

# WIZnet Magazine

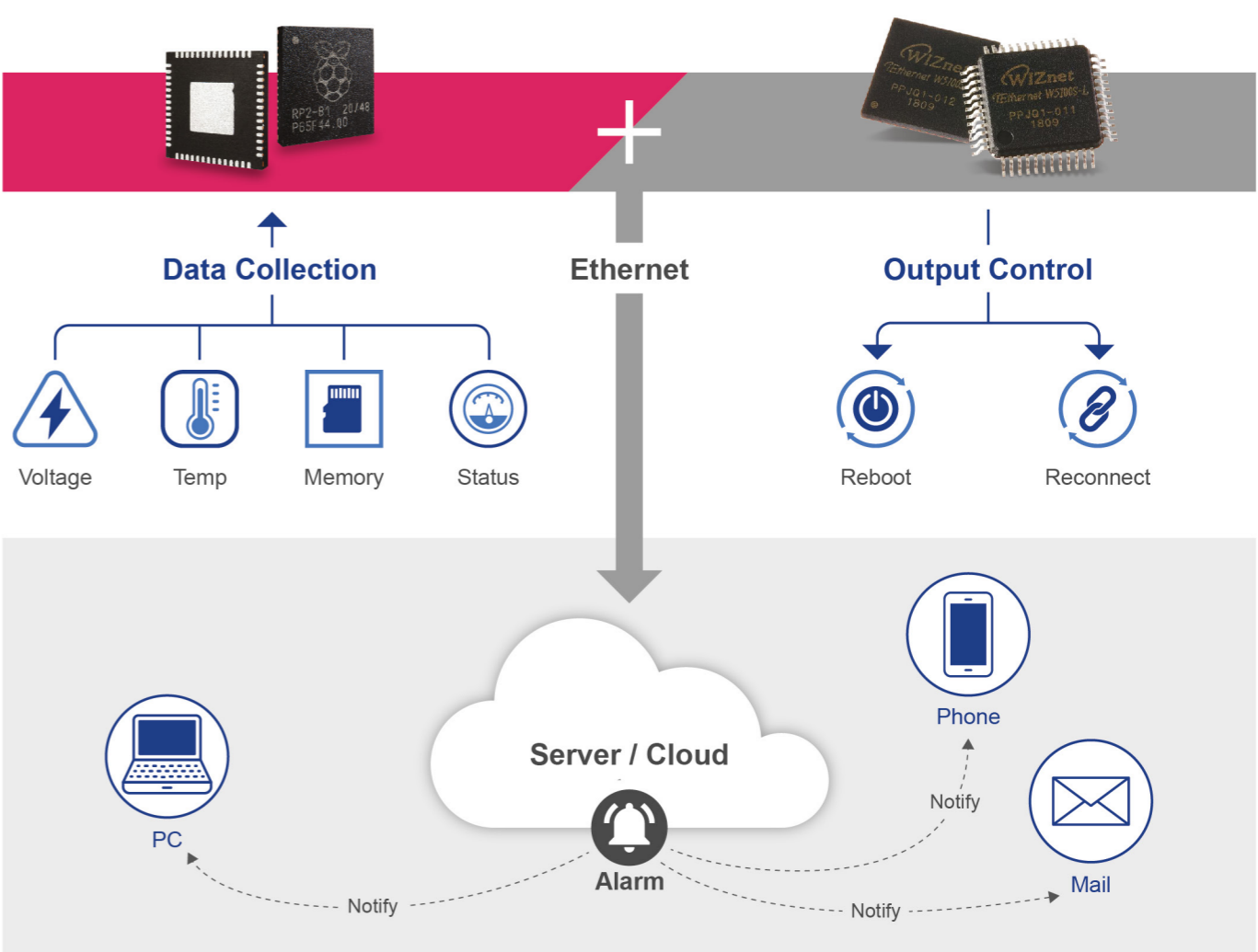
Special Edition 2023

## Top Ethernet **Pico** Projects

How to bring RP2040 to  
network with WIZnet



# IoT Remote Monitoring & Management



## Benefits of WIZnet's Remote Monitoring & Management

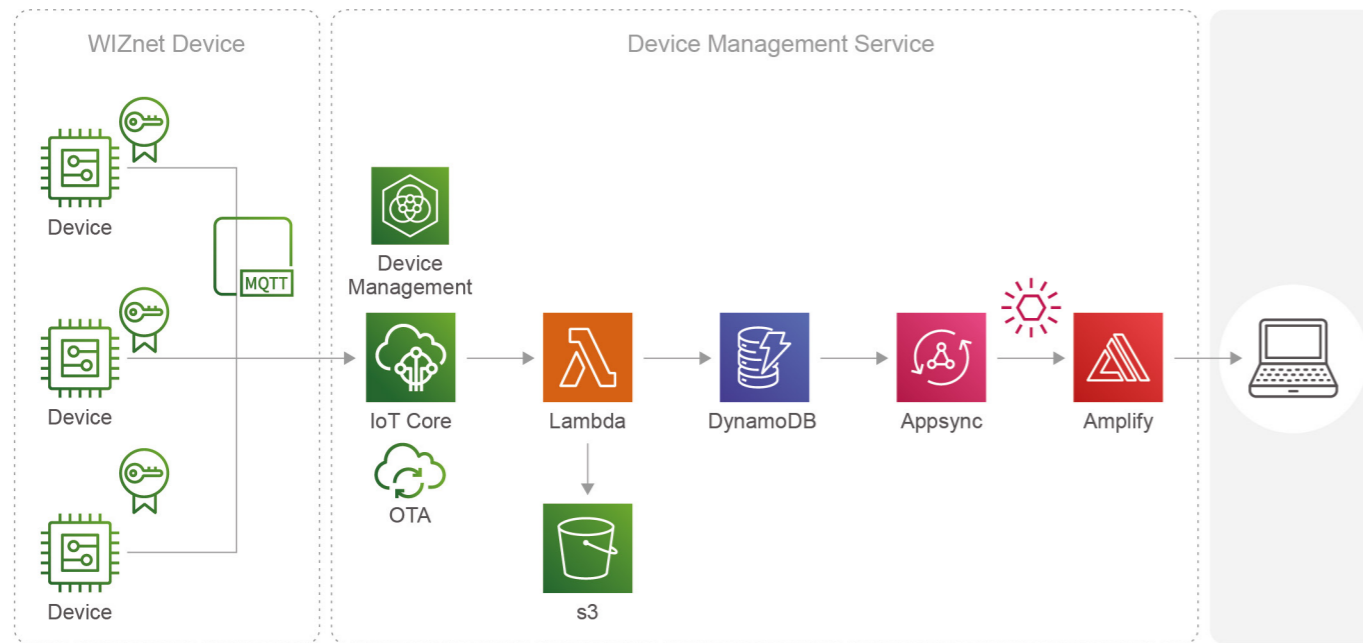
- Real time status update of Power, Temperature, Device status, etc
- Re-connect via Remote Power Reset
- Cost effective security \$1,500 USD/year in average

Our innovative service uses the powerful Raspberry Pi 4 (RPi4) to manage and monitor your devices, ensuring they are always running smoothly.

Reliability of equipment is the most important factor, especially on the highway where our company has installed and operates over 400 RPi4-based AI-Edge devices. That's why we developed a 2nd AI-Edge device based on the W5100S-EVB-Pico module, which can detect and respond to abnormal conditions in real-time.

Currently, 20 devices that combine RPi Pico + W5100S are being tested in the field and the results have been impressive. Once the pilot stage ends, we plan to expand the number of installed devices, making it available to a wider range of customers.

# IoT Remote MONITORING & MANAGEMENT



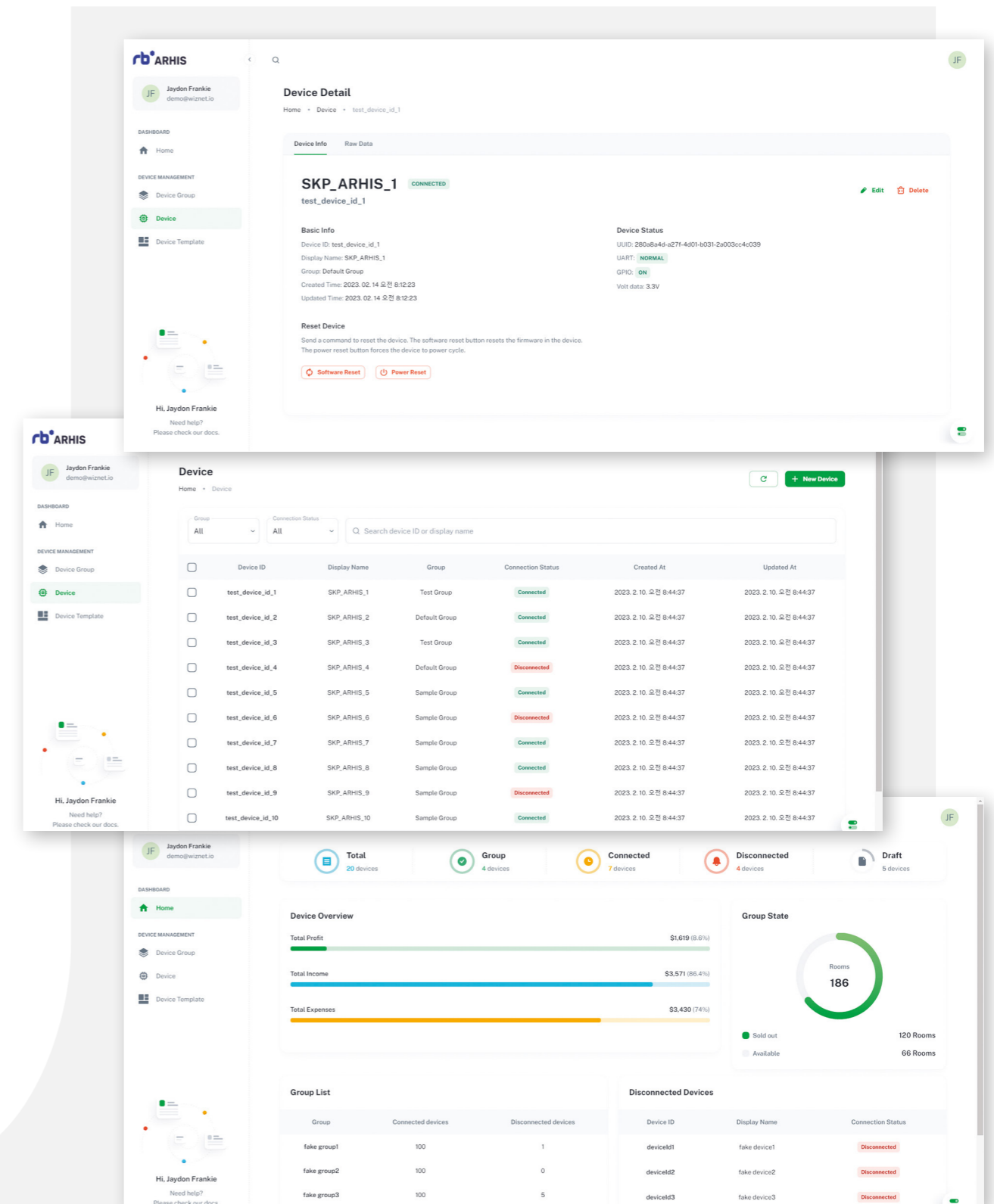
## Device Management Service Core Architecture

The figure above summarizes the architecture of the WIZnet Device Management service. Device-specific certificates allow secure and seamless connectivity. Web-based dashboard provides a summary of device's performance, real-time monitoring and collected data. Any issue can be addressed with ability to raise alarms and transmit restart command to the device. Experience peace of mind knowing you can detect and respond to device anomalies at a moment's notice. Unlock the full potential of your device with our state-of-the-art Device Management service!

## Device Management Service Web application

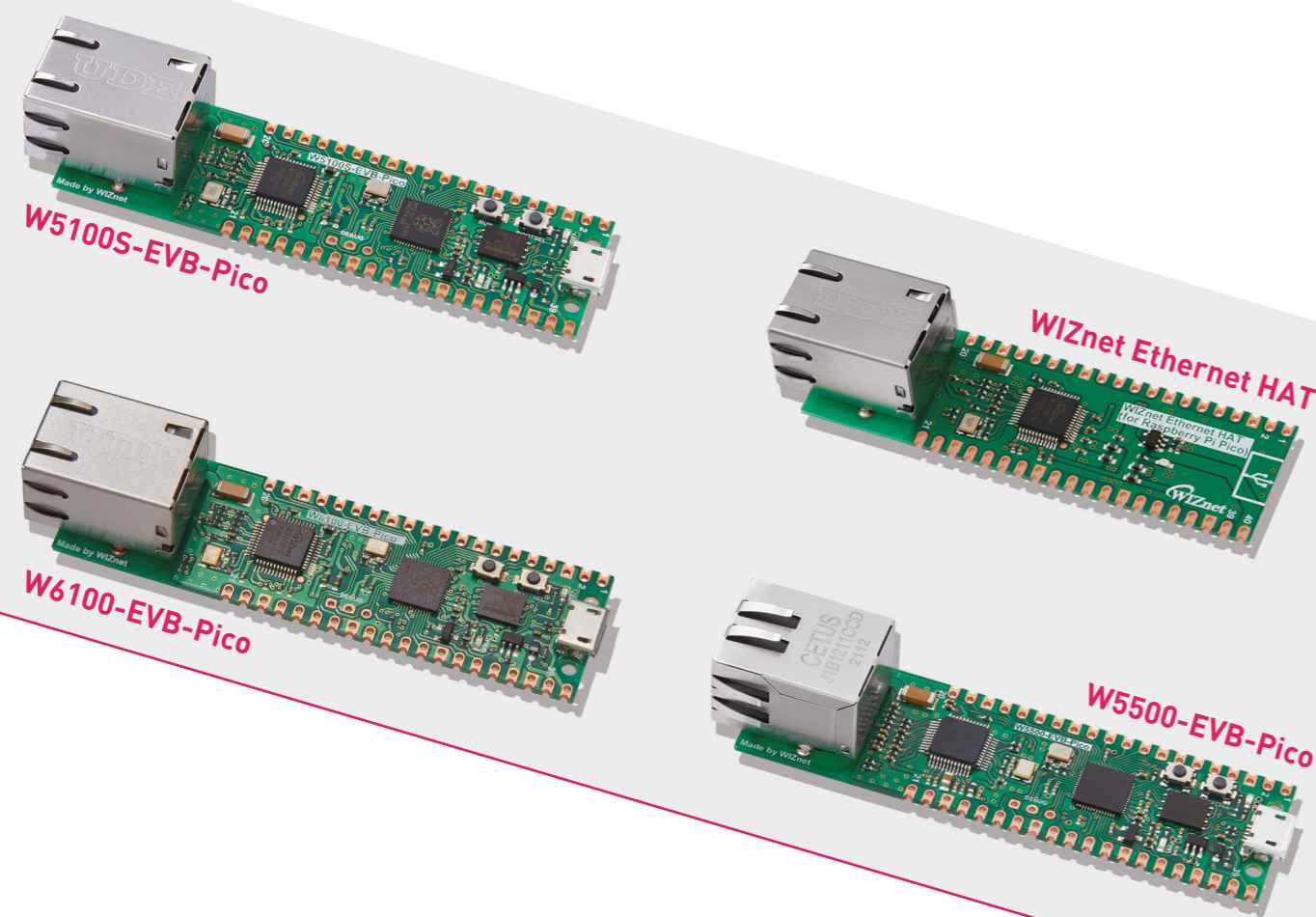
With the Device Management Service Web application, managing your devices has never been easier! Get a clear overview of the state of each device and easily control them in groups. The intuitive template allows you to easily track data sent by your devices in the form of visually appealing graphs. Plus, with the ability to control devices remotely, you have the flexibility to manage your devices from anywhere.

We are proud to offer customized services for customers of WIZnet products, including remote equipment diagnosis, unmanned store equipment management, and smart farm sensor linkage. Experience the convenience and efficiency of our Device Management Service Web application today!



# WIZnet Evaluation boards based on RP2040

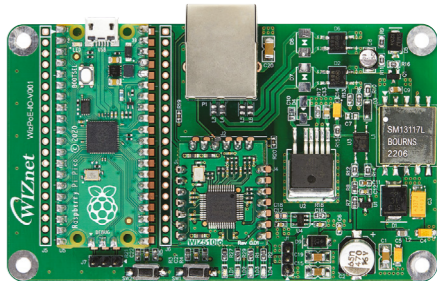
Raspberry Pi’s RP2040 microcontroller is a great silicon, providing a balance of power and flexibility. In January 2021, Raspberry Pi Pico board was launched. This board proved its popularity with sales of 1.4 million boards in 2021. Since WIZnet provides best-in-class connectivity solutions, in 2021 we also released Pico clone boards but with added Ethernet connectivity. The first boards, W5100S-EVB-Pico and WIZnet Ethernet HAT, were released in October 2021. While both boards are using W5100S as Ethernet chips and both boards are pin-compatible with Raspberry Pi’s Pico board, the main difference is that W5100S-EVB-Pico has RP2040 on board and Ethernet HAT doesn’t.



In 2022 we introduced W5500-EVB-Pico and W6100-EVB-Pico. We kept the key feature of the series – pin-compatibility. However, different connectivity chips are utilized, thus bringing different features to the products.

First product introduced in 2023 is PoE HAT. While as this board utilizes RP2040 as MCU, its unique feature is PoE support. Furthermore, this board is compatible with W5100S-io, W5500-io and W6100-io modules; thus, users can try and test all three modules with single board.

All these evaluation boards are designed to be easy to use and provide a platform for developers to test and evaluate the connectivity capabilities of WIZnet Ethernet controllers. Compact size and a built-in network feature make these products a great choice for a wide range of IoT applications and device prototyping.



WIZnet Pico PoE Board

- The Ethernet chips introduced in EVB-Pico series are designed to provide reliable and high-performance connectivity solutions for various IoT devices. Key features of our Ethernet chips include :
- 3-in-1: TCI/P/IP stack + MAC +PHY
  - Industrial grade operation range: -40 ~ +85
  - Compact size: 7x7
  - Protocol support: TCP, UDP, IPv4, ICMP, ARP, IGMP, and PPPoE
  - IEEE 802.3af Mode A, Mode B upto 6.6W

The main differences between the three chips are summarized in the table below:

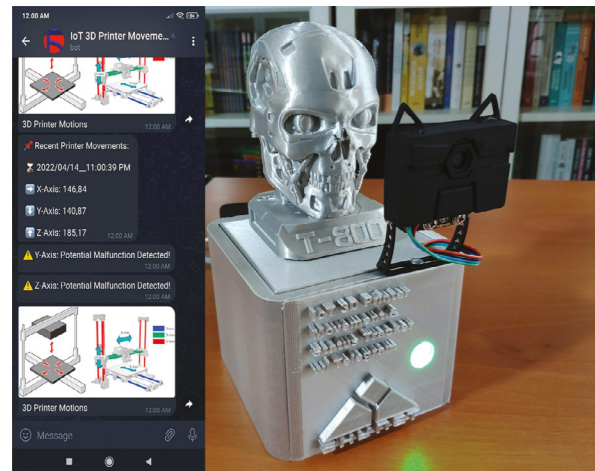
	W6100	W5100S	W5500
Image			
Host I/F	8bit BUS, Fast SPI	8bit BUS, SPI	Fast SPI
TX/RX Buffer	32KB	16KB	32KB
HW Socket #	8	4	8
Network Performance	Max.25Mbps	Max.25Mbps	Max.15Mbps
Package	48LQFP / QFN	48LQFP / QFN	48LQFP

WIZnet provides ioLibrary and drivers for easy start of development. Also, various SDK and examples are available at WIZnet’s Github repositories, from C/C++ to CircuitPython and MicroPython.

# APPLICATIONS

## AI-driven IoT 3D Printer Motion & Status Tracker w/ Telegram

 kutluhan\_aktar

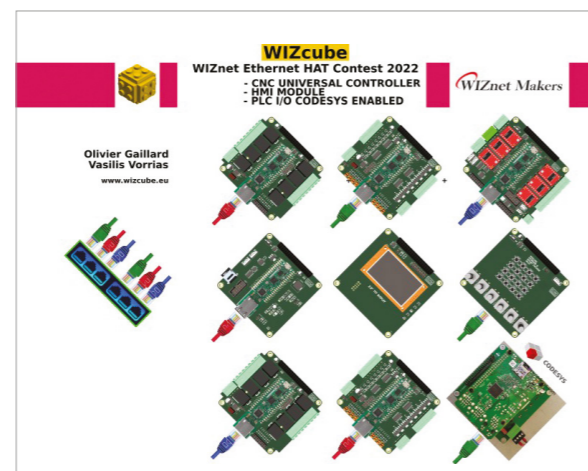


This project tracks vertical & lateral movements of a 3D printer via Air Tags. Also, it informs of any malfunctions via Telegram. It's a great piece of IoT 3D Printer Motion & Status built from an AI Camera, Raspberry Pi Pico, and WIZnet's Ethernet HAT.

<http://bit.ly/40Wcoox> 

## WIZcube Ecosystem: PLC, CNC, HMI, INTELLIGENT EDGE and much more ...

 vorrias

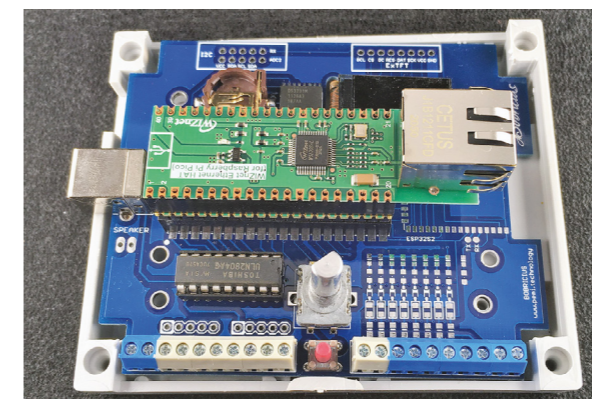


WIZcube is a controller cube or a PLC that comes in a practical form factor of 10x10x10cm cube. It can be used for Industry 4.0 and M2M deployments.

<http://bit.ly/3IJSb5e> 

## WizPLC – Universal DIN rail industrial controller

 pemi

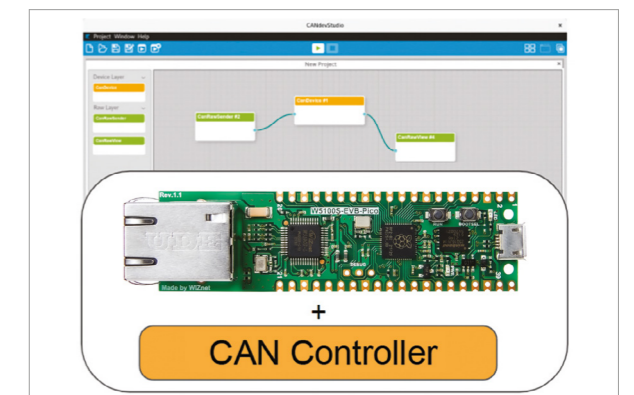


Simple compact-size DIN rail controller with 8 channel transistor relay on output and 8 protected input. ESP32-S2 can be added to upgrade controller to Ethernet gateway.

<http://bit.ly/3IK66bz> 

## Ethernet CAN Gateway

 chcbaram

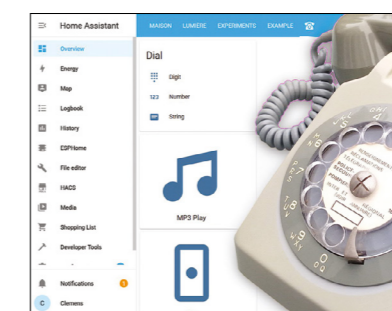


This project is an Ethernet to CAN Gateway project, utilizing the W5100S-EVB-Pico and the CAN module MCP2515. If interested in Ethernet-to-CAN Gateway, make sure to check out this project.

<http://bit.ly/3S9drxu> 

## Rotary Dial Remote Control for Home Automation

 clemo



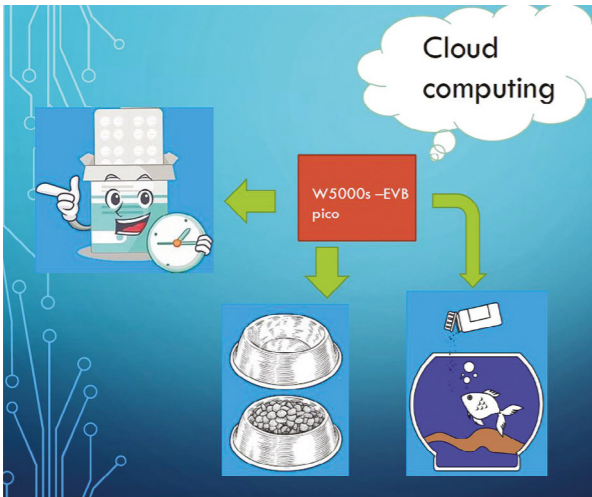
Remember the rotary dial classic phones? This project converts the classic phone to a Remote Control and Alarm for Home Automation.

<http://bit.ly/3YB7xat> 

# APPLICATIONS

## Multipurpose Pet food and medicine dispenser

 harsha

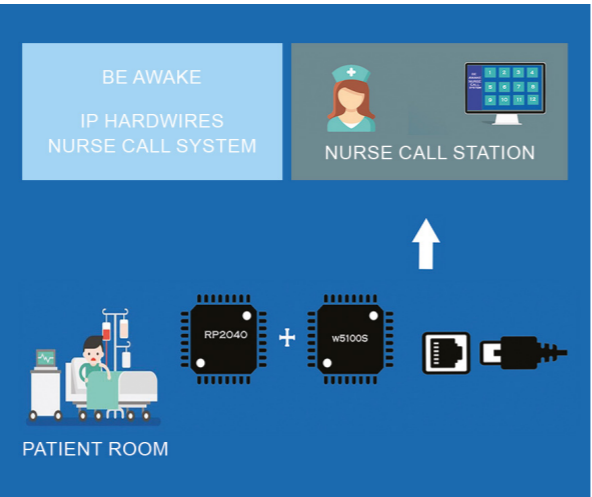


This project demonstrates how W5100S-EVB-Pico can be used for dispensing two different pet foods. Person detection via Tiny ML is added for proper medicine distribution.


<http://bit.ly/3Egzhkp> 

## Be Awake! IP Hardwired Nurse Call System

 amalmathewtech



This system helps in emergencies; such system can be used by patients in hospitals, clinics, nurse homes and other institutions. To provide stable connection, Ethernet was selected as communication method.

<http://bit.ly/3EdXu3h> 

## Real-time Lab monitoring using TinyML

 rahulkhanna

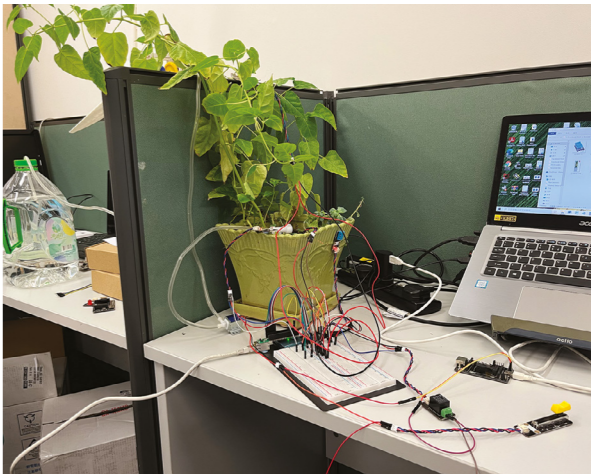


The project demonstrates how to monitor air quality and heat levels to prevent laboratory accidents. The data from sensors are transmitted to ML algorithm to identify anomaly and inform the team via email.


<http://bit.ly/3EfjoD1> 

## Smart Plant application WIZnet Ethernet HAT + Raspberry PI PICO

 WIZnet Ronpang



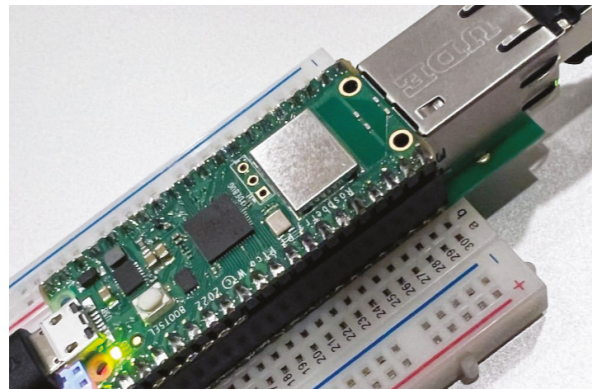
This Smart Plant Application is a simple system to monitor and control devices through Adafruit IO platform. By using WIZnet Ethernet HAT with Raspberry Pi Pico, it required simple coding to create the communication method between Pico with Adafruit IO.

<http://bit.ly/3lv3yH7> 

# REFERENCE

## Raspberry Pi Pico : Wi-Fi + Wired

 Aneccdata



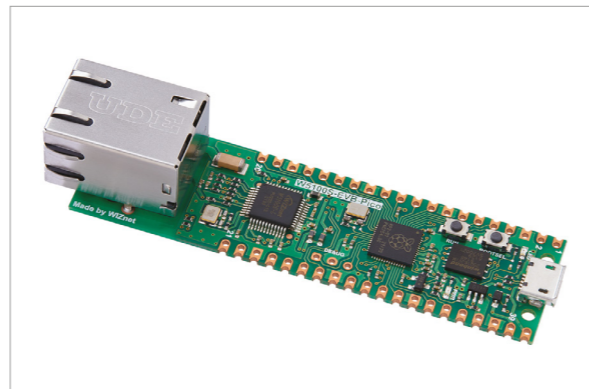
Raspberry Pi Pico W running Adafruit Circuit Python 8 beta + Wiznet W5100S Ethernet HAT.

<http://bit.ly/3EdOHOC>



## How to add Ethernet on Raspberry Pi PICO

 Pallav Aggarwal (<https://pallavaggarwal.in>)



Great article about the comparison of Ethernet solutions available for Raspberry Pi Pico.

<http://bit.ly/3K9jOyK>

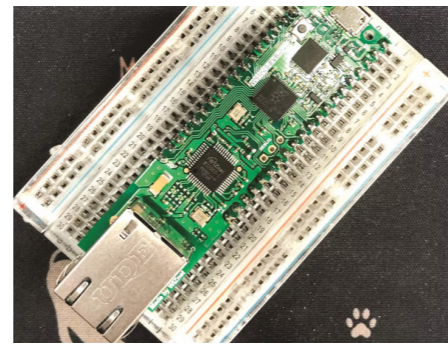


## W5100S-EVB-Pico with the Node-RED

 WIZnet Taylor

Step-by-step guide on how to setup Arduino environment for W5100S-EVB-Pico and to connect the board to Node-RED dashboard.

<http://bit.ly/3Keb3n9>



## Raspberry Pi Pico and rp2040 board: ethernet w5500 with plain (HTTP) and SSL (HTTPS) requests

 Renzo Mischianti (<https://www.mischianti.org/>)



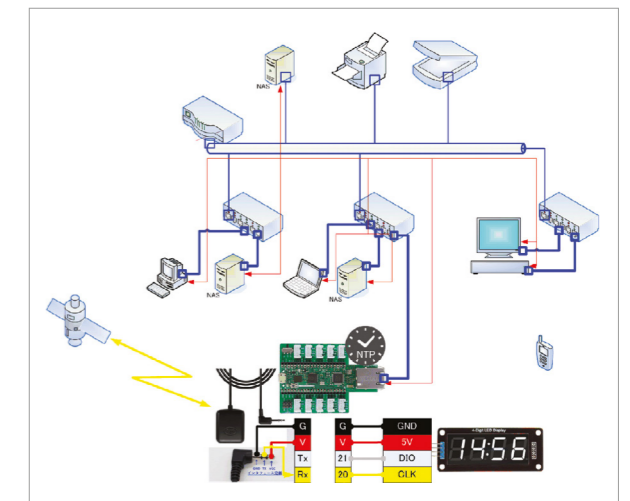
Looking to add SSL to your project? Check this guide to find out how to run Raspberry Pi Pico or any RP2040 board with Ethernet and SSL (HTTPS) requests.

<http://bit.ly/3YRQPDu>



## Examining GPS NTP Servers for RaspberryPiPico (RaspberryPiPico版のGPSNTPサーバの検討)

 toolbox



Author created GPS NTP Server using W5500-EVB-Pico for time synchronization across operating devices.

<http://bit.ly/3XzjAE1>



# REFERENCE

## Connect W5100S-EVB-Pico to AWS IoT Core

WIZnet Viktor



W5100S-EVB-Pico is the first RP2040-based AWS Qualified board.

This project will demonstrate how to connect to AWS IoT Core and transmit data using C/C++.

<http://bit.ly/3XiIANP>



## How to connect AWS IoT with Micropython using W5100S-EVB-Pico

WIZnet Rena

How to connect to **AWS IoT** using **W5100S-EVB-Pico** and **Micropython**



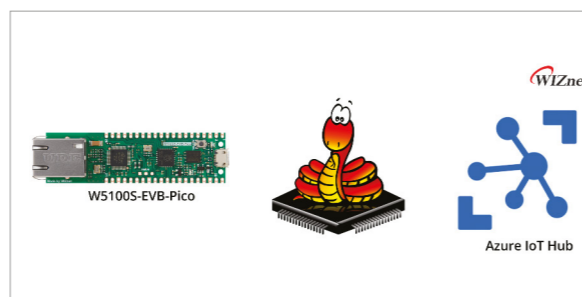
Need help with MicroPython code to connect to cloud? Check out this project to find the detailed step-by-step guide.

<http://bit.ly/3YEte9G>



## Connect to Azure IoT Hub using Micropython on W5100S-EVB-Pico

WIZnet Rena



The process of connecting W5100S-EVB-Pico to Azure IoT Hub by MQTT using MicroPython and sending and receiving messages.

<http://bit.ly/3YVouMD>



## Alert System Using W5100S-EVB-Pico & AWS SNS

WIZnet Gemma



An alert system that operates when the value sent from the sensor exceeds the threshold.

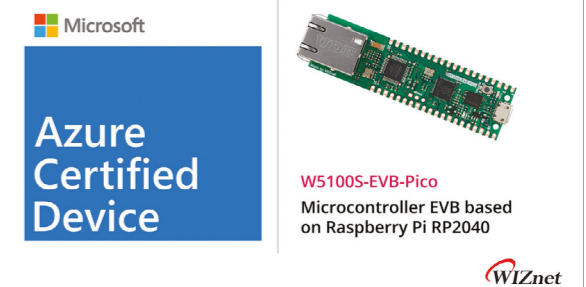
<http://bit.ly/3k2EihU>



## Connect W5100S-EVB-Pico to Azure IoT Cloud!

WIZnet Austin

**RP2040 to Azure with W5100S**



C/C++ based guide how to connect the board to Microsoft Azure.

<http://bit.ly/3It7Kak>



## Azure IoT Gateway with W5500 and WizFi360

WIZnet Eric



The project demonstrates a simple gateway by combining WizFi360-EVB-pico and Ethernet HAT. The gateway can receive data via Wi-Fi from clients and transmit to Azure via MQTT using Ethernet connection.

<http://bit.ly/3IGNQjh>





**Documents**  
[docs.wiznet.io](https://docs.wiznet.io)



**Tech Support**  
[forum.wiznet.io](https://forum.wiznet.io)



**Online Shop**  
[eshop.wiznet.io](https://eshop.wiznet.io)