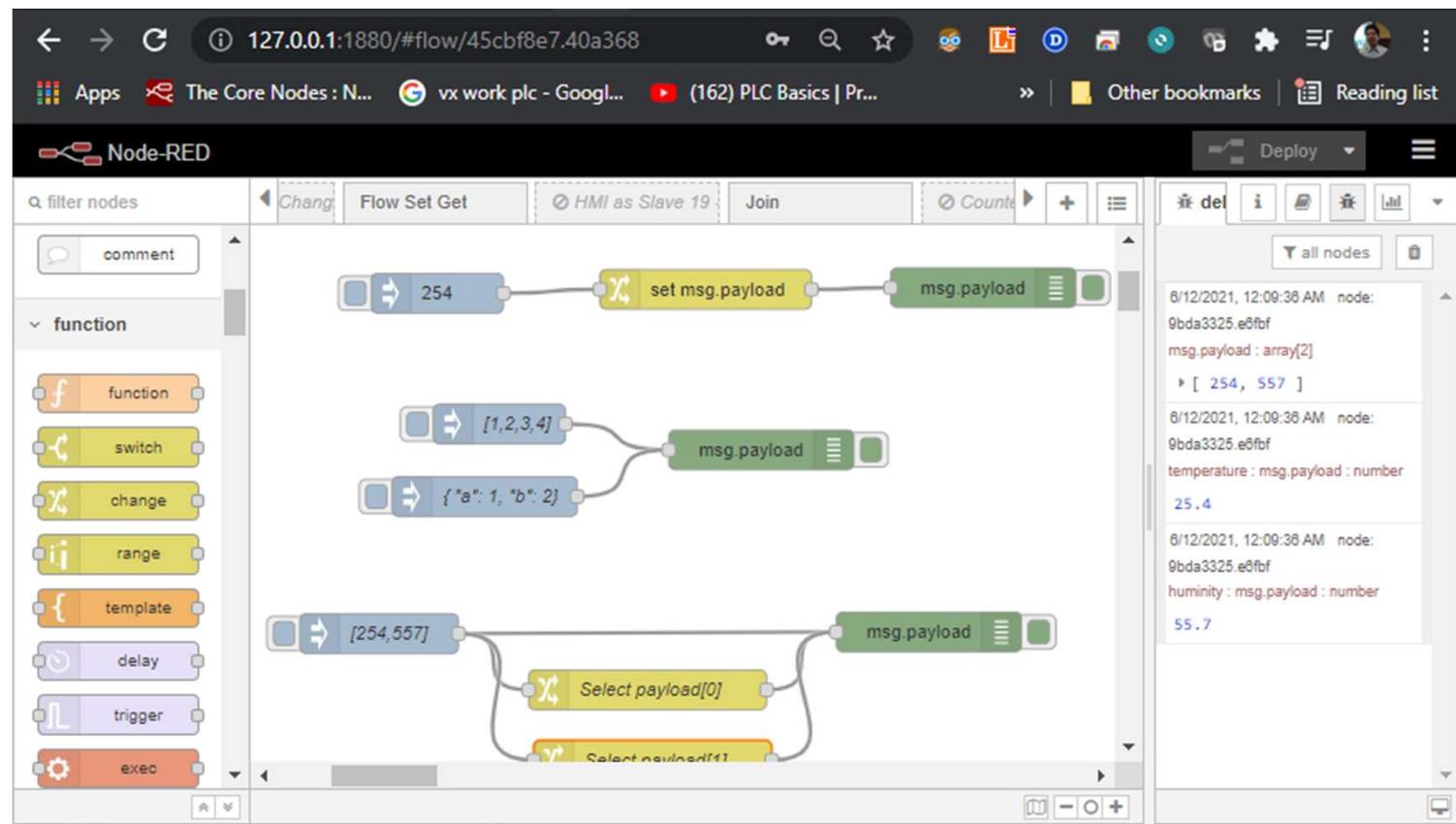
Node-Red

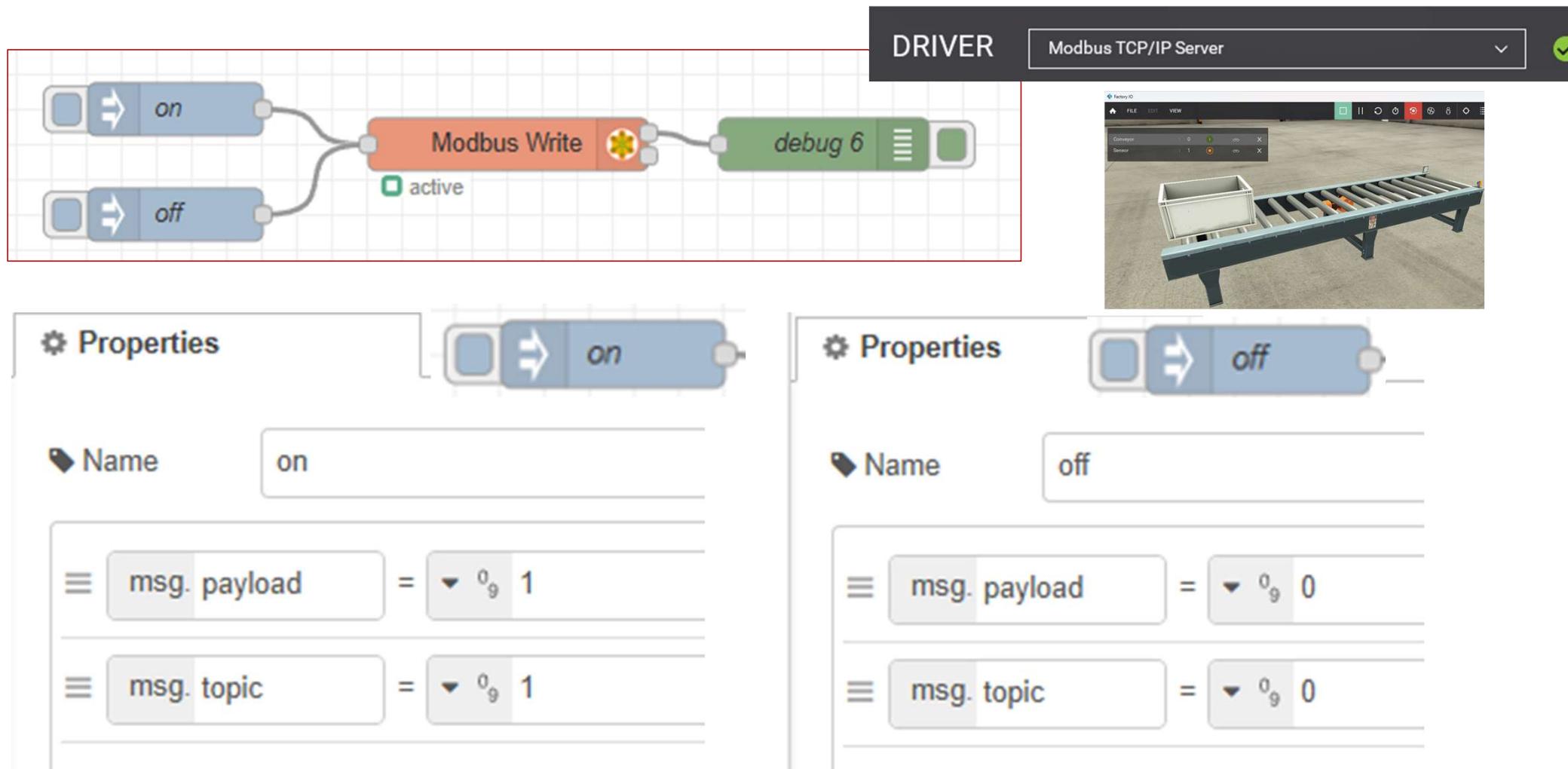
- *Node-RED is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways.*
- Cmd
 - Node-red
- <http://localhost:1880>
- 127.0.0.1:1880

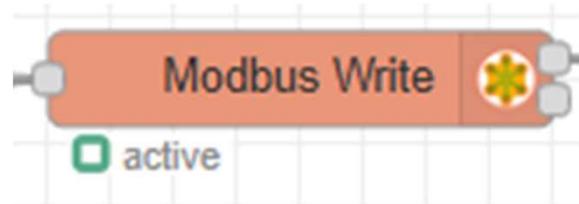


<https://github.com/chalerdmchonv/UtccFoodlotCodes/tree/main/Node-Red>

Node-RED is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways.







active

Edit Modbus-Write node

Delete

Cancel

Done

Properties

Settings

Optionals

Name

Name

Unit-Id

1

ID

1

FC

FC 5: Force Single Coil

FC

5

Address

0

Address

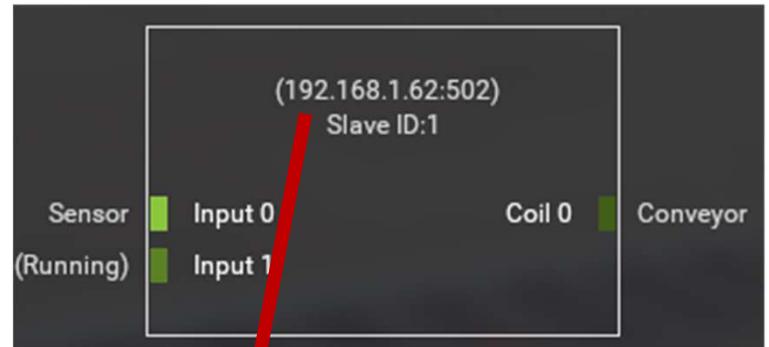
0

Delay to activate input

Server

FactoryIO

Add new modbus-client...



Edit Modbus-Write node > Edit modbus-client node

Delete

Cancel

Update

Properties

Settings

Queues

Optionals

Name

FactoryIO

Type

TCP

Host

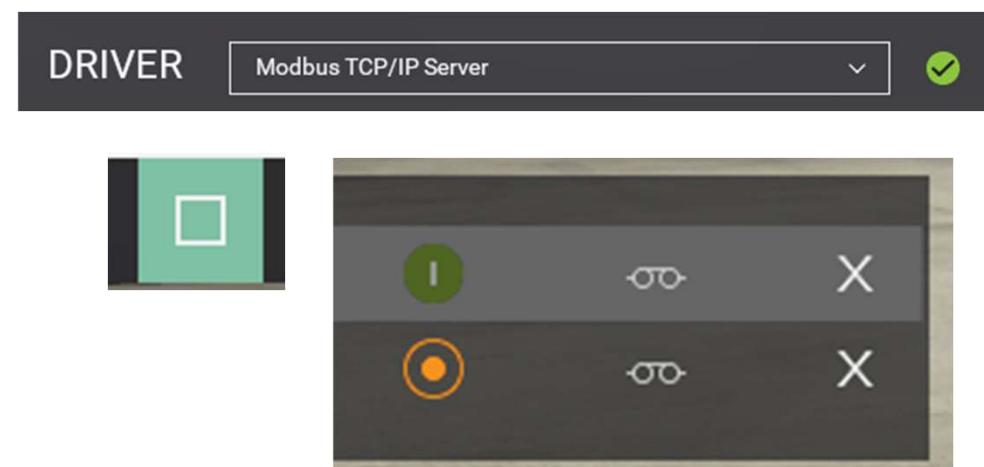
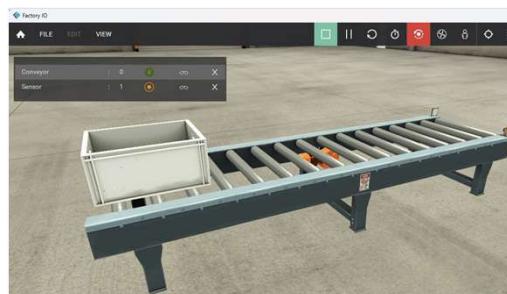
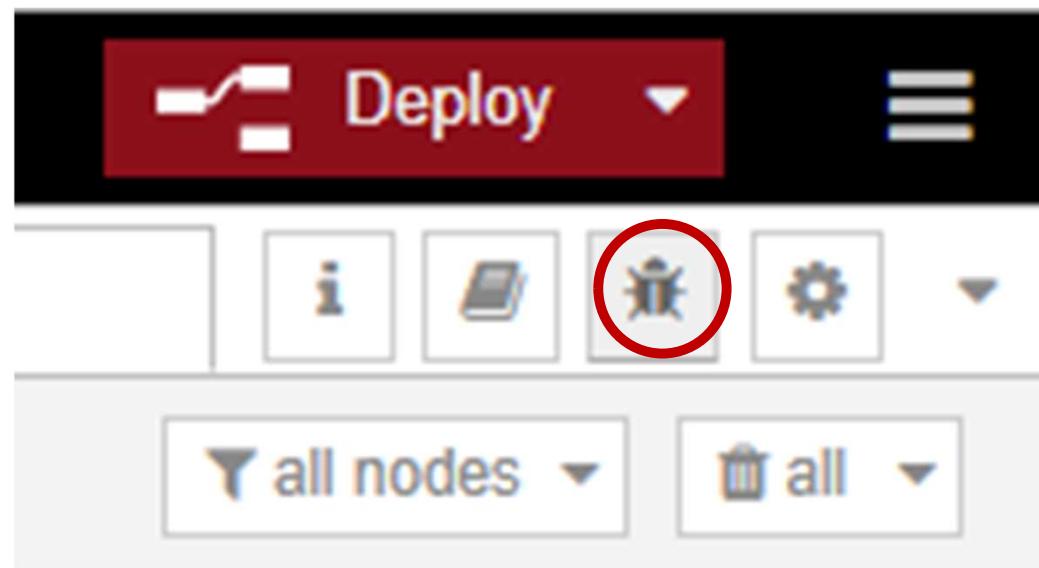
10.119.225.52

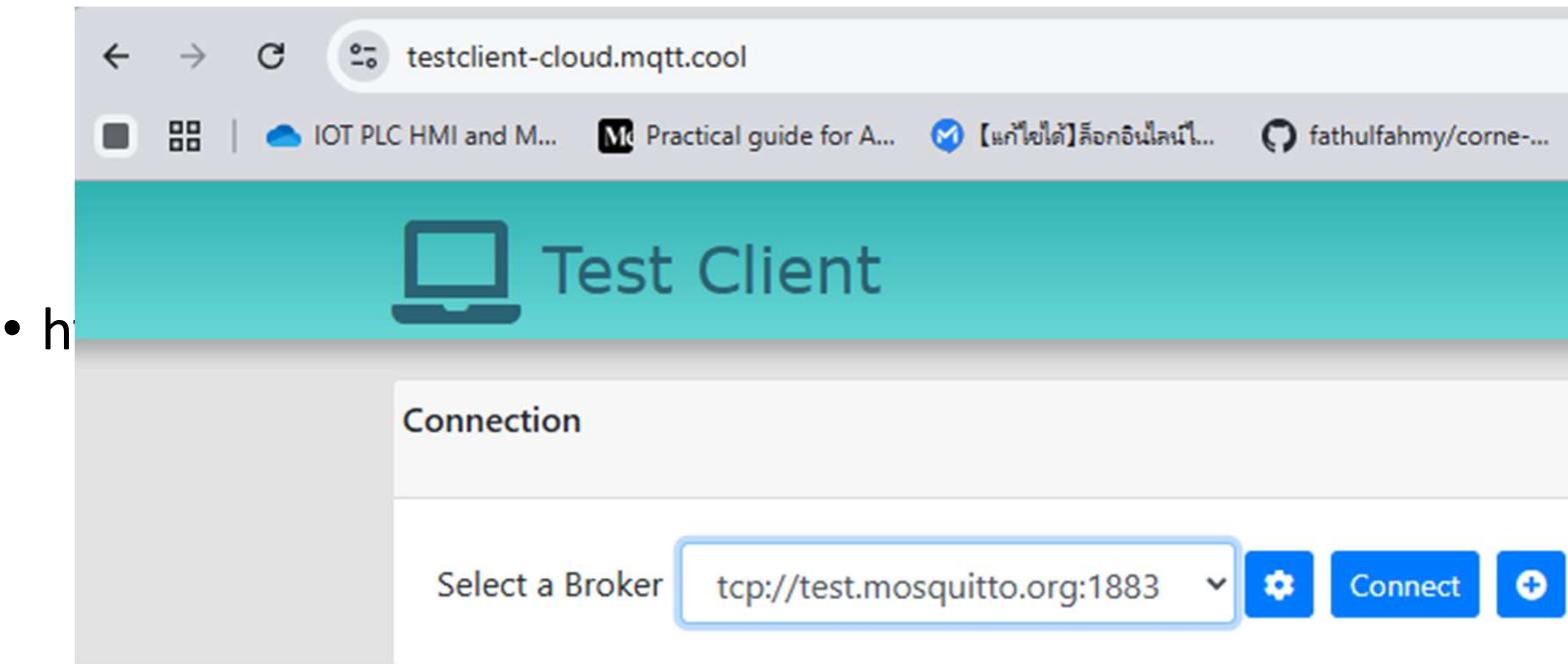
Port

502

TCP Type

DEFAULT





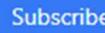
<https://testclient-cloud.mqtt.cool/>

tcp://test.mosquitto.org

 **Test Client**  **MQTT.Cool**

Connection <tcp://test.mosquitto.org:1883>  

Subscriptions

utcc/fac/xxxx/on-off QoS 0 

Subscribed topics

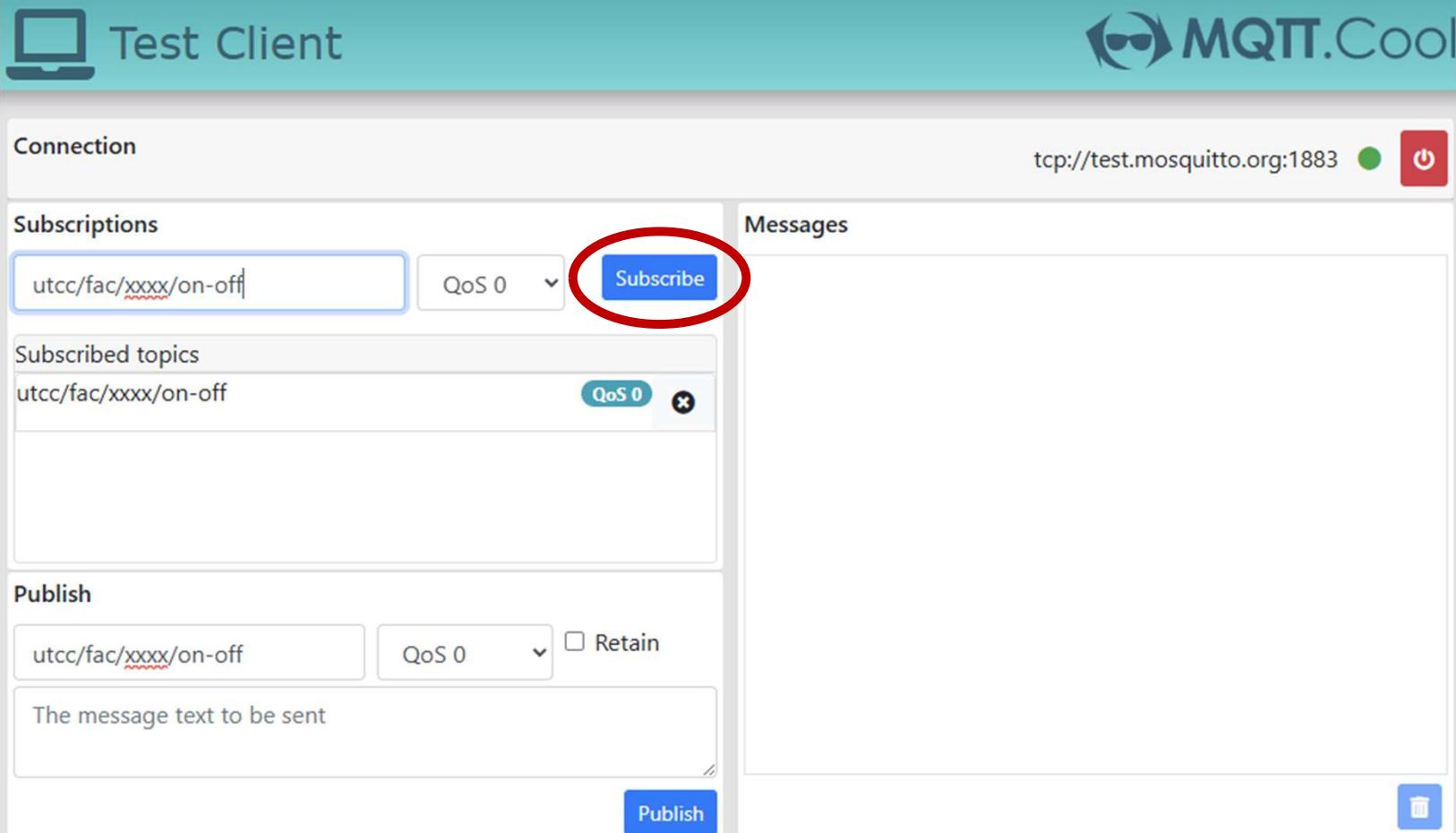
utcc/fac/xxxx/on-off  

Publish

utcc/fac/xxxx/on-off QoS 0 Retain

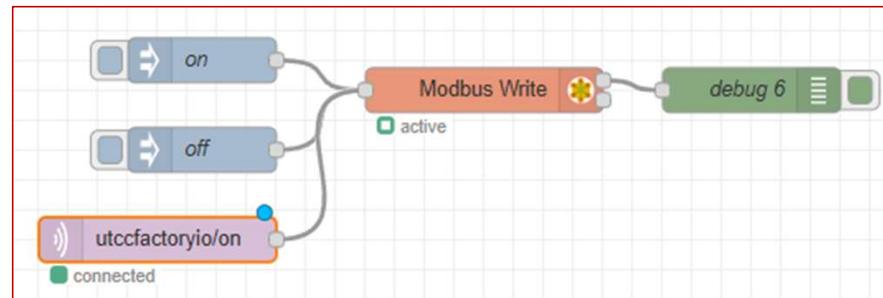
The message text to be sent



utcc/fac/xxxx/on-off

xxxx รหัส 4 ตัวสุดห้ามซ้ำกัน เช่น เลขท้ายบัตรประชาชน



Properties

utccfactoryio/on

Server: mqtt (with edit icon circled)

Action: Subscribe to single topic

Topic: utcc/fac/xxxx/on-off

QoS: 2

Output: auto-detect (parsed JSON object, string or buf)

Name: Name

utcc/fac/xxxx/on-off

XXXX รหัส 4 ตัวสุดท้ายมีซ้ำกัน เช่น เลขท้ายบัตรประชาชน

Properties

mqtt

Connection

Server: tcp://test.mosquito.org (with edit icon circled)

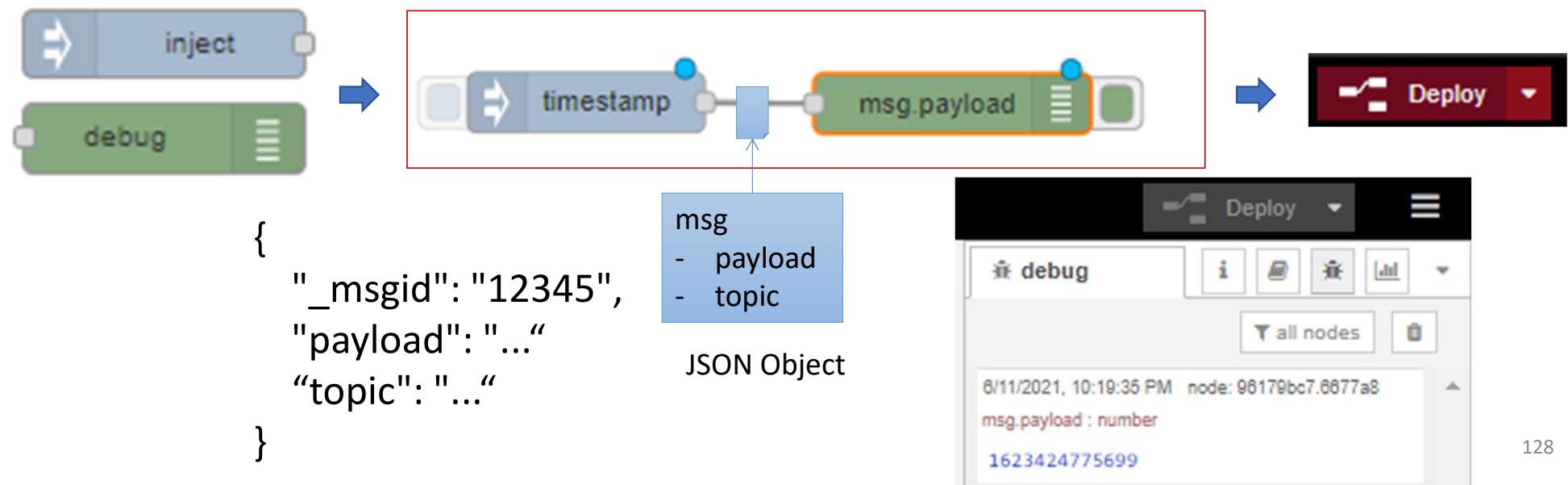
Connect automatically

Use TLS

Protocol: MQTT V3.1.1

Basic Nodes

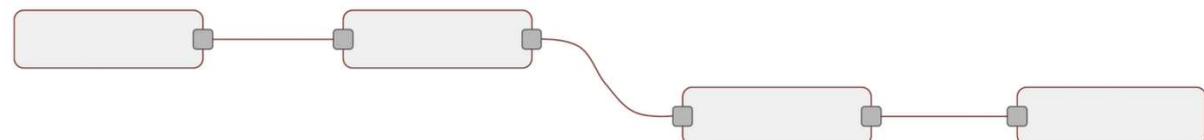
- Input Node นำข้อมูลเข้า node-red
- Function Node กำหนดการทำงานเปลี่ยนแปลงค่า
- Output Node แสดงผลข้อมูลในรูปแบบต่าง



JSON Object (Data Transfer)

- Boolean - true, false
- Number - eg 0, 123.4
- String - "hello"
- Array - [1,2,3,4]
- Object - { "a": 1, "b": 2}
- Null

{ payload: "sunny",
topic: "weather/uk",
color: "red",
temp: 20.2 }



JSON Object Examples

ชื่อตัวแปร ค่าตัวแปร

{ "name" : "John" } ข้อความ

{ "age" : 30 } ตัวเลข

{"name" : "John" , "age" : 30 } หลายตัวแปร

Array Object

[{ "name": "John" , "age": 30 } , { "name": "jenny" , "age": 22 }]

payload and topic properties (default)

The screenshot shows the configuration of an 'inject' node in the FME Datastage interface. The payload is set to 'timestamp' and the topic is set to 'a_z'. A red box highlights the 'a_z' topic selection, with a Thai annotation 'กำหนดค่าชนิดข้อมูล' (Define data type) pointing to it. Another red box highlights the 'Repeat' dropdown, with a Thai annotation 'กำหนดเวลาทำซ้ำ' (Define repeat time) pointing to it.

กำหนดค่าชนิดข้อมูล

กำหนดเวลาทำซ้ำ

payload and topic properties (default)

inject

timestamp

msg
- payload
- topic

Name

msg. payload = timestamp

msg. topic = a_z

+ add

none

repeat

Enabled

Done

Delete

Cancel

Properties

msg.
flow.
global.
string
number
boolean
JSON
buffer
timestamp
expression
env variable

none
interval
interval between times
at a specific time

repeat

131

กำหนดค่า payload และการแสดงค่า Debug

JavaScript Types

boolean : true / false

number : 123

string : "hello"

array : [1, 2, 3, 4]

object : { "color": "red" }



Name

[1,2,3,4]

msg. payload = [1,2,3,4]
msg. topic = a_z



6/11/2021, 11:30:40 PM node: e

msg.payload : array[4]

array[4]

0: 1

1: 2

2: 3

3: 4

6/11/2021, 11:30:42 PM node: e

msg.payload : Object

object

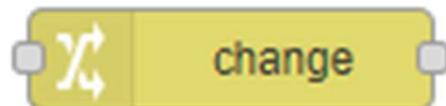
a: 1

b: 2

Name

{ "a": 1, "b": 2 }

msg. payload = { "a": 1, "b": 2 }
msg. topic = a_z



- Set a property to a value,
- Change a String property by performing a search and replace,
- Delete a property,
- Move a property.

Set

to msg. payload

msg. payload

to msg.

- msg.
- flow.
- global.

msg. payload

- Boolean - true, false
- Number - eg 0, 123.4
- String - "hello"
- Array - [1,2,3,4]
- Object - { "a": 1, "b": 2}
- Null

J: expression

Set

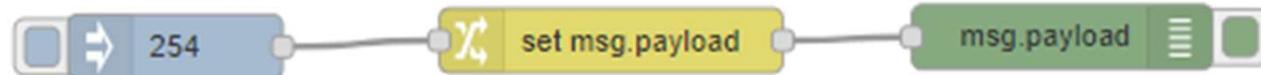
to msg. payload.temperature_c

to J: (payload.temperature-32)*5/9

```
{  
  "payload": {  
    "temperature": 90,  
    "temperature_c": 32.22222  
  }  
}
```

Change กำหนดค่า payload / 10

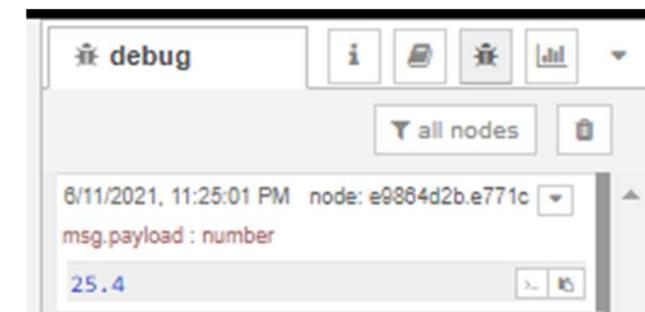
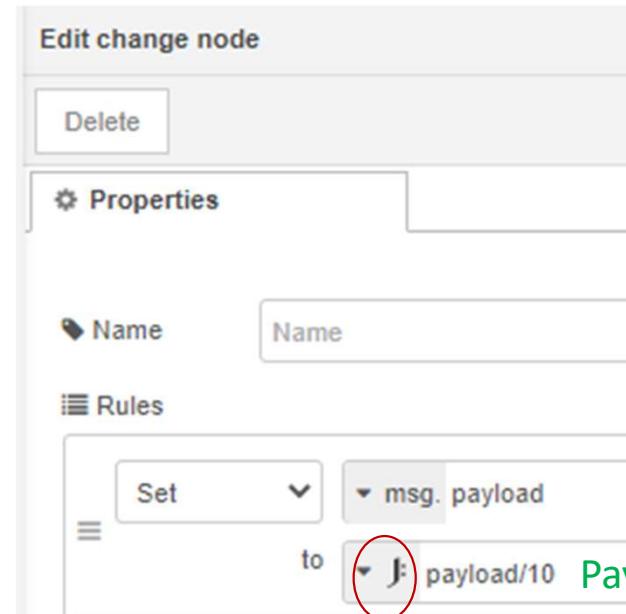
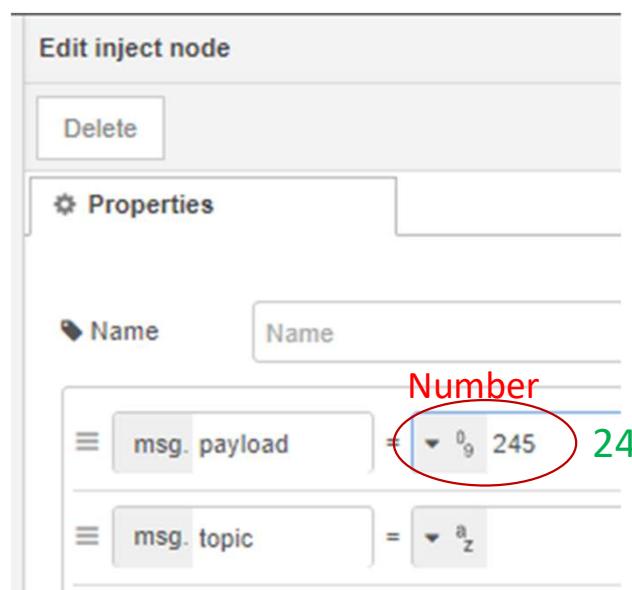
GitHub Node-Red - 02 Basic Change



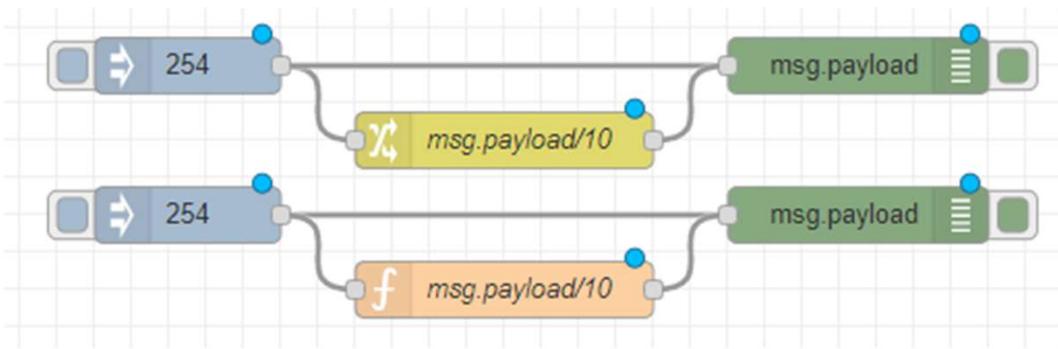
payload (254) - input

Change (254/10)

Payload 25.4 - output



<https://github.com/chalermchonv/UtccFoodlotCodes/tree/main/Node-Red>



6/16/2021, 9:25:53 PM node:

1d98376f.4e0a19

msg.payload : number

254

6/16/2021, 9:25:53 PM node:

1d98376f.4e0a19

msg.payload : number

25.4

Edit change node

Delete Cancel Done

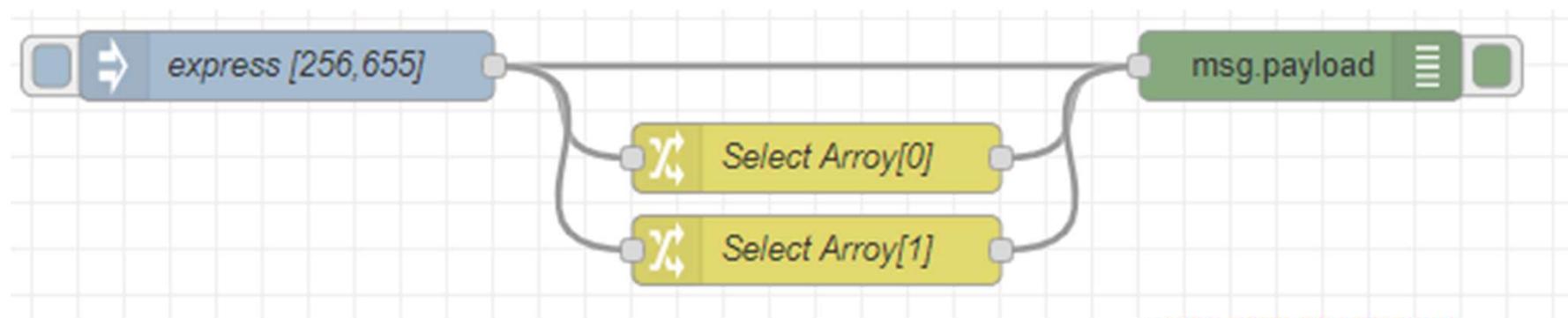
Properties

Name: msg.payload/10

Rules

Set msg. payload to J: payload/10

msg.payload = msg.payload/10
;return msg;



Set msg. payload to `J: payload[0]`

Set msg. payload to `J: payload[1]`

`msg.payload : array[2]`

▶ [256, 655]

6/16/2021, 9:26:23 PM node:

89d312c3.58257

`msg.payload : number`

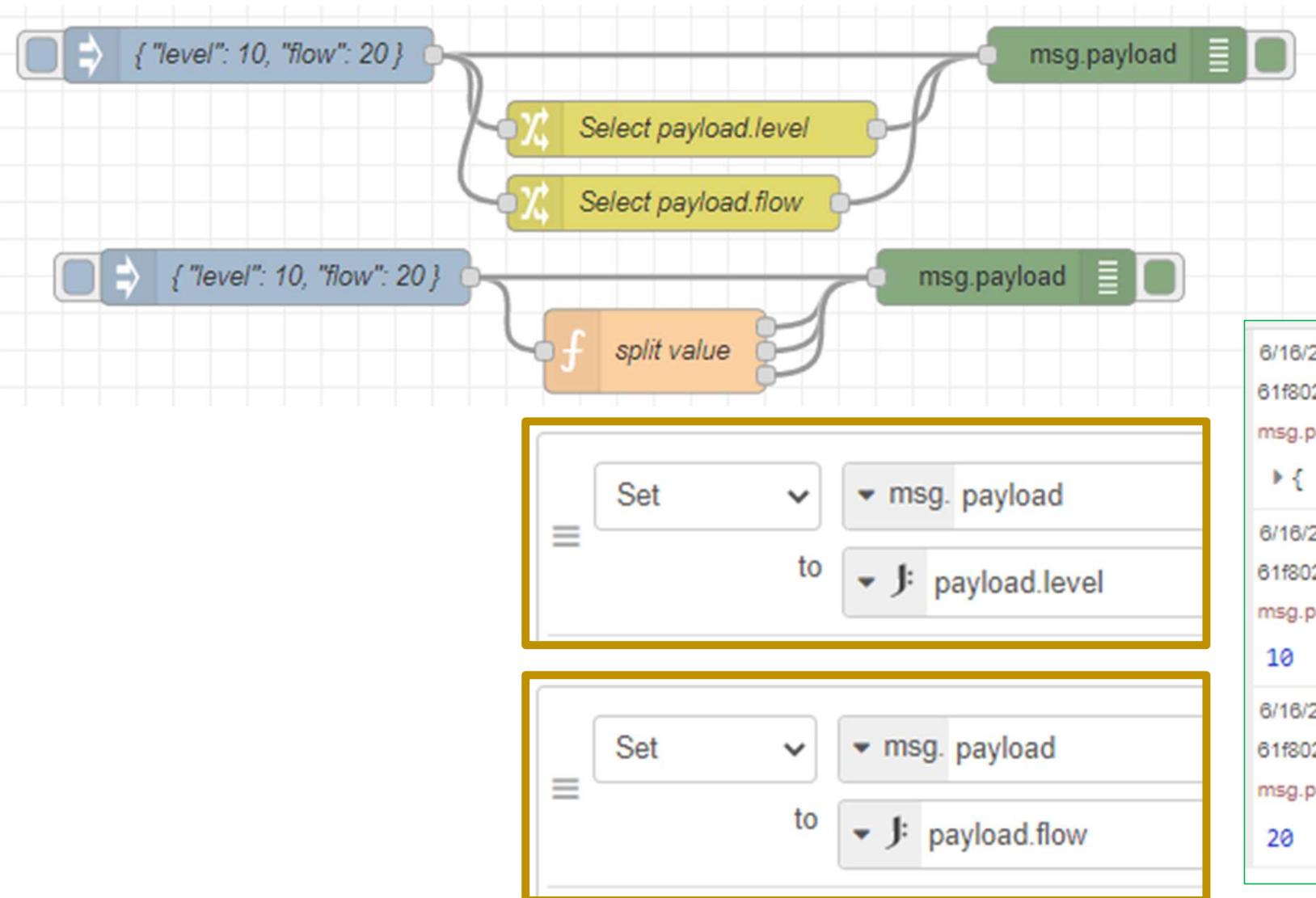
256

6/16/2021, 9:26:23 PM node:

89d312c3.58257

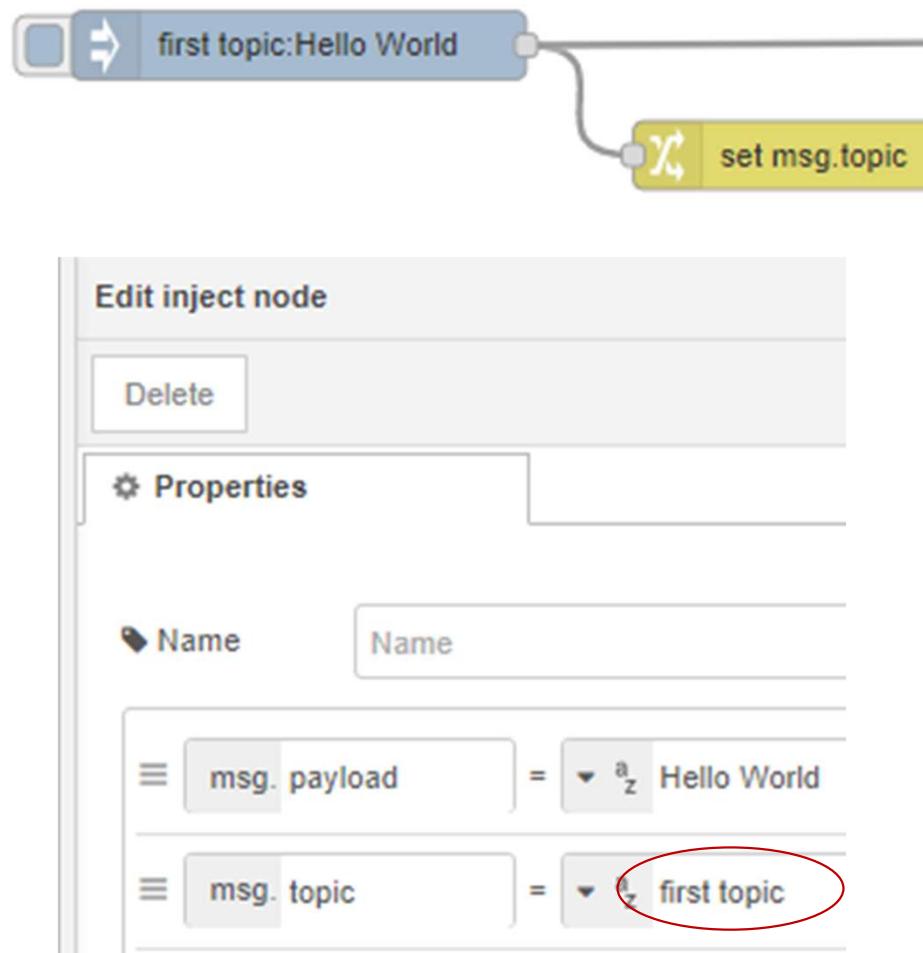
`msg.payload : number`

655



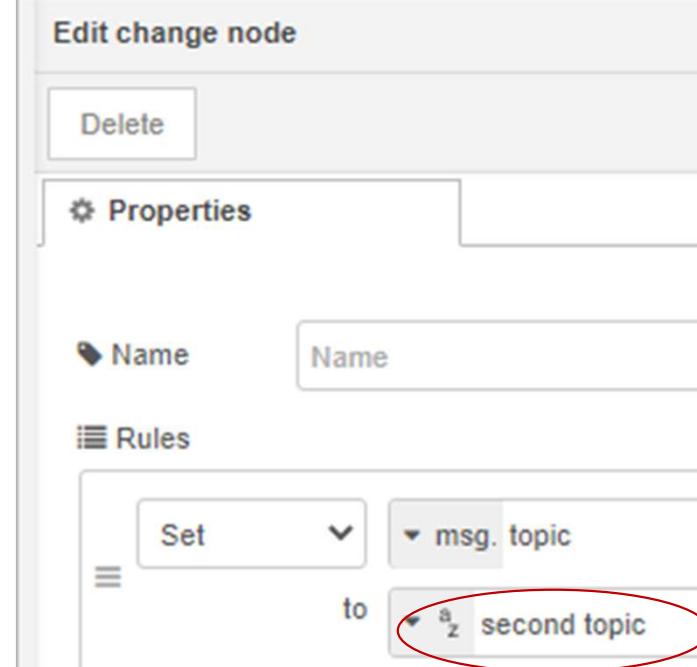
6/16/2021, 9:34:48 PM node: 61f802b9.82c3ac <code>msg.payload : Object</code> ▶ <code>{ level: 10, flow: 20 }</code>
6/16/2021, 9:34:48 PM node: 61f802b9.82c3ac <code>msg.payload : number</code> <code>10</code>
6/16/2021, 9:34:48 PM node: 61f802b9.82c3ac <code>msg.payload : number</code> <code>20</code>

Change กำหนดค่า topic



GitHub Node-Red - 02 Basic Change

```
6/11/2021, 11:56:04 PM node: 96179b  
first topic : msg.payload : string[11]  
"Hello World"  
6/11/2021, 11:56:04 PM node: 96179b  
second topic : msg.payload : string[11]  
"Hello World"
```



แยกค่าเป็น สອງทางและกำหนด topic ใหม่

payload[0] , payload[1]

Edit change node

Delete

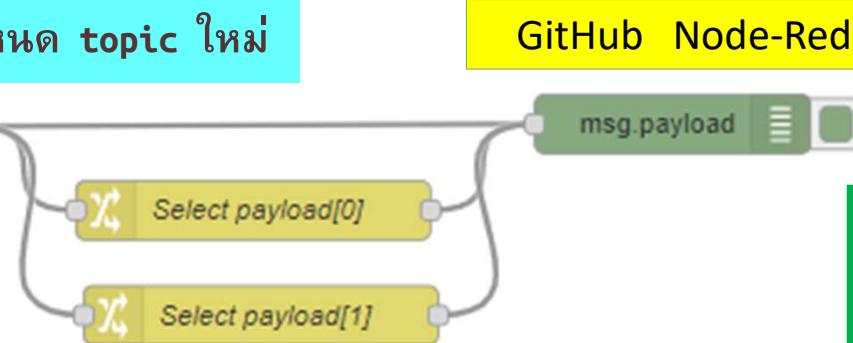
Properties

Name: Select payload[0]

Rules

Set msg. payload to **payload[0]/10** Express Payload[0]/10

Set msg. topic to **a_z temperature**



Edit change node

Delete

Properties

Name: Select payload[1]

Rules

Set msg. payload to **payload[1]/10** Express Payload[1]/10

Set msg. topic to **a_z humidity**

GitHub Node-Red - 02 Change-Function

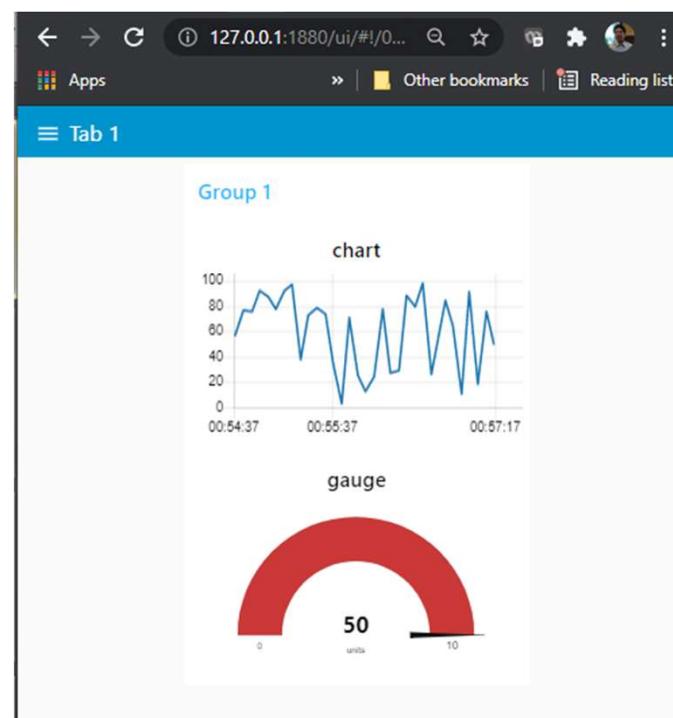
```
6/12/2021, 12:09:36 AM node: 9bda3:  
msg.payload : array[2]  
[ 254, 557 ]  
6/12/2021, 12:09:36 AM node: 9bda3:  
temperature : msg.payload : number  
25.4  
6/12/2021, 12:09:36 AM node: 9bda3:  
humidity : msg.payload : number  
55.7
```

Express
Payload[1]/10

Dashboard Module

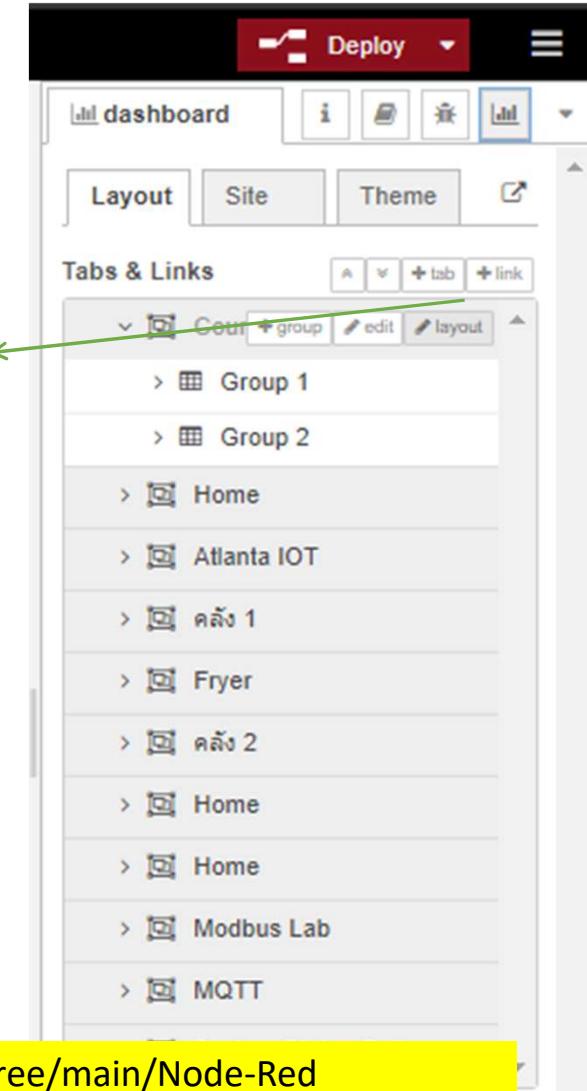
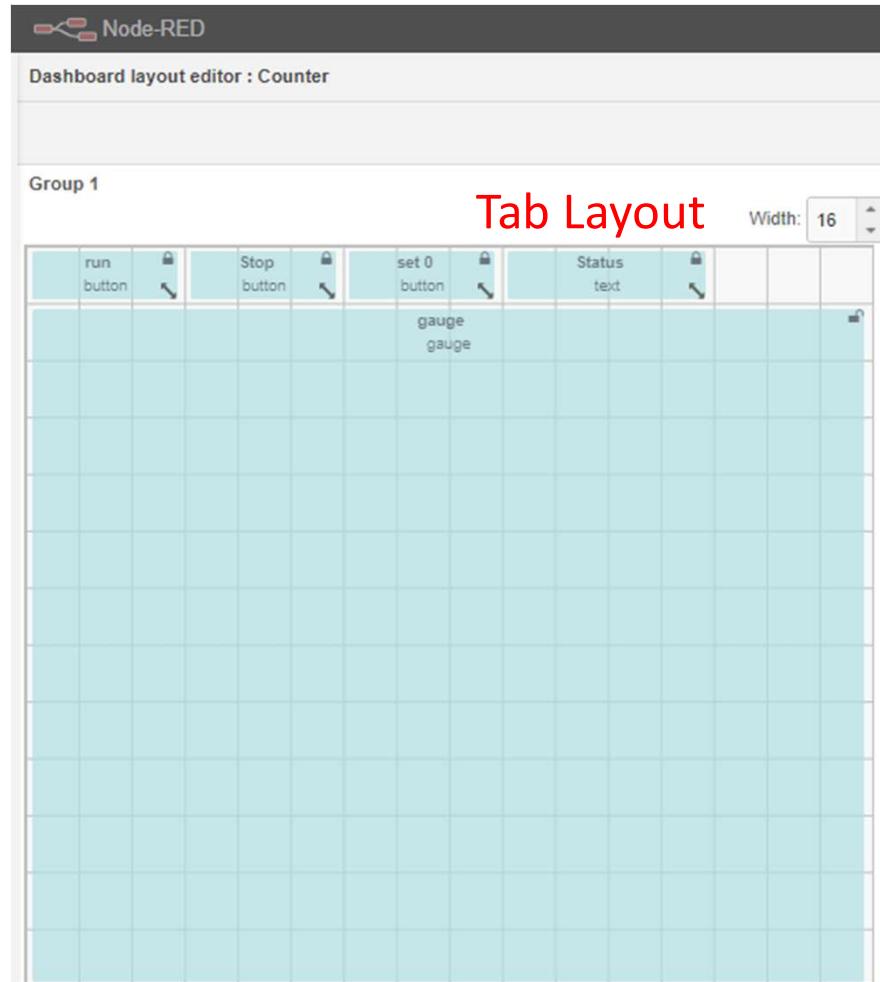


<http://127.0.0.1:1880/>



สร้าง Tab และ Group เพื่อกำหนดพื้นที่แสดง

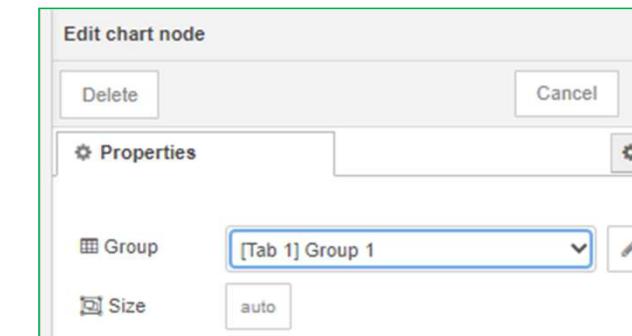
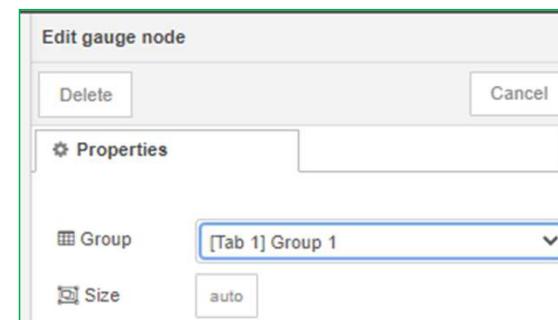
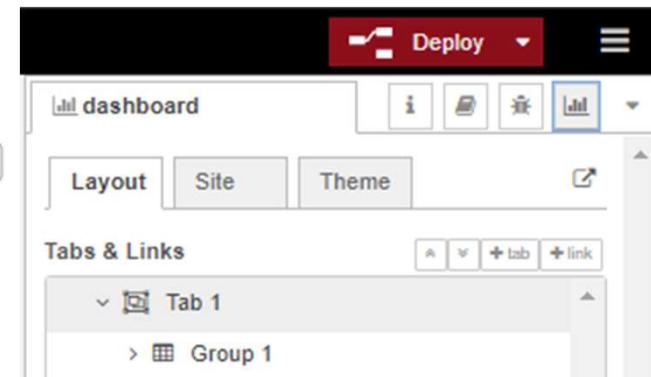
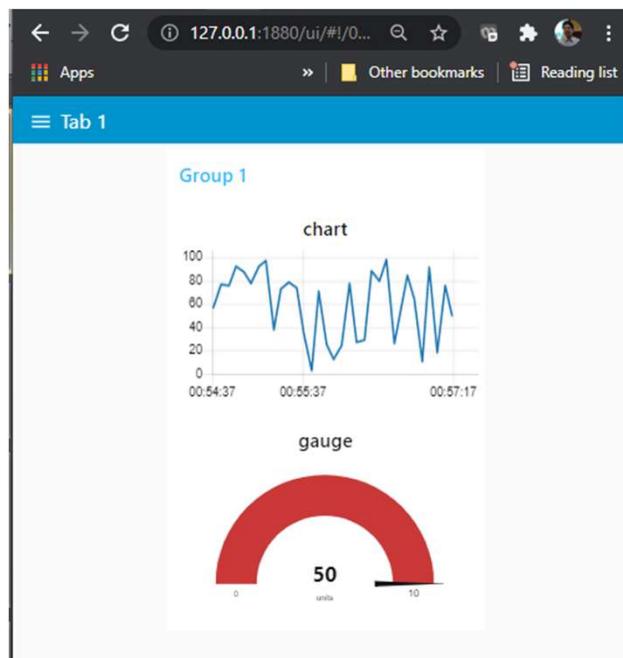
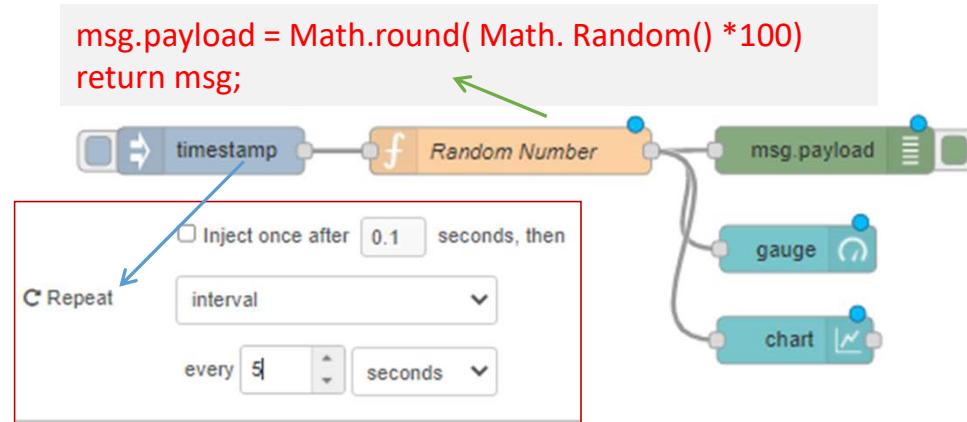
GitHub Node-Red 03 Basic Dashboard

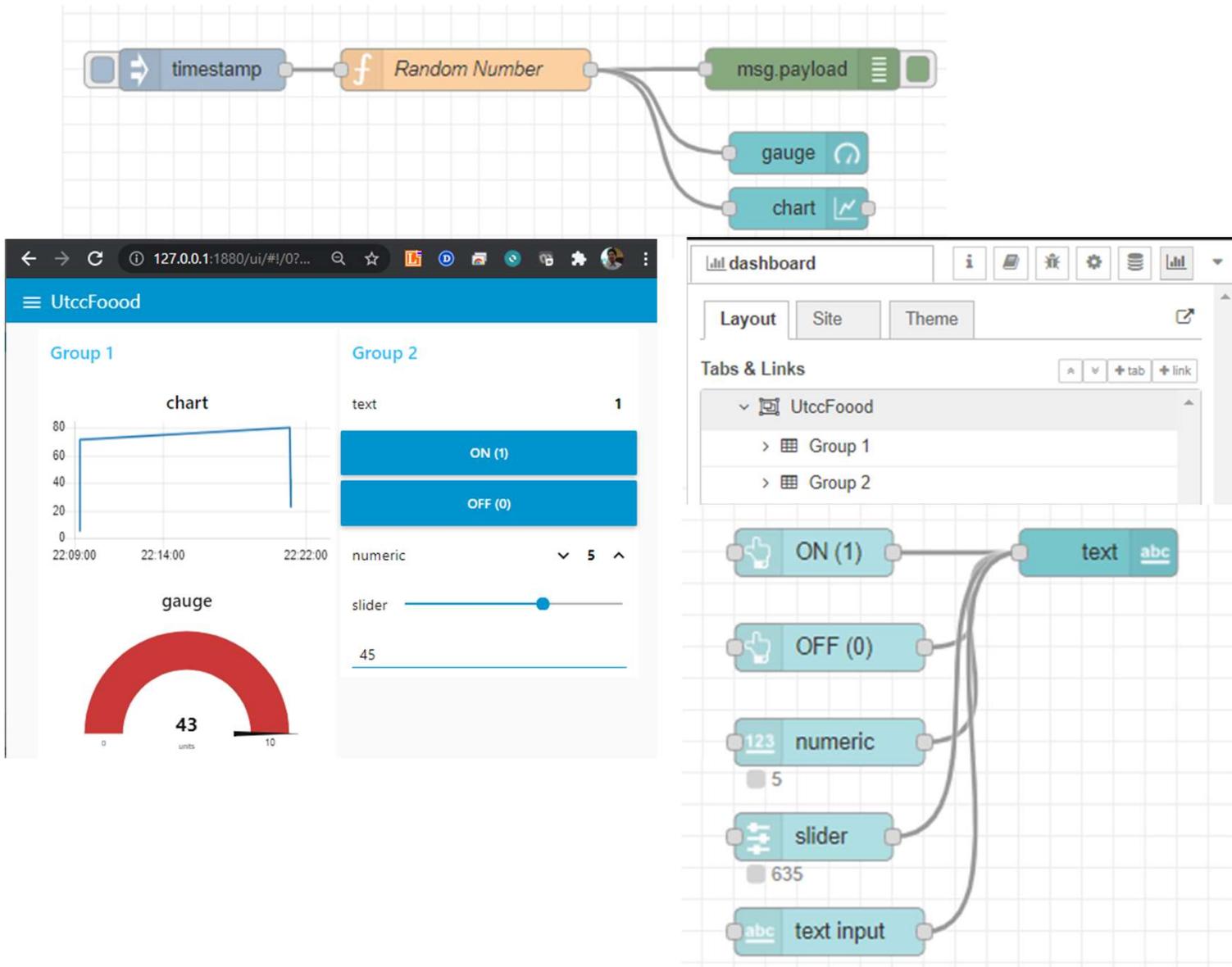


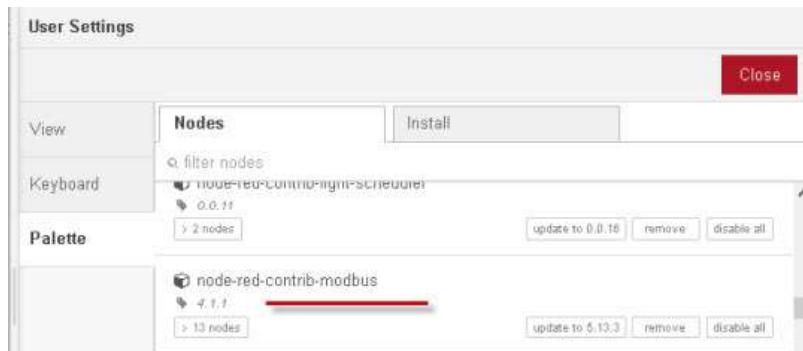
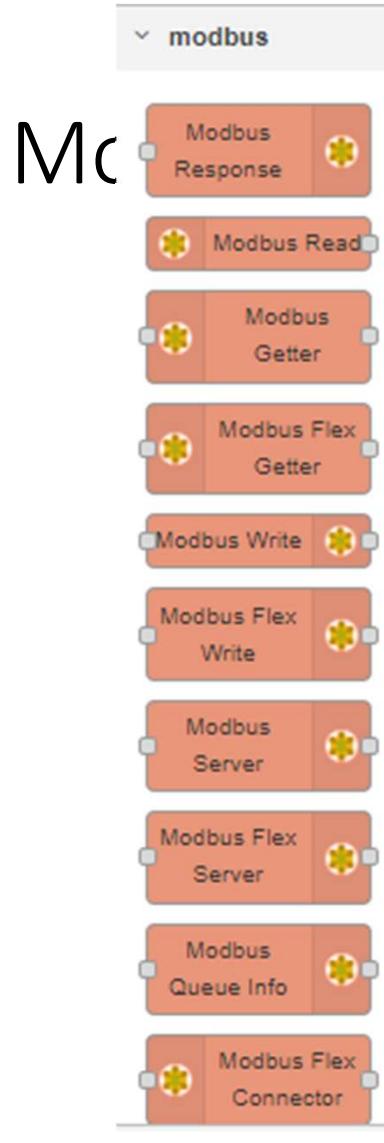
<https://github.com/chalermchonv/UtccFoodlotCodes/tree/main/Node-Red>

Basic Dashboard Control

GitHub Node-Red 03 Basic Dashboard







Sensor , Machine, PLC,HMI

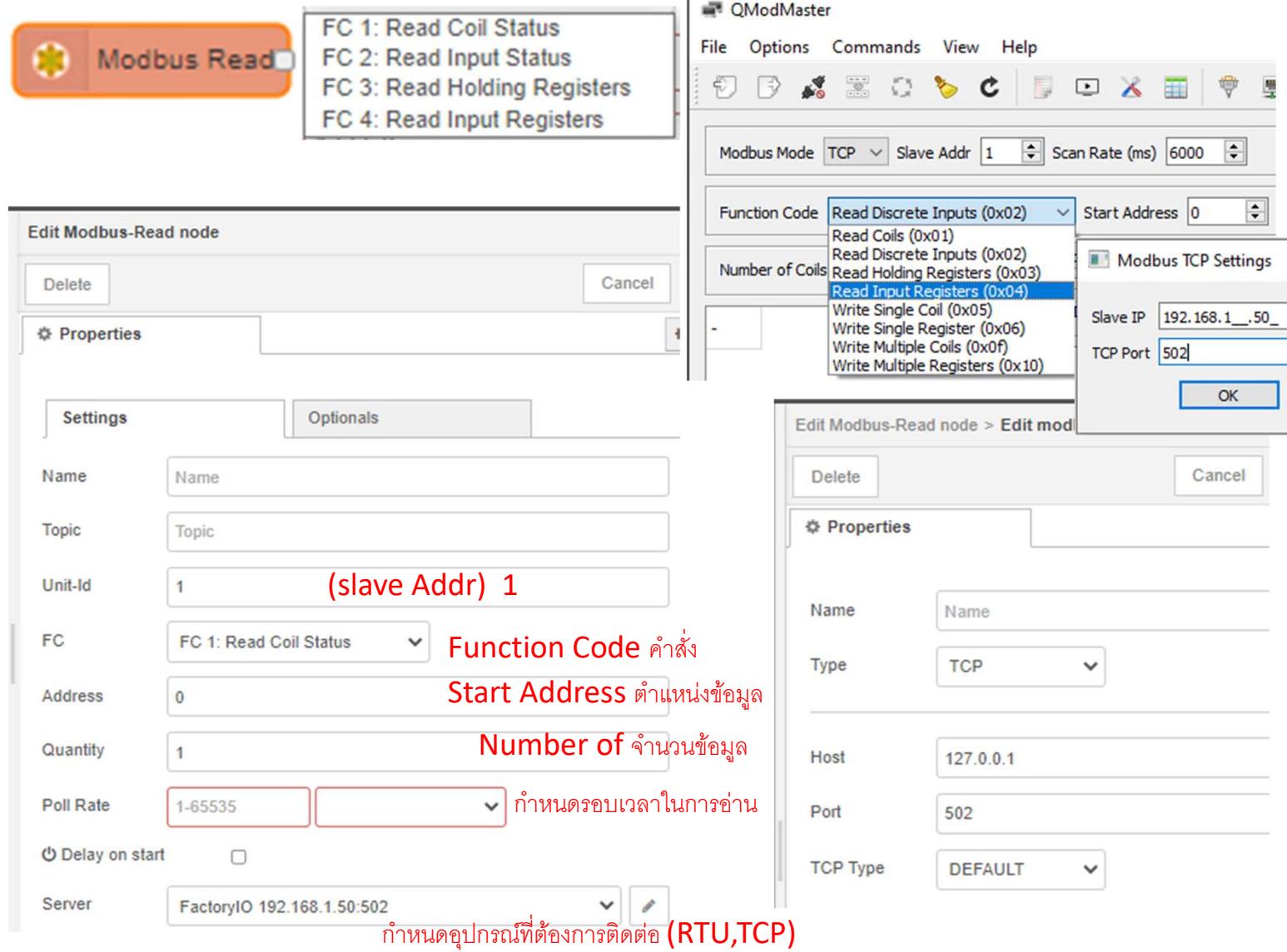
Modbus Memo

MODBUS Eth. TCP/IP PLC - Simulator (port: 502)

Connected (1/10) : (received/sent) (7681/7681) Serv. write de Rx: Tx:

Address: C H D I/O Coil Outputs (000000) Fmt: decimal +/-

Address	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+1
000001-000016	1	0	0	0	0	0	0	0	0	0	0
000017-000032	0	0	0	0	0	0	0	0	0	0	0
000033-000048	0	0	0	0	0	0	0	0	0	0	0
000049-000064	0	0	0	0	0	0	0	0	0	0	0
000065-000080	0	0	0	0	0	0	0	0	0	0	0
000081-000096	0	0	0	0	0	0	0	0	0	0	0
000097-000112	0	0	0	0	0	0	0	0	0	0	0
000113-000128	0	0	0	0	0	0	0	0	0	0	0
000129-000144	0	0	0	0	0	0	0	0	0	0	0
000145-000160	0	0	0	0	0	0	0	0	0	0	0
000161-000176	0	0	0	0	0	0	0	0	0	0	0
000177-000192	0	0	0	0	0	0	0	0	0	0	0
000193-000208	0	0	0	0	0	0	0	0	0	0	0
000209-000224	0	0	0	0	0	0	0	0	0	0	0
000225-000240	0	0	0	0	0	0	0	0	0	0	0
000241-000256	0	0	0	0	0	0	0	0	0	0	0
000257-000272	0	0	0	0	0	0	0	0	0	0	0
000273-000288	0	0	0	0	0	0	0	0	0	0	0
000289-000304	0	0	0	0	0	0	0	0	0	0	0
000305-000320	0	0	0	0	0	0	0	0	0	0	0
000321-000336	0	0	0	0	0	0	0	0	0	0	0
000337-000352	0	0	0	0	0	0	0	0	0	0	0
000353-000368	0	0	0	0	0	0	0	0	0	0	0
000369-000384	0	0	0	0	0	0	0	0	0	0	0
000385-000400	0	0	0	0	0	0	0	0	0	0	0
000401-000416	0	0	0	0	0	0	0	0	0	0	0
000417-000432	0	0	0	0	0	0	0	0	0	0	0
000433-000448	0	0	0	0	0	0	0	0	0	0	0
000449-000464	0	0	0	0	0	0	0	0	0	0	0
000465-000480	0	0	0	0	0	0	0	0	0	0	0
000481-000496	0	0	0	0	0	0	0	0	0	0	0
000497-000512	0	0	0	0	0	0	0	0	0	0	0
000513-000528	0	0	0	0	0	0	0	0	0	0	0
000529-000544	0	0	0	0	0	0	0	0	0	0	0
000545-000560	0	0	0	0	0	0	0	0	0	0	0
000561-000576	0	0	0	0	0	0	0	0	0	0	0
000577-000592	0	0	0	0	0	0	0	0	0	0	0
000593-000608	0	0	0	0	0	0	0	0	0	0	0
000609-000624	0	0	0	0	0	0	0	0	0	0	0
000625-000640	0	0	0	0	0	0	0	0	0	0	0
000641-000656	0	0	0	0	0	0	0	0	0	0	0
000657-000672	0	0	0	0	0	0	0	0	0	0	0
000673-000688	0	0	0	0	0	0	0	0	0	0	0
000689-000704	0	0	0	0	0	0	0	0	0	0	0
000705-000720	0	0	0	0	0	0	0	0	0	0	0
000721-000736	0	0	0	0	0	0	0	0	0	0	0
000737-000752	0	0	0	0	0	0	0	0	0	0	0
000753-000768	0	0	0	0	0	0	0	0	0	0	0
000769-000784	0	0	0	0	0	0	0	0	0	0	0
000785-000800	0	0	0	0	0	0	0	0	0	0	0
000801-000816	0	0	0	0	0	0	0	0	0	0	0
000817-000832	0	0	0	0	0	0	0	0	0	0	0
000833-000848	0	0	0	0	0	0	0	0	0	0	0
000849-000864	0	0	0	0	0	0	0	0	0	0	0
000865-000880	0	0	0	0	0	0	0	0	0	0	0
000881-000896	0	0	0	0	0	0	0	0	0	0	0
000897-000912	0	0	0	0	0	0	0	0	0	0	0
000913-000928	0	0	0	0	0	0	0	0	0	0	0
000929-000944	0	0	0	0	0	0	0	0	0	0	0
000945-000960	0	0	0	0	0	0	0	0	0	0	0
000961-000976	0	0	0	0	0	0	0	0	0	0	0
000977-000992	0	0	0	0	0	0	0	0	0	0	0
000993-001008	0	0	0	0	0	0	0	0	0	0	0
001009-001024	0	0	0	0	0	0	0	0	0	0	0
001025-001040	0	0	0	0	0	0	0	0	0	0	0
001041-001056	0	0	0	0	0	0	0	0	0	0	0
001057-001072	0	0	0	0	0	0	0	0	0	0	0
001073-001088	0	0	0	0	0	0	0	0	0	0	0
001089-001104	0	0	0	0	0	0	0	0	0	0	0
001105-001120	0	0	0	0	0	0	0	0	0	0	0
001121-001136	0	0	0	0	0	0	0	0	0	0	0
001137-001152	0	0	0	0	0	0	0	0	0	0	0
001153-001168	0	0	0	0	0	0	0	0	0	0	0
001169-001184	0	0	0	0	0	0	0	0	0	0	0
001185-001196	0	0	0	0	0	0	0	0	0	0	0
001197-001208	0	0	0	0	0	0	0	0	0	0	0
001209-001216	0	0	0	0	0	0	0	0	0	0	0
001217-001224	0	0	0	0	0	0	0	0	0	0	0
001225-001232	0	0	0	0	0	0	0	0	0	0	0
001233-001240	0	0	0	0	0	0	0	0	0	0	0
001241-001248	0	0	0	0	0	0	0	0	0	0	0
001249-001256	0	0	0	0	0	0	0	0	0	0	0
001257-001264	0	0	0	0	0	0	0	0	0	0	0
001265-001272	0	0	0	0	0	0	0	0	0	0	0
001273-001280	0	0	0	0	0	0	0	0	0	0	0
001281-001288	0	0	0	0	0	0	0	0	0	0	0
001289-001296	0	0	0	0	0	0	0	0	0	0	0
001297-001304	0	0	0	0	0	0	0	0	0	0	0
001305-001312	0	0	0	0	0	0	0	0	0	0	0
001313-001320	0	0	0	0	0	0	0	0	0	0	0
001321-001328	0	0	0	0	0	0	0	0	0	0	0
001329-001336	0	0	0	0	0	0	0	0	0	0	0
001337-001344	0	0	0	0	0	0	0	0	0	0	0
001345-001352	0	0	0	0	0	0	0	0	0	0	0
001353-001360	0	0	0	0	0	0	0	0	0	0	0
001361-001368	0	0	0	0	0	0	0	0	0	0	0
001369-001376	0	0	0	0	0	0	0	0	0	0	0
001377-001384	0	0	0	0	0	0	0	0	0	0	0
001385-001392	0	0	0	0	0	0	0	0	0	0	0
001393-001396	0	0	0	0	0	0	0	0	0	0	0
001397-001400	0	0	0	0	0	0	0	0	0	0	0
001401-001404	0	0	0	0	0	0	0	0	0	0	0
001405-001408	0	0	0	0	0	0	0	0	0	0	0
001409-001412	0	0	0	0	0	0	0	0	0	0	0
001413-001416	0	0	0	0	0	0	0	0	0	0	0
001417-001420	0	0	0	0	0	0	0	0	0	0	0
001421-001424	0	0	0	0	0	0	0	0	0	0	0
001425-001428	0	0	0	0	0	0	0	0	0	0	0
001429-001432	0	0	0	0	0	0	0	0	0	0	0
001433-001436	0	0	0	0	0	0	0	0	0	0	0
001437-001440	0	0	0	0	0	0	0	0	0	0	0
001441-001444	0	0	0	0	0	0	0	0	0	0	0
001445-001448	0	0	0	0	0	0	0	0	0	0	0
001449-001452	0	0	0	0	0	0	0	0	0	0	0
001453-001456	0	0	0	0	0	0	0	0	0	0	0
001457-001460	0	0	0	0	0	0	0	0	0	0	0
001461-001464	0	0	0	0	0	0	0	0	0	0	0
001465-001468	0	0	0	0	0	0	0	0	0	0	0
001469-001472	0	0	0	0	0	0	0	0	0	0	0
001473-001476	0	0	0	0	0	0	0	0	0	0	0
001477-001480	0	0	0	0	0	0	0	0	0	0	0
001481-001484	0	0	0	0	0	0	0	0	0	0	0
001485-001488	0	0	0	0</							



The screenshot shows the Node-Red interface with a central canvas and a sidebar containing nodes.

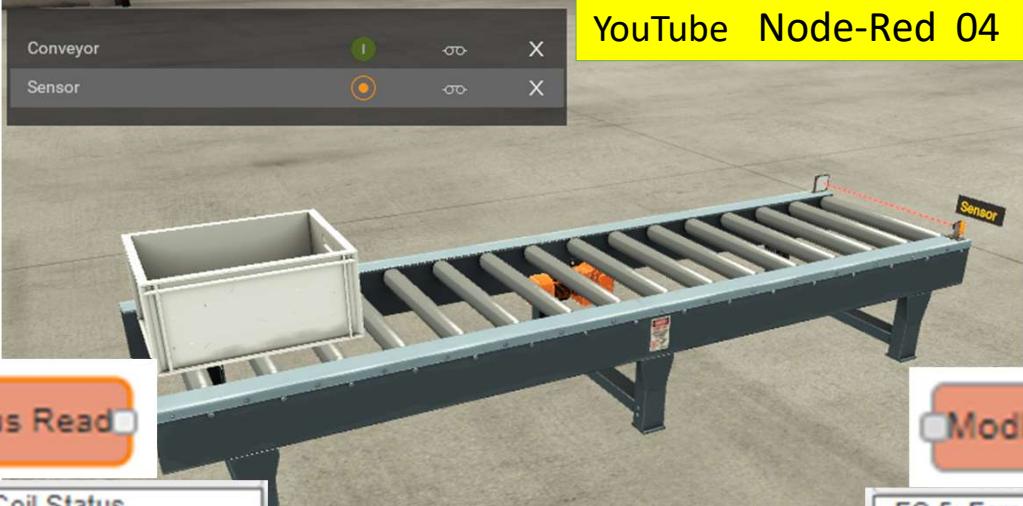
Modbus Write Node Configuration:

- Name:** Name
- Unit-Id:** 1
- FC:** A dropdown menu showing:
 - FC 5: Force Single Coil
 - FC 6: Preset Single Register
 - FC 15: Force Multiple Coils
 - FC 16: Preset Multiple Registers
- Address:** (empty input field)
- Quantity:** (empty input field)
- Server:** modbus-tcp@127.0.0.1:502

Modbus Read Node:

- FC:** A dropdown menu showing:
 - FC 1: Read Coil Status
 - FC 2: Read Input Status
 - FC 3: Read Holding Registers
 - FC 4: Read Input Registers

YouTube Node-Red 04 Modbus FactoryIO



The image shows a 3D model of a conveyor belt system. A sensor is mounted on the side of the conveyor, connected by a red dashed line to a yellow 'Sensor' node in a Node-Red interface at the top.

Modbus Read

- FC 1: Read Coil Status
- FC 2: Read Input Status
- FC 3: Read Holding Registers
- FC 4: Read Input Registers

คำสั่ง FC 1 (Re

Modbus Write

- FC 5: Force Single Coil
- FC 6: Preset Single Register
- FC 15: Force Multiple Coils
- FC 16: Preset Multiple Registers

Factory IO

ค่าบคุณจาก Server (Master) ภายนอก (Node-Red , QModMaster, PLC, HMI)

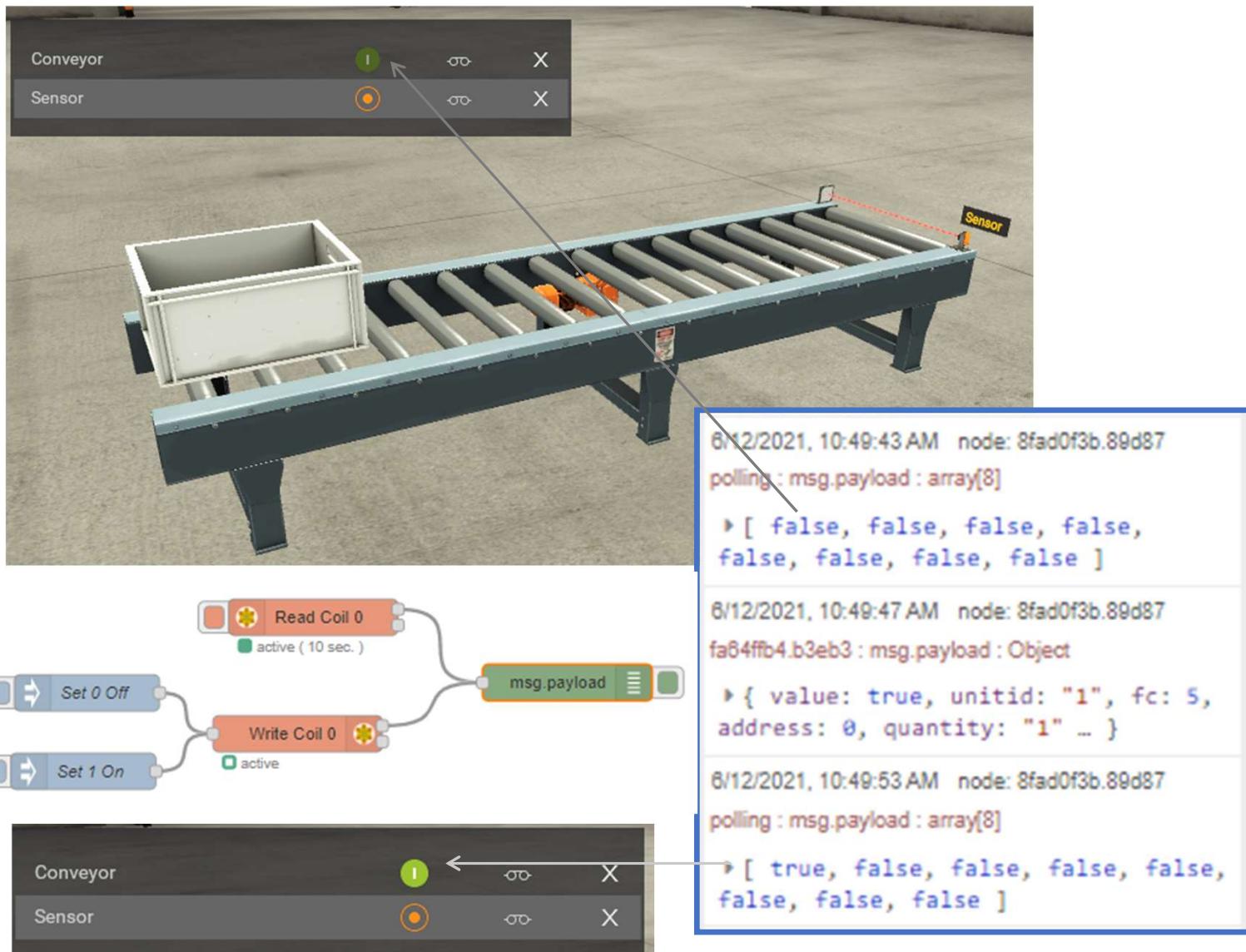
← DRIVER Modbus TCP/IP Server START CONFIGURATION CLEAR

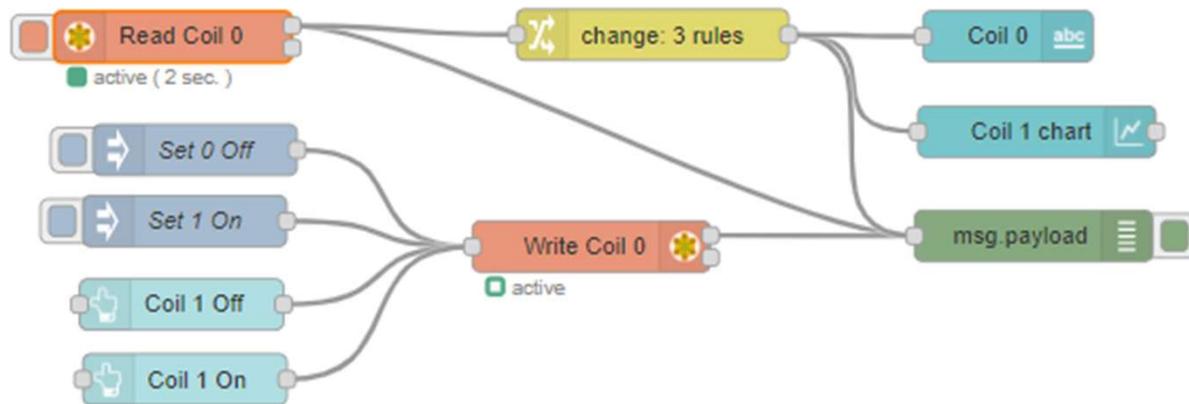
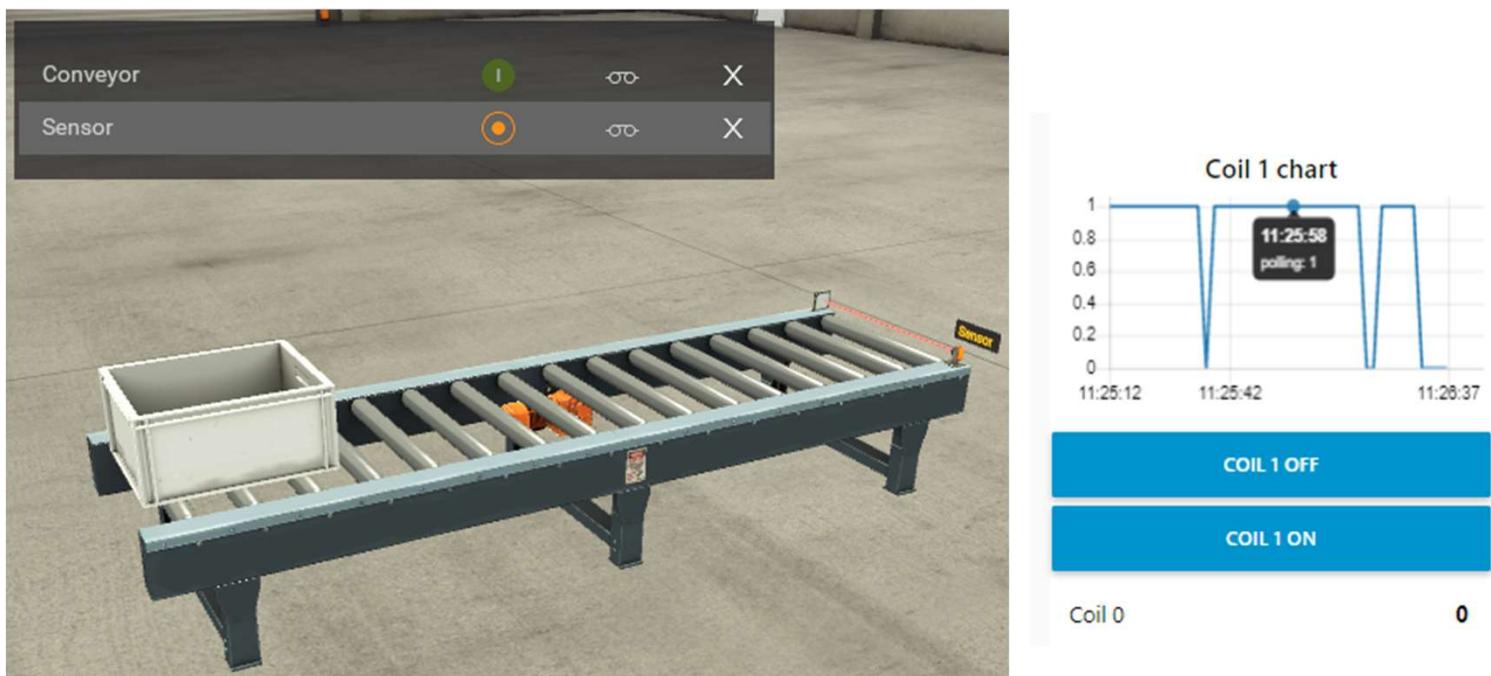
SENSORS

	Input	
FACTORY I/O (Paused)	Sensor	(192.168.1.50:502) Slave ID:1
FACTORY I/O (Reset)		Input 0
FACTORY I/O (Running)		Input 1
FACTORY I/O (Time Scale)	I/O (Running)	
	Sensor	

ACTUATORS

	Output -Coil	
Conveyor	Coil 0	Conveyor
FACTORY I/O (Camera Position)	FC 1 (Read)	
FACTORY I/O (Pause)		FC 5 (Write)
FACTORY I/O (Reset)		
FACTORY I/O (Run)		



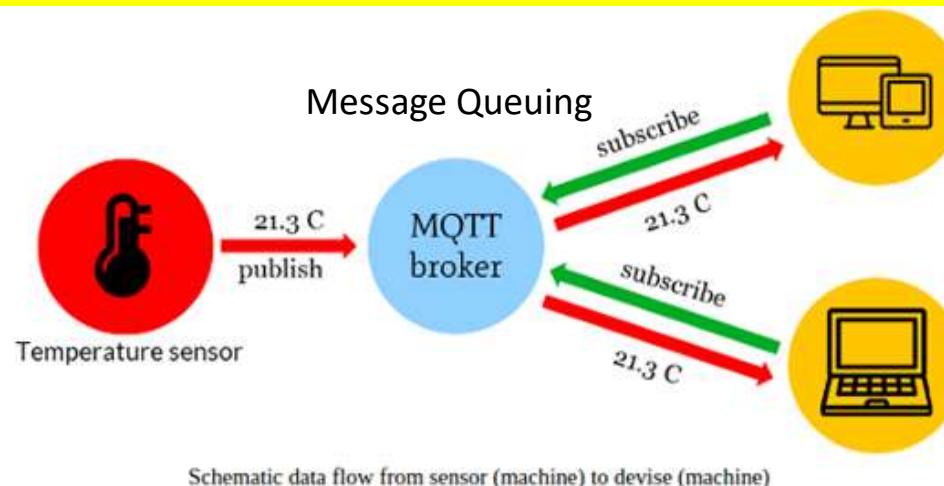


MQTT

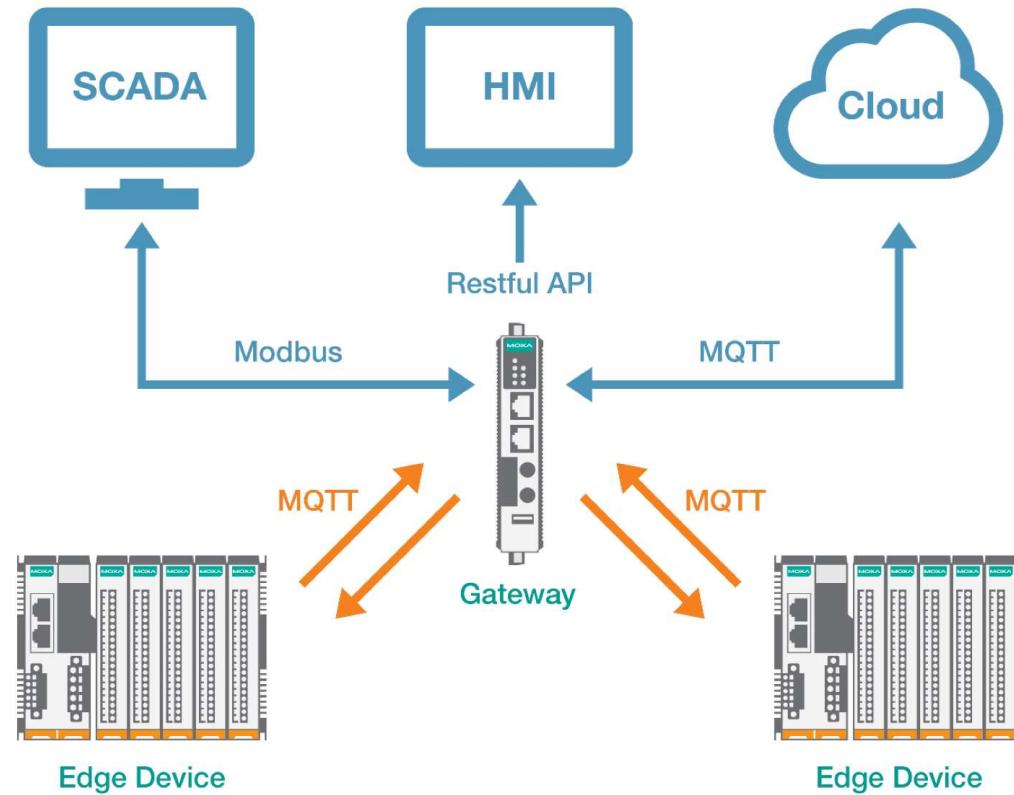
- Message Queuing Telemetry Transport (MQTT)
- เป็น Protocol ที่ออกแบบมาเพื่อการเชื่อมต่อแบบ M2M (machine-to-machine) คือ อุปกรณ์ติดต่อหรือสื่อสารกับอุปกรณ์โดยเป็นส่วนหนึ่งของเทคโนโลยี IoT (Internet of Things) ซึ่งเป็นเทคโนโลยีที่อินเทอร์เน็ตเชื่อมต่อ กับอุปกรณ์ต่าง ๆ เช่น โทรศัพท์มือถือ รถยนต์ โทรทัศน์ ตู้เย็น เข้า กับอินเทอร์เน็ตทำให้สามารถเชื่อมโยงสื่อสารกับอุปกรณ์ต่าง ๆ ได้ โดยผ่านเครือข่ายอินเทอร์เน็ต ซึ่งจะทำ ให้มนุษย์สามารถควบคุมอุปกรณ์ต่าง ๆ จากที่อื่นได้ เช่นการสั่งปิดเปิดไฟในบ้านจากที่อื่น ๆ

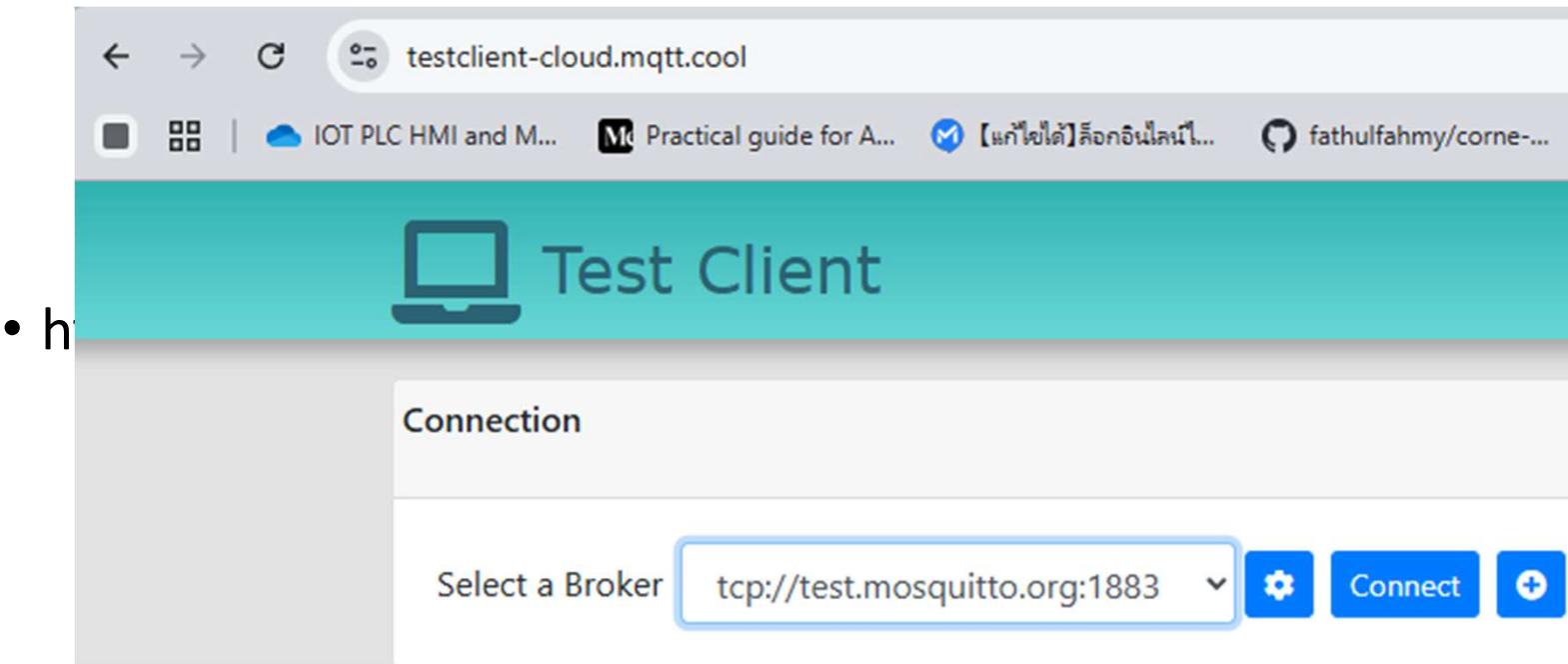
MQTT Protocol

- การส่งข้อมูล (publish) ผู้ส่ง (อุปกรณ์ IOT, Software)
- ผู้บริการรับส่งข้อมูล (MQTT broker) ตัวกลาง Server , Cloud
- การขอรับข้อมูล (subscribe) ผู้รับ (อุปกรณ์ IOT, Software)



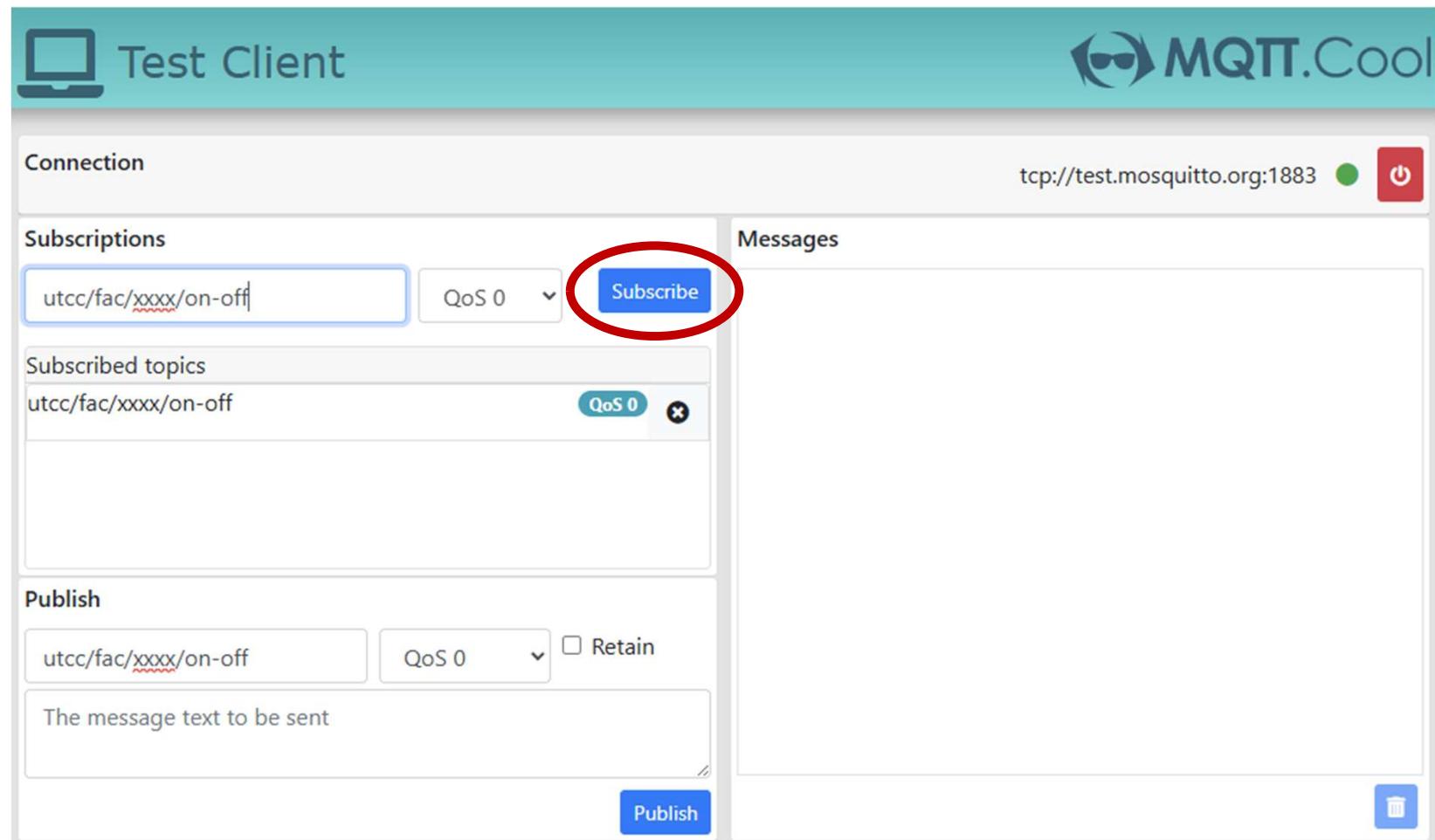
- สามารถรับ และส่ง ได้ใน อุปกรณ์เดียวกัน
- เป็นการสื่อสารสองทาง





<https://testclient-cloud.mqtt.cool/>

tcp://test.mosquitto.org



utcc/fac/xxxx/on-off

xxxx รหัส 4 ตัวสุดห้ามซ้ำกัน เช่น เลขท้ายบัตรประชาชน