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cMT-G01 with OPC UA Server and Modbus Gateway

Introduction:

Industrial IT Technology has quickly advanced with the integration of plant-floor data, supervisory control demand, ERP, and even new cloud-based applications. Integrating legacy and different brands of factory machines has never been an easy task since the controllers in a factory use different communication protocols. To facilitate integration of numerous proprietary protocols, Weintek has developed the first Gateway protocol converter: cMT-G01. The cMT-G01 gateway provides the necessary IIoT connectivity to retrofit existing machines into a single protocol.

This document discusses how to utilize the cMT-G01 to build an OPC UA server, which is a standard protocol for IIoT systems, and allows OPC UA client to access data.

Benefits of cMT-G01

- Supports OPC UA for Integration of SCADA or ERP systems
- Supports MQTT and has built-in broker for publish-subscribe messaging protocol
- Connectivity to AWS, Azure, and IBM IoT platforms via MQTT
- Supports MQTT Sparkplug B specification
- Supports Modbus gateway
- Supports Protocol conversion
- Additional Data logger and event detector
- SQL synchronization capability to MySQL and MS SQL database server for data log and event log
- EasyAccess2.0(Optional)– Remote access factory equipment

Equipment & software:

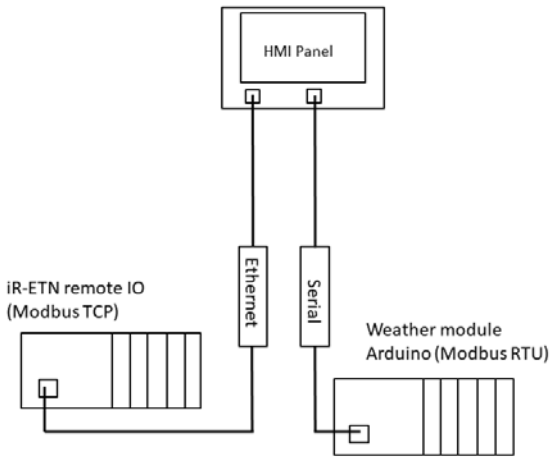
1. HMI
2. Arduino board
3. iR-ETN remote IO
4. cMT-G01

Note: In this demonstration, Easybuilder pro version 6.01.02 is used.

Wiring diagram:

Before configuration-

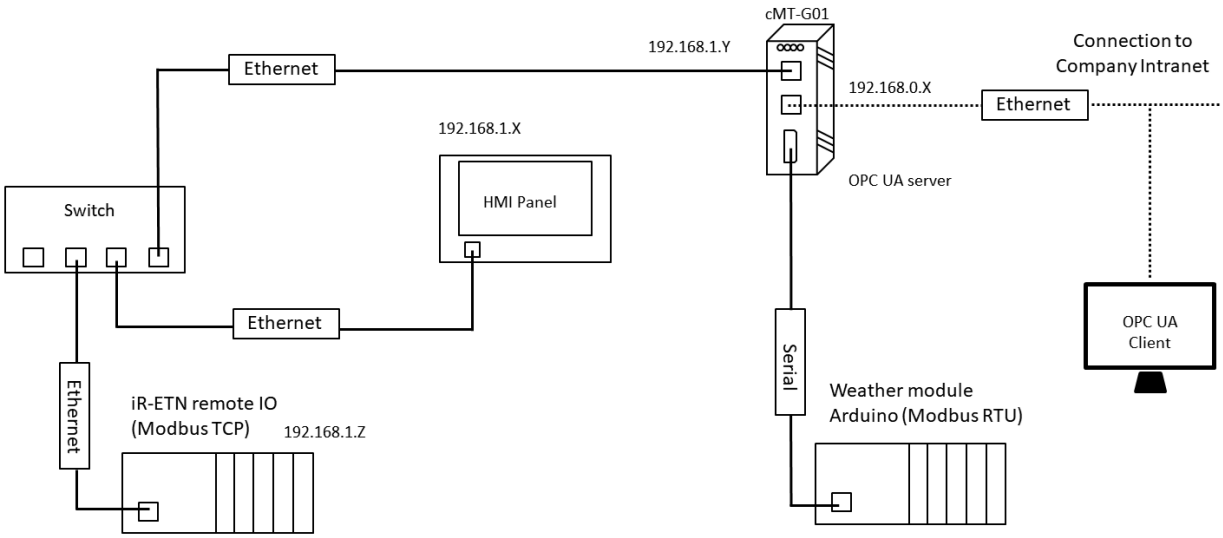
The HMI communicates with the Arduino board via Modbus RTU protocol.
The HMI communicates with the iR-ETN remote IO via Modbus TCP protocol.



After configuration-

In this way, the HMI program is changed because the HMI uses Modbus TCP Master protocol to query the cMT-G01. The cMT-G01 acts as a ModbusTCP-to-ModbusRTU bridge, which is a Modbus gateway. It saves the cost of purchasing an extra communication module of the PLC.

cMT-G01 with OPC UA Server and Modbus Gateway



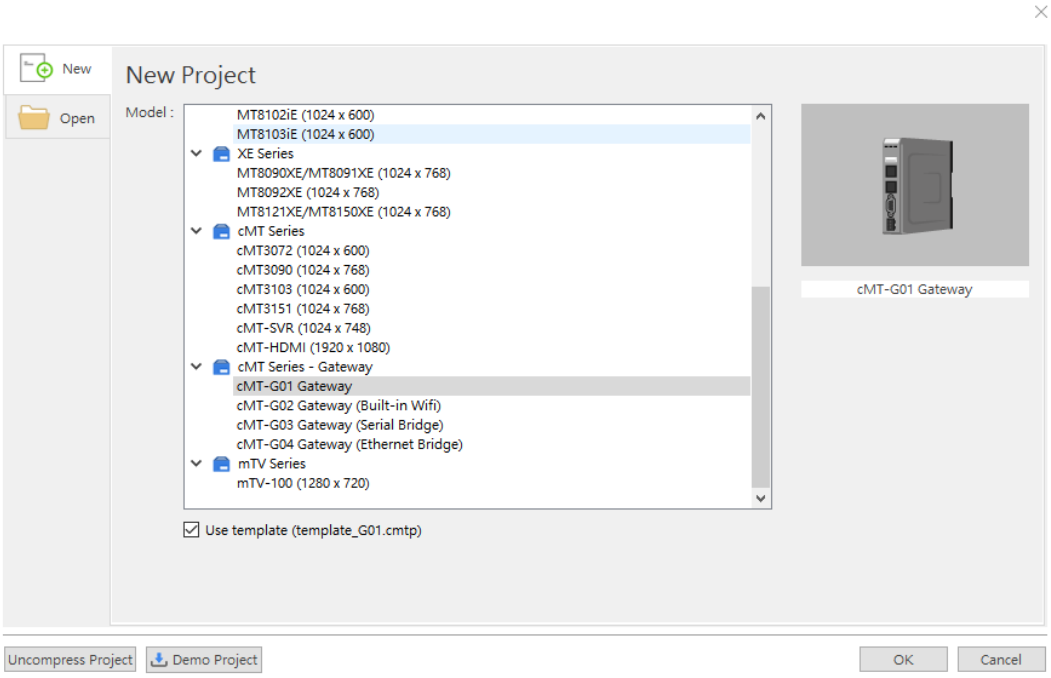
Hardware configuration:

I/O ports of cMT-G01 -

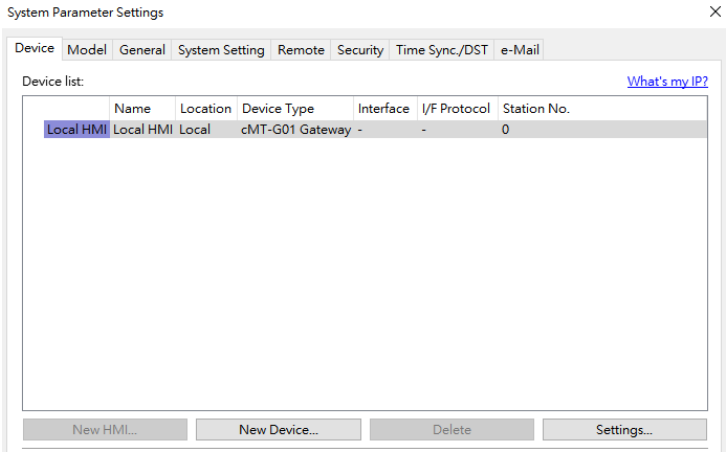
Port Name	Connecting to
LAN2	Machine network
LAN1	Company or factory network
COM	Serial-based controller

Software configuration:

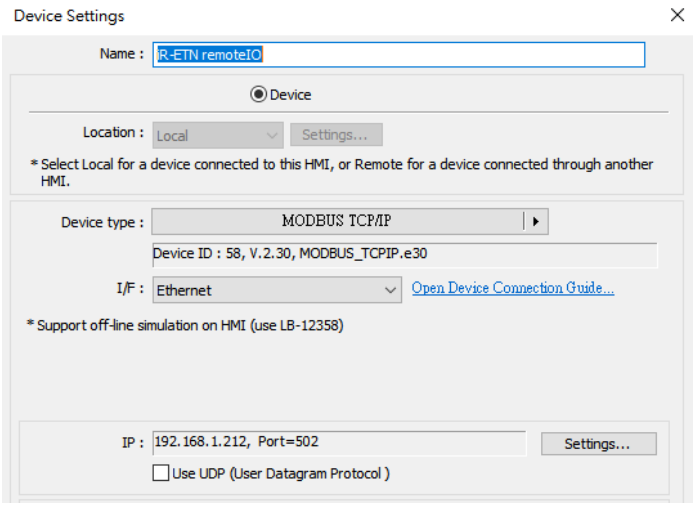
Launch Easybuilder Pro and select cMT-G01 Gateway.



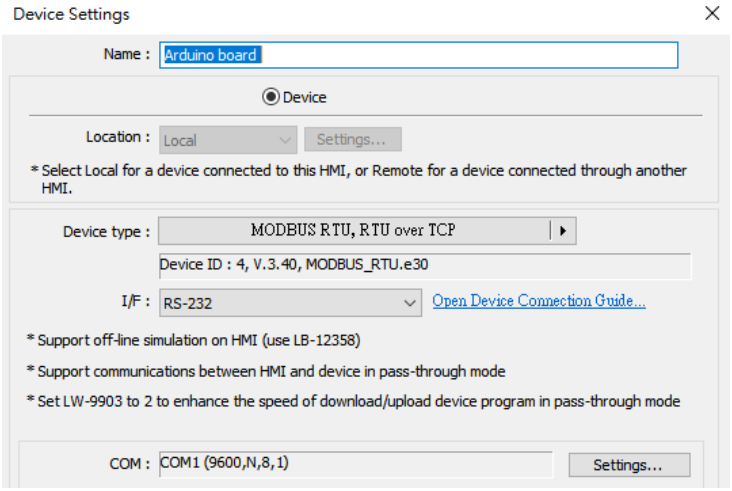
The popup window will be displayed as shown. Click [New Device] to select drivers of the controllers.



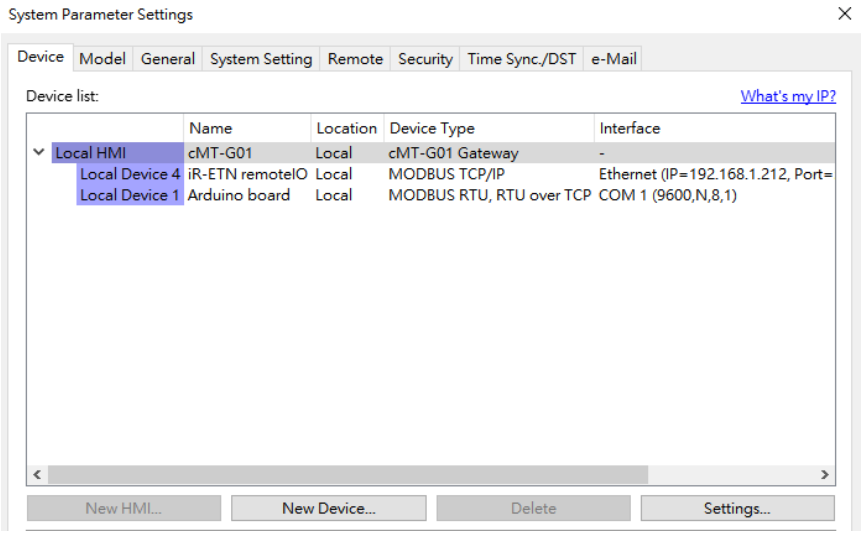
Add this driver “Modbus TCP/IP” into [Device list]. Enter the IP address of the iR-ETN.



Add this driver “Modbus RTU,RTU over TCP” into [Device list]. Enter the communication parameters of COM port.



[Device List] includes two drivers to communicate with the iR-ETN and the Arduino board. Double [Local HMI] to change the name of the cMT-G01.



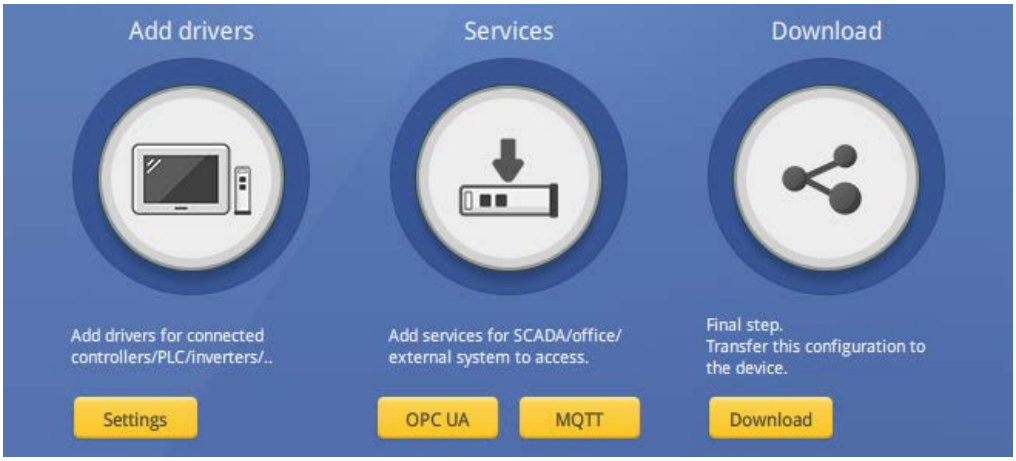
Click [OK] to close [System Parameter Settings].

You can see the three main steps on the main screen to complete this project.

Step 1. Add a driver into Device List in the project. (**This step is completed)**

Step 2. Enable OPC UA Server and designate PLC addresses.

Step 3. Download this project to cMT-G01.



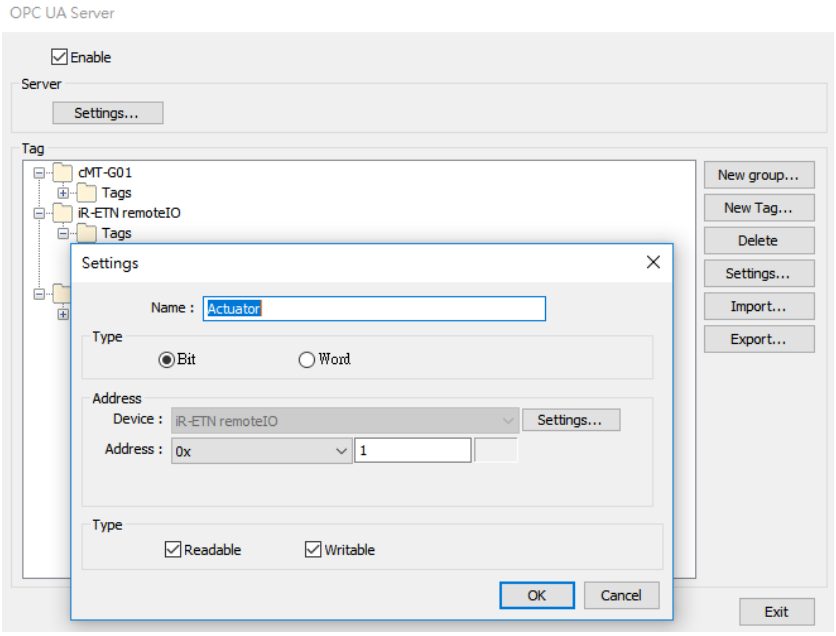
Step2. -

Click [OPC UA] button on the main screen or go to [IIoT/Energy] » [OPC UA Server] on the toolbar, and check [Enable] checkbox to enable OPC UA server.

Click [Tags] within [IR-ETN remoteIO](Controller name) and then click [New Tag] to add OPC UA tags.

For example, add a tag for the output of the iR-ETN.

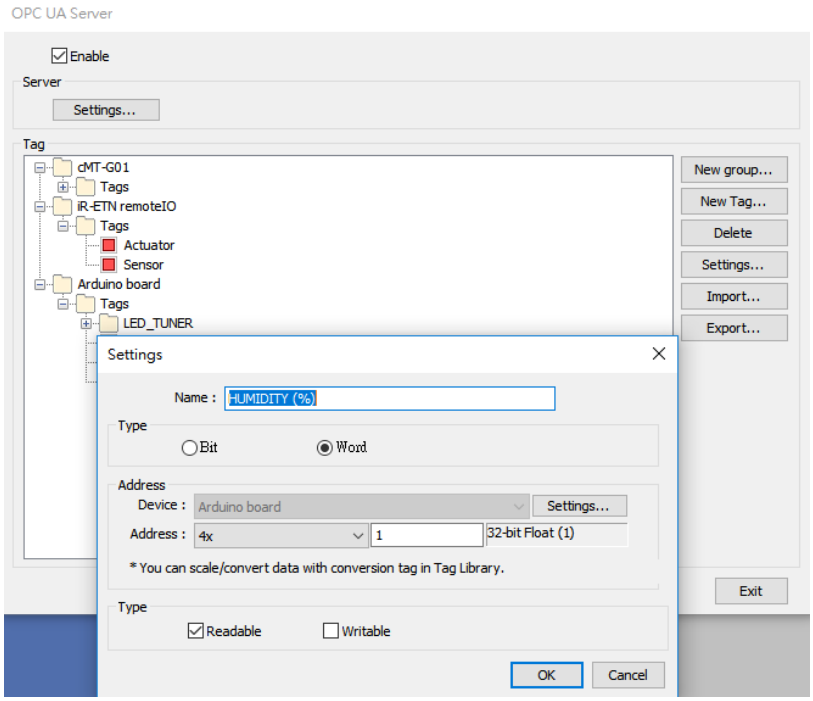
[Name]: Enter a tag name.
[Type]: Data type is **Bit**.
[Address]: Enter **Modbus function code + register number (Decimal).**
[Type]: data is readable and writable.
Click [OK] to exit.



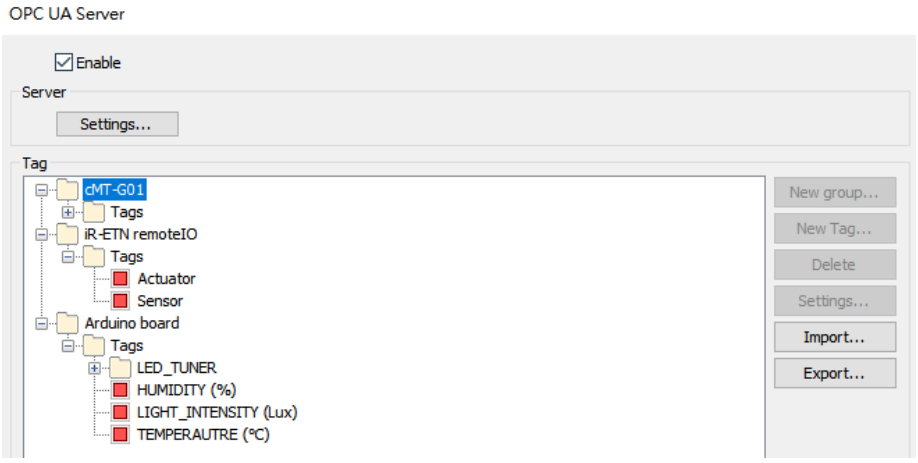
Click [Tags] within [Arduino board](Controller name) and then click [New Tag] to add OPC UA tags.

For example, add a tag for the analog input of the Arduino board.

[Name]: Enter a tag name.
[Type]: Data type is **Word**.
[Address]: Enter **Modbus function code + register number (Decimal).**
[Type]: data is readable.
Click [OK] to exit.



The window as shown includes all tags created in the OPC UA server.



Modbus gateway configuration -

Click [Settings] button on the main screen or go to [Home] » [System Parameters] on the toolbar, add this driver “Modbus Server” into [Device list]. Check the checkbox within [Modbus TCP/IP Gateway] and go to [Address Mapping Tables].

The window “Address Mapping table” will be displayed as shown below. Click [Add] to open table settings for register mapping.

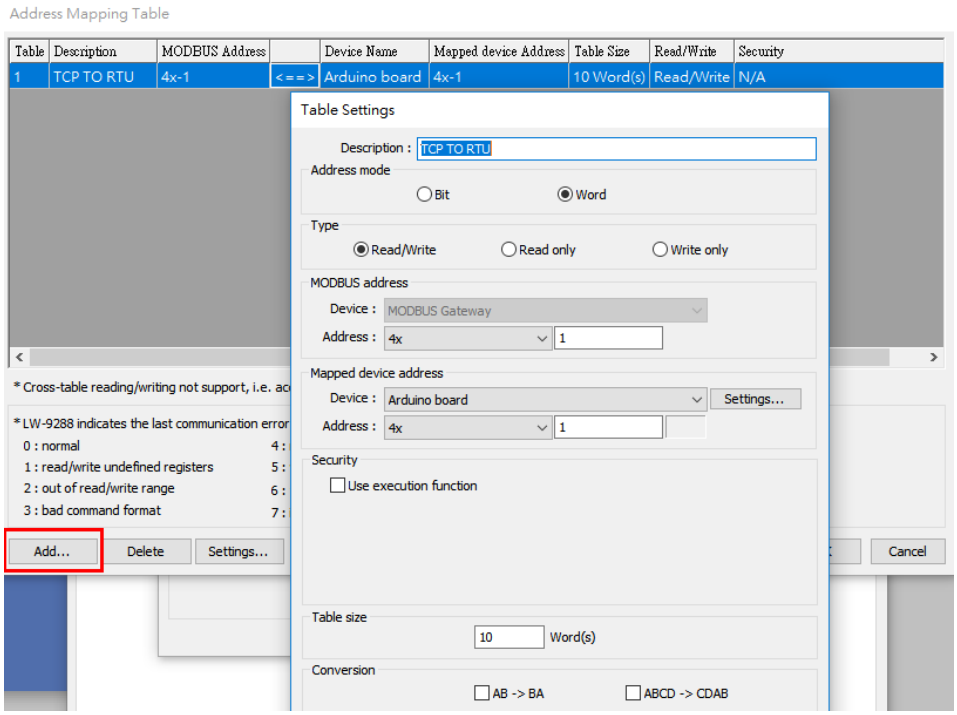
[Address mode]: Data type is **Word**.

[Type]: Select **Read/Write**.

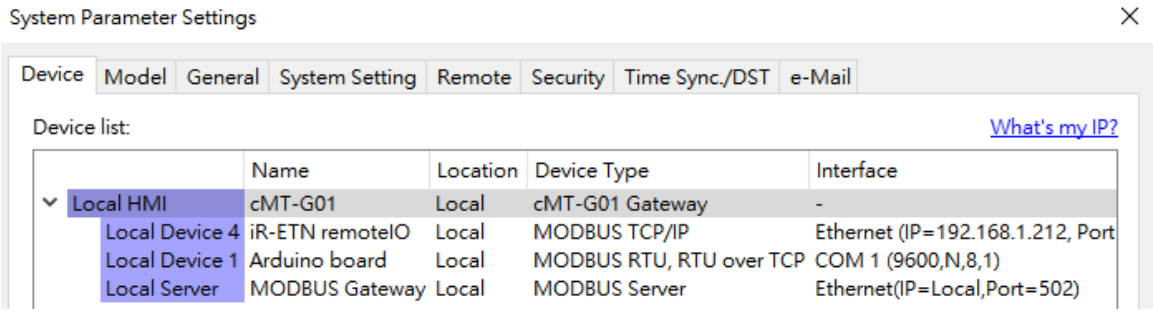
[Modbus address]: Enter **Modbus TCP function code + register number (Decimal).**

[Mapped device address]: Enter **Modbus RTU function code + register number (Decimal).**

[Table size]: Total memory size. (Unit: words)



The Modbus gateway is added to [Device list] as shown.



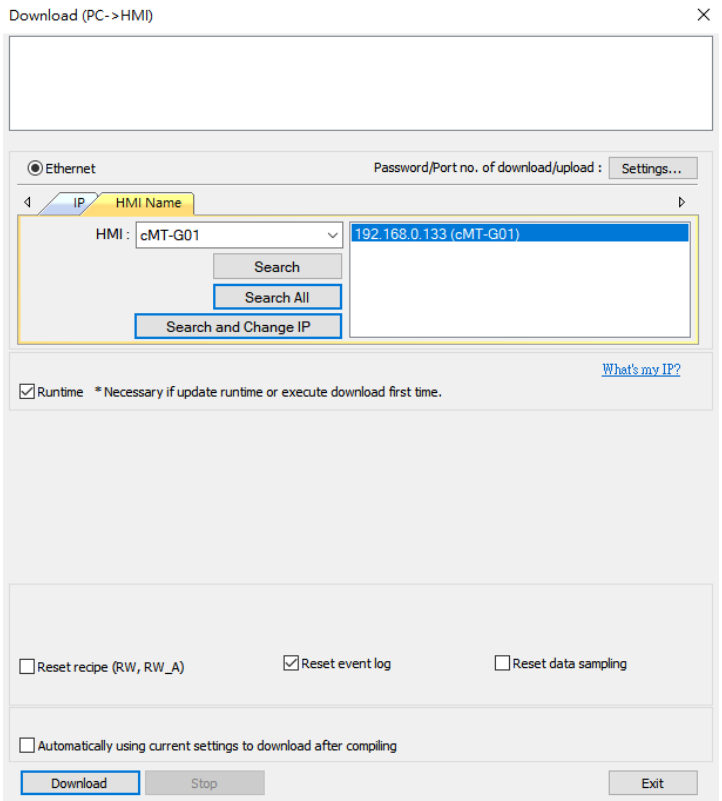
Change the HMI program to read and write Modbus TCP registers. The following Modbus function codes are supported.

Modbus Function Code	Definition
1	Read Coil Status
2	Read Input Status
3	Read Holding Registers
4	Read Input Registers
5	Force Single Coil
6	Preset Single Register
16	Preset Multiple Registers

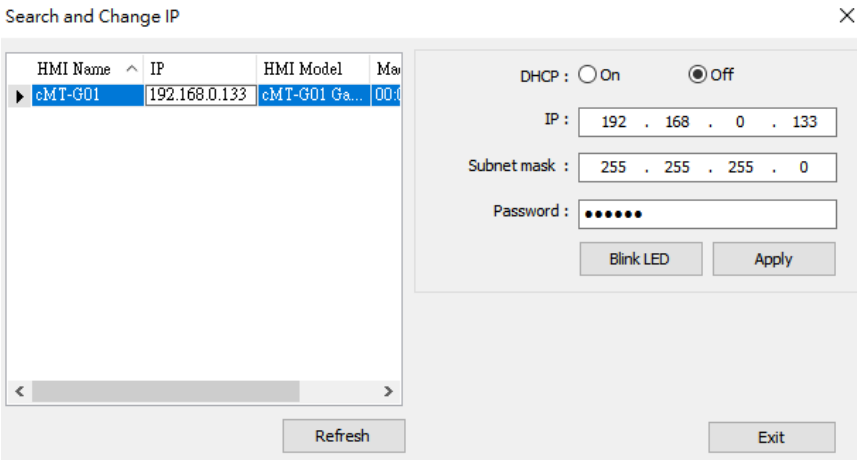
Step3. -

Connect the **LAN1** port of the cMT-G01 and the PC to a router with an Ethernet cable. Click [Download] button on the main screen or go to [Project] » [Download] on the toolbar.

Find the cMT-G01 and click [Download].



You can change the **LAN1** IP address of the cMT-G01 by going to [Search and Change IP]. Disable DHCP and then enter IP address as well as subnet mask according to the company/ factory network. Click on [Apply] to finish. The popup window will show “Successfully updated Ethernet settings.”

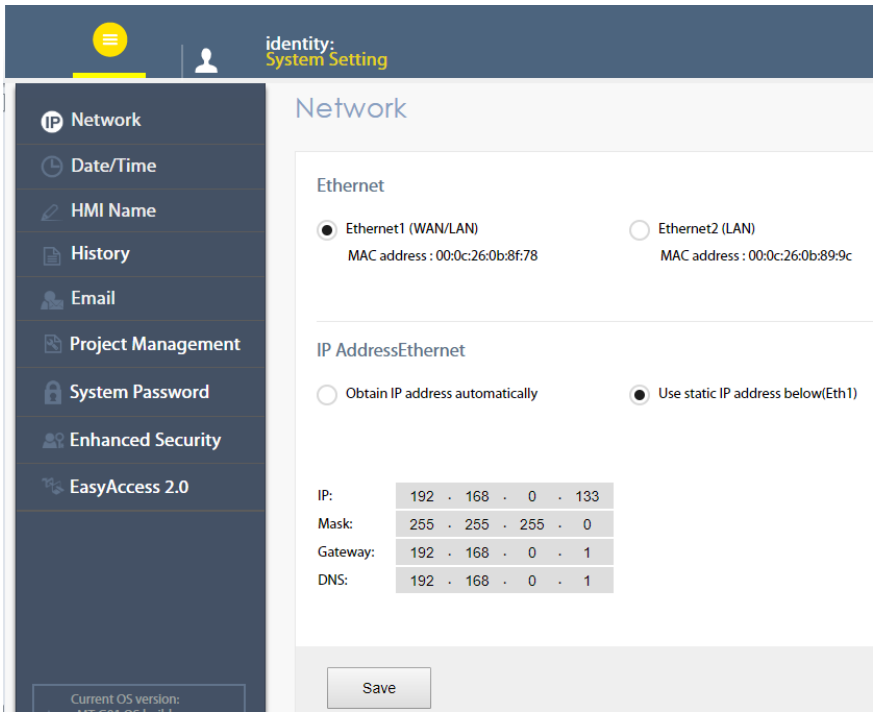


Change the IP address of the LAN2

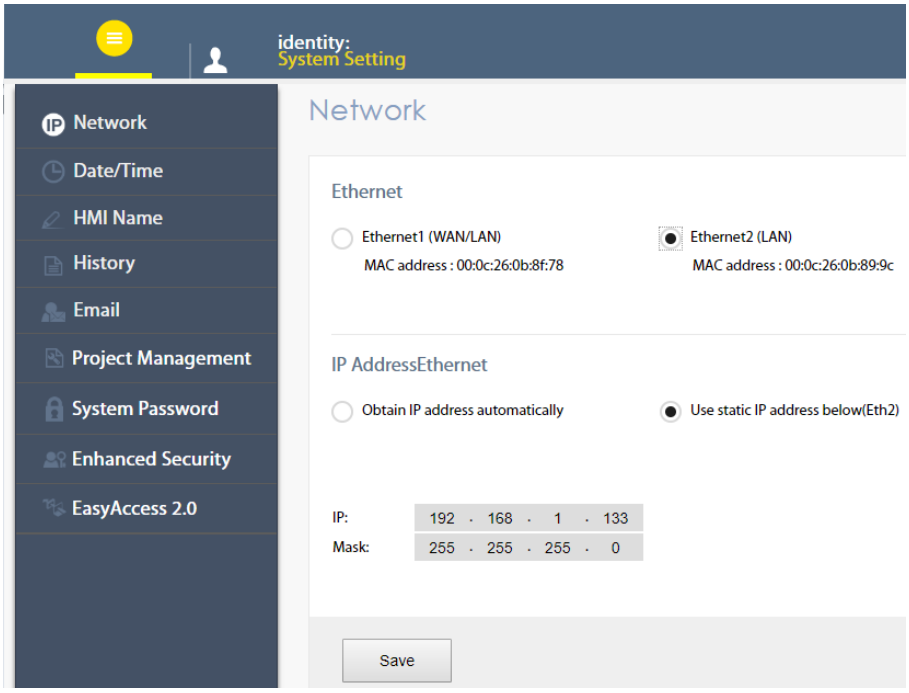
Connect the **LAN1** port of the cMT-G01 and the PC to a router with an Ethernet cable. Open a web browser (IE, Chrome, or Firefox) on a PC, and make sure the IP address of the PC has a same subnet IP. Enter the IP address of cMT-G01. For example, 192.168.0.133.

Select an identity and enter its password. The default password is 111111.

Go to [Network] tab. The IP address of the Ethernet1 is the IP address of **LAN1** port, and it is changed by the earlier step.

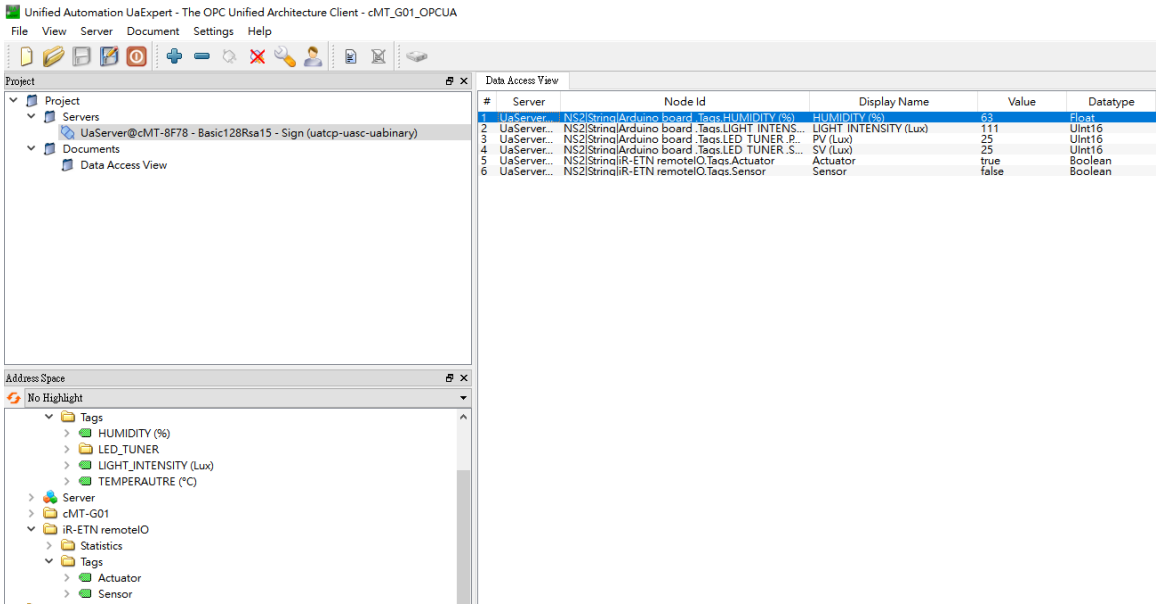


Click [Ethernet2] and then enter the IP address as well as mask for the communication of the machine network.

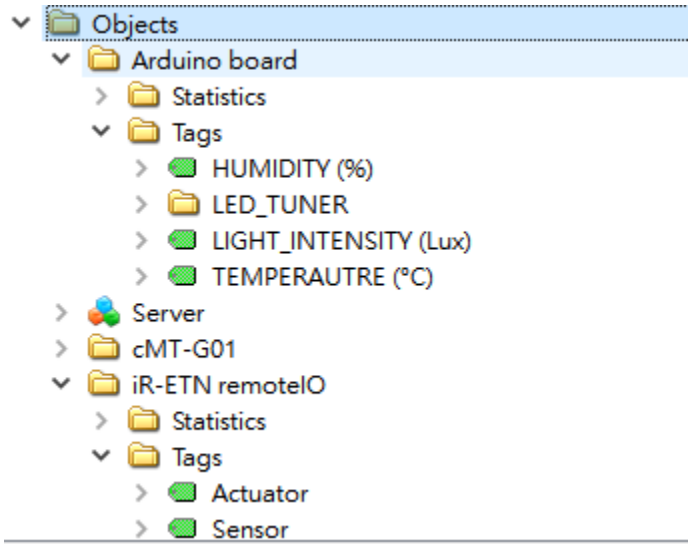


Testing:

Launch the OPC UA client software UAExpert on a PC to monitor OPC UA tags data.



You can drag and drop tags configured in the OPC UA server to [Data Access View].



The data will be displayed as shown.

#	Server	Node Id	Display Name	Value	Datatype
1	UaServer...	NS2|String|Arduino board .Tags.HUMIDITY (%)	HUMIDITY (%)	63	Float
2	UaServer...	NS2|String|Arduino board .Tags.LIGHT INTENS...	LIGHT INTENSITY (Lux)	111	UInt16
3	UaServer...	NS2|String|Arduino board .Tags.LED TUNER .P...	PV (Lux)	25	UInt16
4	UaServer...	NS2|String|Arduino board .Tags.LED TUNER .S...	SV (Lux)	25	UInt16
5	UaServer...	NS2|String|iR-ETN remoteIO.Tags.Actuator	Actuator	true	Boolean
6	UaServer...	NS2|String|iR-ETN remoteIO.Tags.Sensor	Sensor	false	Boolean

Reference Link:

Weintek Labs website: http://www.weintek.com

Founded in 1996, WEINTEK LABS is a global-leading HMI manufacturer and is dedicated to the development, design, and manufacturing of practical HMI solutions. WEINTEK LAB's mission is to provide quality, customizable HMI-solutions that meet the needs of all industrial automation requirements while maintaining customer satisfaction by providing "on-demand" customer service. WEINTEK LABS brought their innovative technology to the United States in 2016, WEINTEK USA, INC., to provide quality and expedient solutions to the North American industrial market.

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