

新能源應用方案

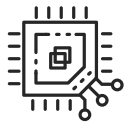
儲能管理

Steven Lin 林碩徽



Key Takeaways

Transmission / distribution



- **NUC980**
- **MA35D1**
- M467
- NADC24

Energy Storage



High-side/Low-side FET control
Built-in fault detection

- KA495xxA

Dual bank
Secure boot
CAN-FD

- ESS-M467
- BMS-M2L31

Electrical Vehicles



ASIL-D certified BM-IC, PM-IC
SOH Quick measurement

- 25-ch KA84950UA
- KA84917UA

AC EV Charging pile

ReRAM
Write Protection
Ultra-Low-Power

- M2L31

| Energy Storage Market Growth

- With the adoption of the United Nations climate agreement and goals approaching, governments and organizations are increasing the adoption of energy storage.
- Battery monitoring is an essential issue in the energy storage industry, and the Nuvoton MPU platform provides a complete solution.



Microcontroller Platform

Feature **U** USB **C** CAN **CF** CAN FD **E** Ethernet **L** LCD **T** Touch Key **BT** Bluetooth **V** Video Codec
Low Power **TrustZone** **AEC-Q100** **Operating Voltage** **1.8** 1.8V **3.3** 3.3V **5** 5V

Operating Frequency	8051	Cortex® -M0	Cortex® -M23	Cortex® -M4	MPU
800 MHz					Cortex® -A35 MA35D1 U
300 MHz					Arm9™ NUC980 E C U
192 MHz		3.3 5 NUC1261 U 3.3 5 NUC126 U 3.3 M031G 3.3 M029G/M030G 1.8 3.3 M032 U 1.8 3.3 M031 3.3 5 NUC029 U 1.8 3.3 M032BT BT U 1.8 3.3 M031BT BT	1.8 3.3 M2354 U 1.8 3.3 M2351 U 3.3 5 NUC1263 U 3.3 5 NUC1262 U 1.8 3.3 M263 C U 1.8 3.3 M262 U 1.8 3.3 M261 U 1.8 3.3 5 M258 T L U 1.8 3.3 5 M256 T L 1.8 3.3 5 M254 L 1.8 3.3 5 M253 CF U 1.8 3.3 5 M252 U 1.8 3.3 5 M251 U	1.8 3.3 M480 E C U 1.8 3.3 M460 E CF U 3.3 5 M471 U 3.3 5 M453 C 3.3 5 M452 U 3.3 5 M451	NUC970 E C L U N9H V E C L U N329 V E L U
72 MHz					
64 MHz					
50 MHz	1.8 3.3 ML56 T L 1.8 3.3 ML54 L 1.8 3.3 5 ML51 U 3.3 5 MS51 3.3 5 N79E 3.3 5 N76E 1.8 3.3 5 MUG51 U	3.3 5 NUC230 C 3.3 5 NUC131U C 3.3 5 NUC1311 C 3.3 5 M0A23 C 3.3 5 M071 3.3 5 M051 3.3 5 Mini51 1.8 3.3 Nano100 U			
24 MHz					
16 MHz					

| NuMicro MPU for Energy Monitoring



Energy Storage Monitoring



PV Inverter Monitoring



EV Charging Station Monitoring



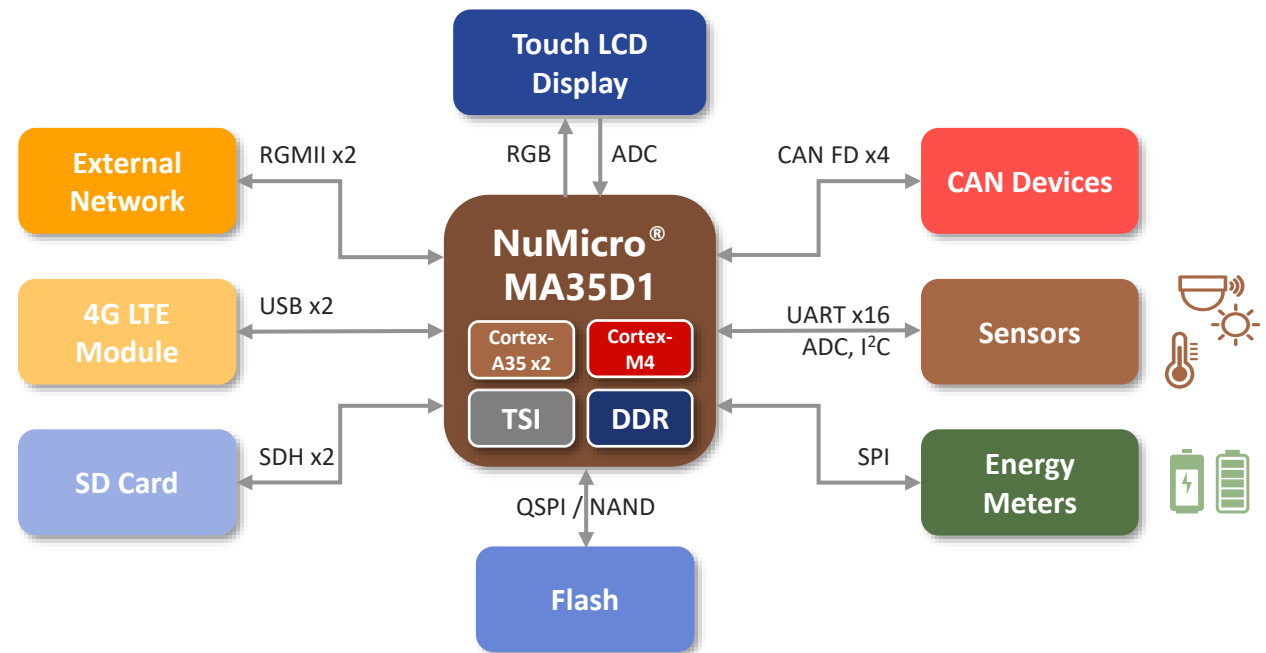
Power Network Monitoring

Edge Computing for Energy Storage

- Edge computing for energy gateway applications will require higher computing performance and security.
- Nuvoton **MA35D1** platform provides the requirements of high computing performance and high-speed peripherals.

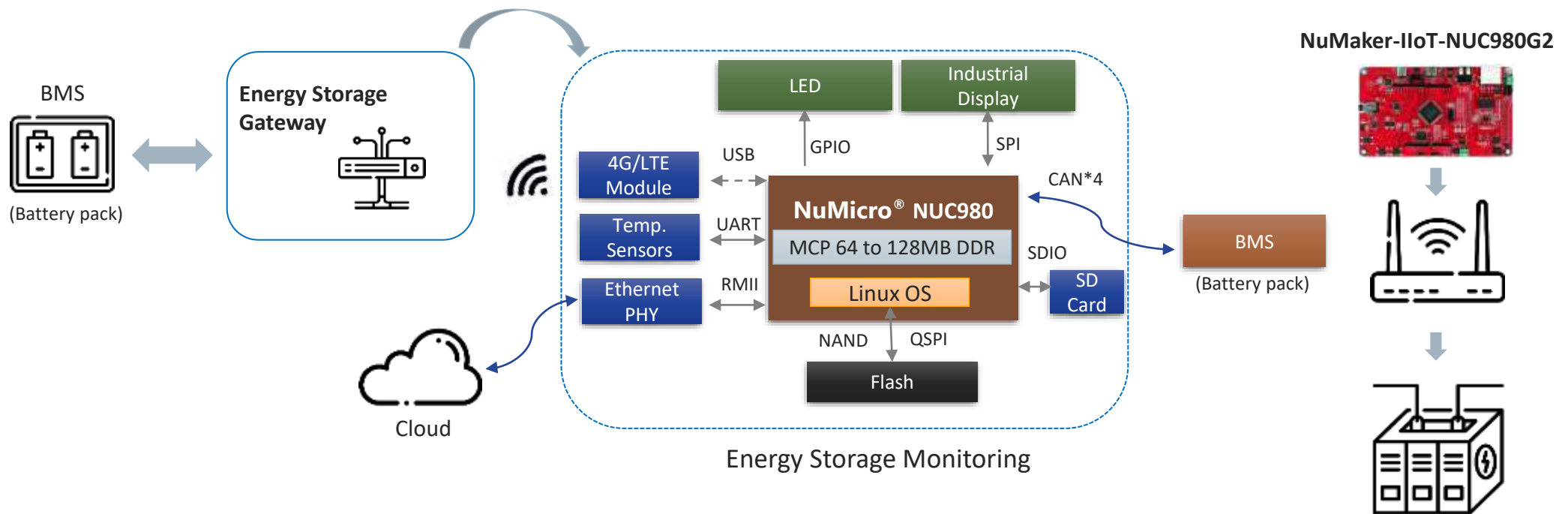
MA35D1 Features

- BGA312 / LQFP216 packages
- Stacking DDR up to 512 MB
- 2 sets of Giga Ethernet for external network
- 2 sets of USB 2.0 HS host for connecting 4G module
- 1 set of SDIO3.0 and 1 set of SDIO2.0
- Up to 4 sets of CAN FD
- Up to 17 sets of UART (up to 9.5MB), and I²C, ADC for connecting sensors.
- Up to 6 sets of SPI for connecting energy meters
- TFT-LCD by parallel RGB-24 bit I/F
- ADC for resistive touch screen
- TSI (Trusted Secure Island) for Security



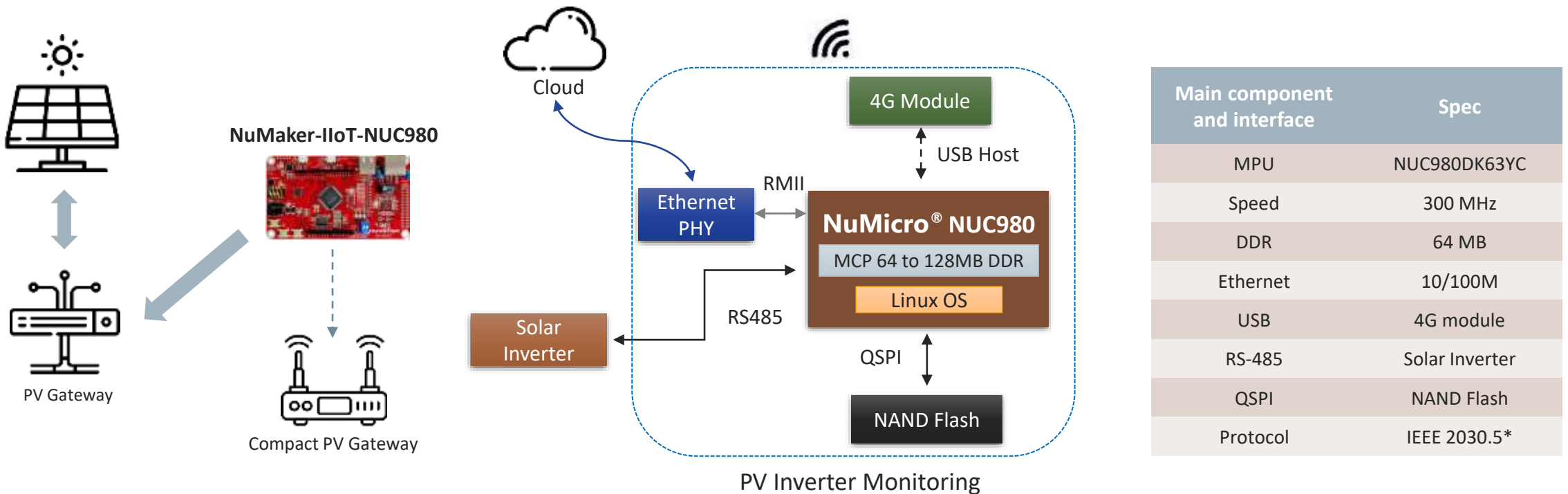
Successful Story: Energy Storage Monitoring

- An Energy Storage Monitoring is a control and communication unit in the energy storage system. It can collect environmental information and monitor the status of battery pack.



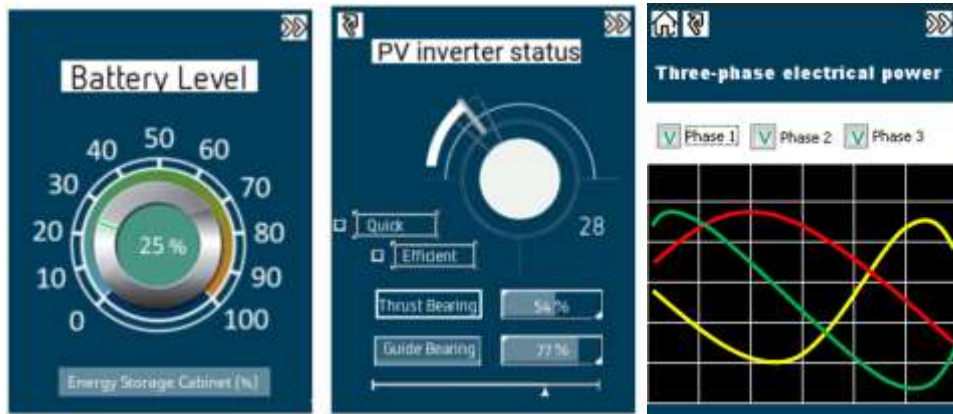
Successful Story: PV Inverter Monitoring

- A PV Inverter Monitoring connects photovoltaic systems to the grid, managing energy production. It features data monitoring, remote control, and integration for efficient solar power utilization.



Recommended EVB for Energy Storage Monitoring

- Key features of **NuMaker-IIoT-NUC980G2D**
 - NUC980DK71YC (MCP 128MB DDR) + CAN Bus x4 + SPI LCD (supports emWin)
- Suitable applications:
 - Energy Storage Monitoring, PV Inverter Monitoring, EV Charging Pile Monitoring, Power Network Monitoring, etc.

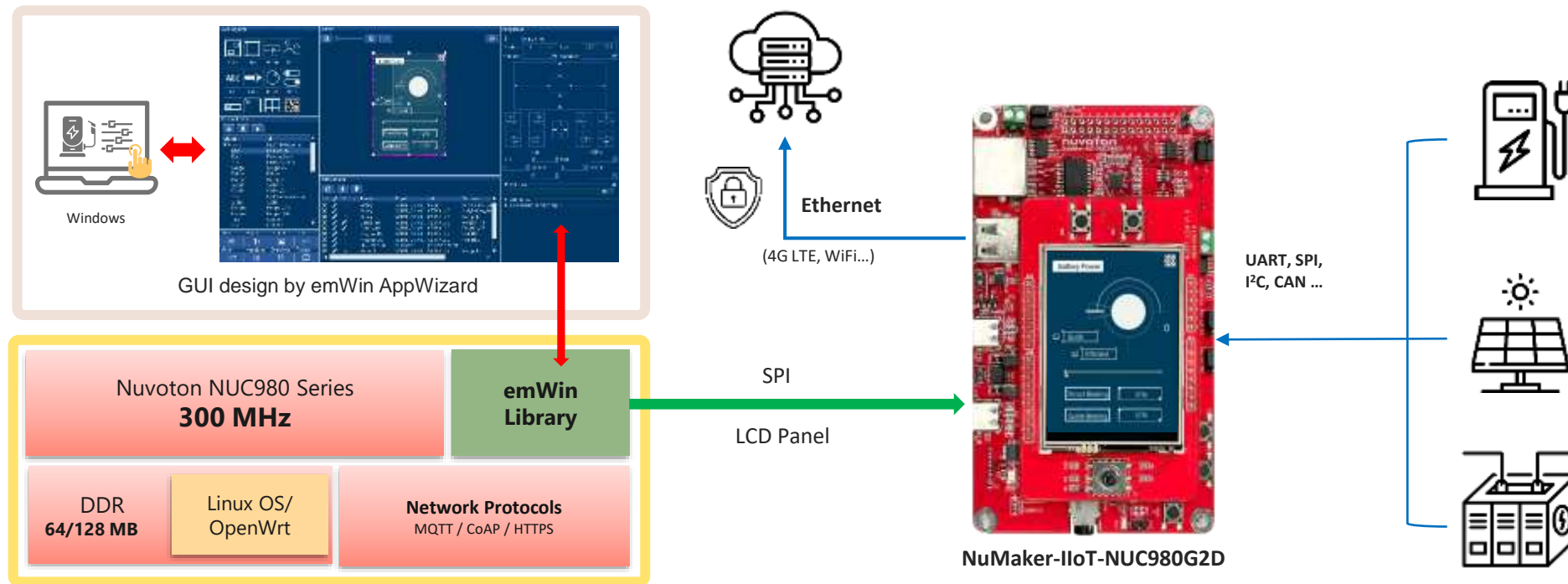


Features:

- NUC980DK71YC (MCP 128MB DDR)
- 1 Gbit SPI-NAND Flash
- 10 / 100 Ethernet x 1
- USB 2.0 High Speed Host x 1 + Host / Device x 1
- Mono microphone input / Stereo headphone output
- MicroSD card slot
- USB Power and CDC Debug Port
- External memory expansion interface
- Arduino compatible interface
- UART x 3
- CAN bus x 4
- TFT-LCD display (QVGA)

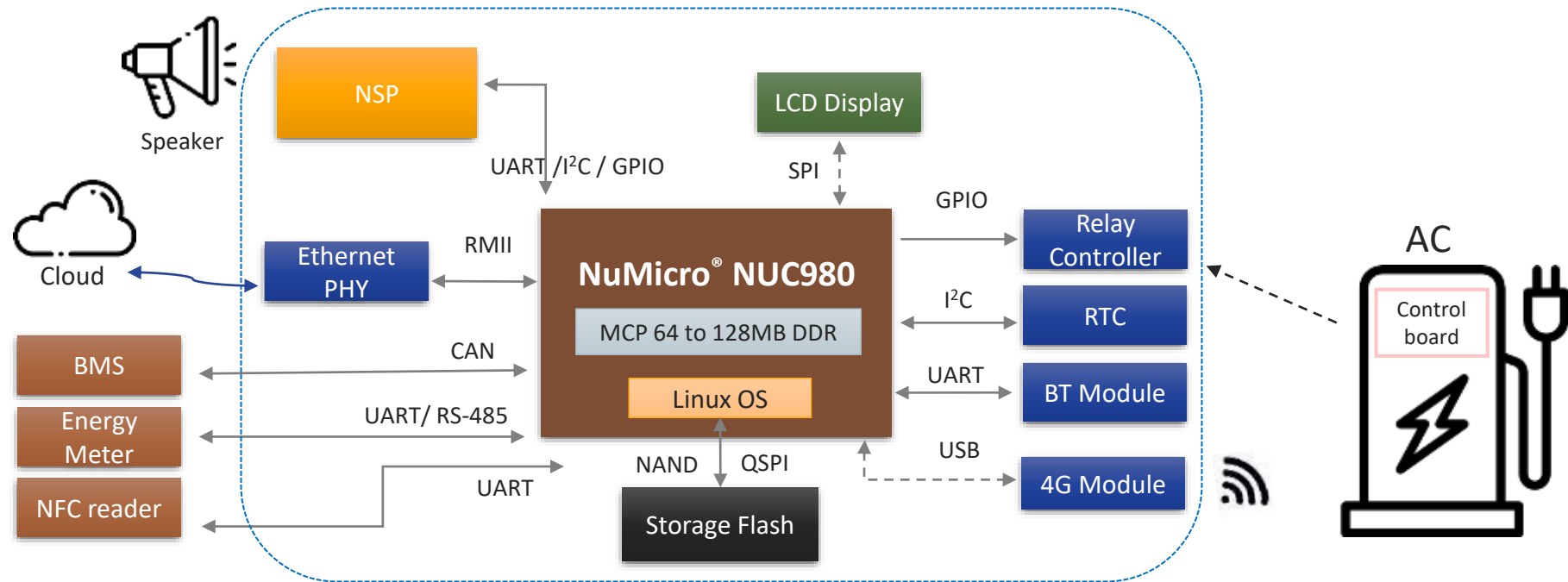
Accelerate Energy Application Development

- In addition to EVB hardware, Nuvoton also provides software BSP and example code to accelerate energy application development.



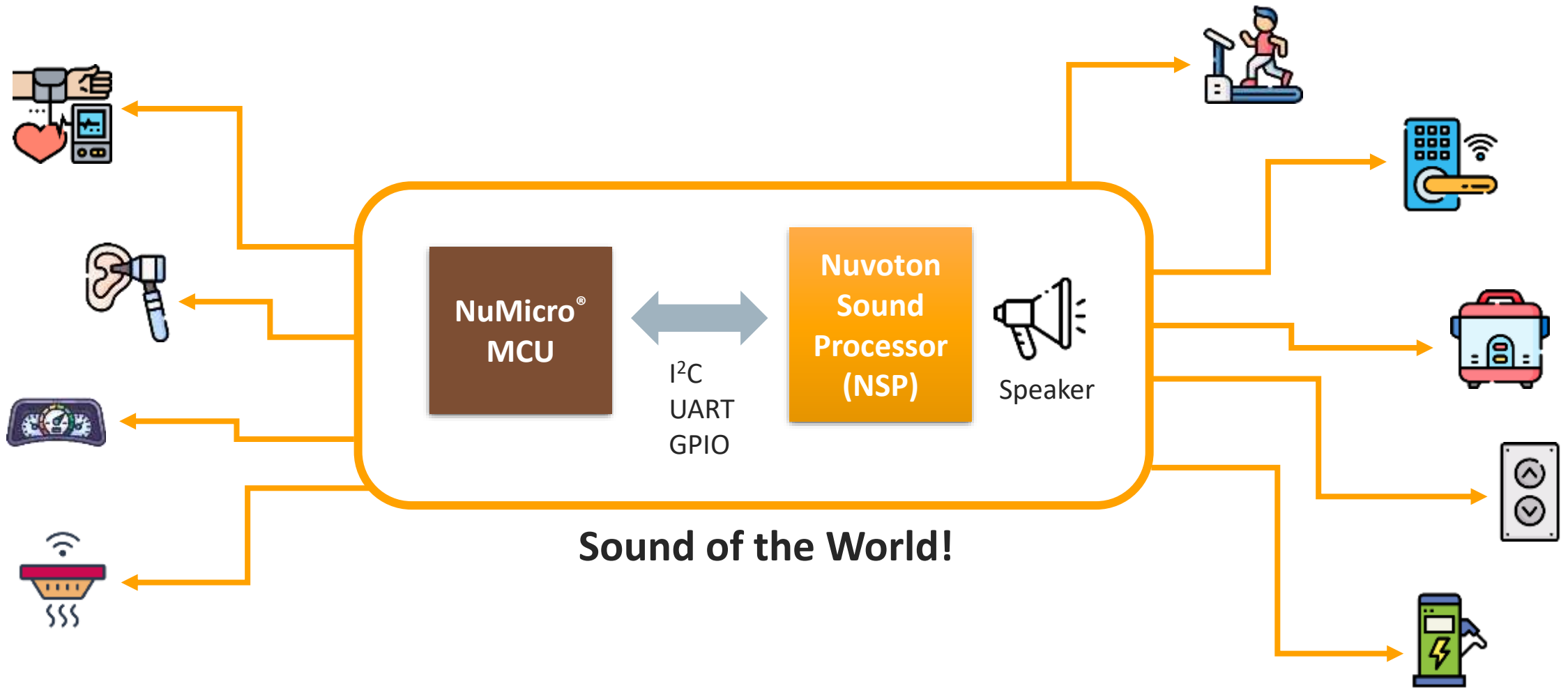
| Success Story: EV Charging Pile Monitoring

- An EV Charging Pile Monitoring enables efficient EV recharging with multiple standards and smart grid integration, fostering sustainability and EV adoption.



EV Charging Pile Monitoring

Nuvoton Sound Processor (NSP)



| NSP Voice Assistance Applications



NSP Application on EV Charger

- Interface with Host MCU: I²C or UART
- Voice Duration (Flash type): 96", 177", 420" @ 12 KHz
- 2-ch Voice Playback
- Low Standby Current: < 1 μ A
- OTA (Over The Air) Voice Content Update
- Tiny Package Form: SOP8
- Flash Endurance: 100K times



| Successful Story: EV Charger

- **Solution: Host MCU + NSP2340A**
- **Voice Assistance:**
 - Charging operation guide
 - Charging status report
 - Abnormal function reminding
 - Abnormal operation warning
 - OTA to upgrade content (option)
- **Market: China & Global**



Successful Story: EV Charger for e-Bike

- Solution: Host MCU + NSP2170A
- Voice Assistance:
 - Charging operation guide
 - Charging status report
 - Abnormal function reminding
 - Abnormal operation warning
- Market: China



NSP Series Product Selection Guide

Part No.	Duration (sec.)		Package	OTA	VDD (V)	Audio Output (8Ω, THD+N≤ 1%)		Operating Temperature	Interface			
	12 KHz	16 KHz				3.3V	5.5V		1-Wire	2-Wire	UART	I ² C
NSP2080A	96	72	SOP8	√	2.0~5.5	0.2W	0.5W	-40~85° C	√	√	√	√
NSP2170A	177	133										
NSP2340A	420	315										
NSP2080A01G	96	72	SOP16	√	2.0~5.5	0.4W	1.0W	-40~85° C	√	√	√	√
NSP2170A01G	177	133										
NSP2340A01G	420	315										

Joy of innovation
nuvoTon

谢谢

謝謝

Děkuji

Bedankt

Thank you

Kiitos

Merci

Danke

Grazie

ありがとう

감사합니다

Dziękujemy

Obrigado

Спасибо

Gracias

Teşekkür ederim

Cảm ơn