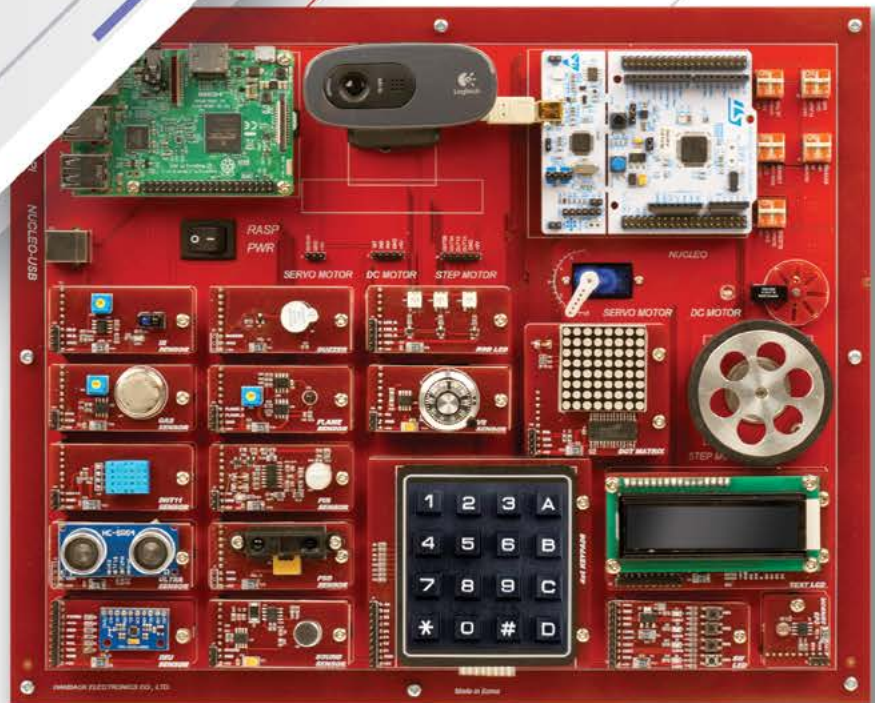# NEW Microprocessor

SMART NUCLEO

Cortex-M4 practice equipment using ST's NUCLEO board

HANBACK ELECTRONICS

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Product specifications and appearance of this catalog are subject to change without notice for quality improvement.   V2.0.1

Since 1984

HANBACK ELECTRONICS ®

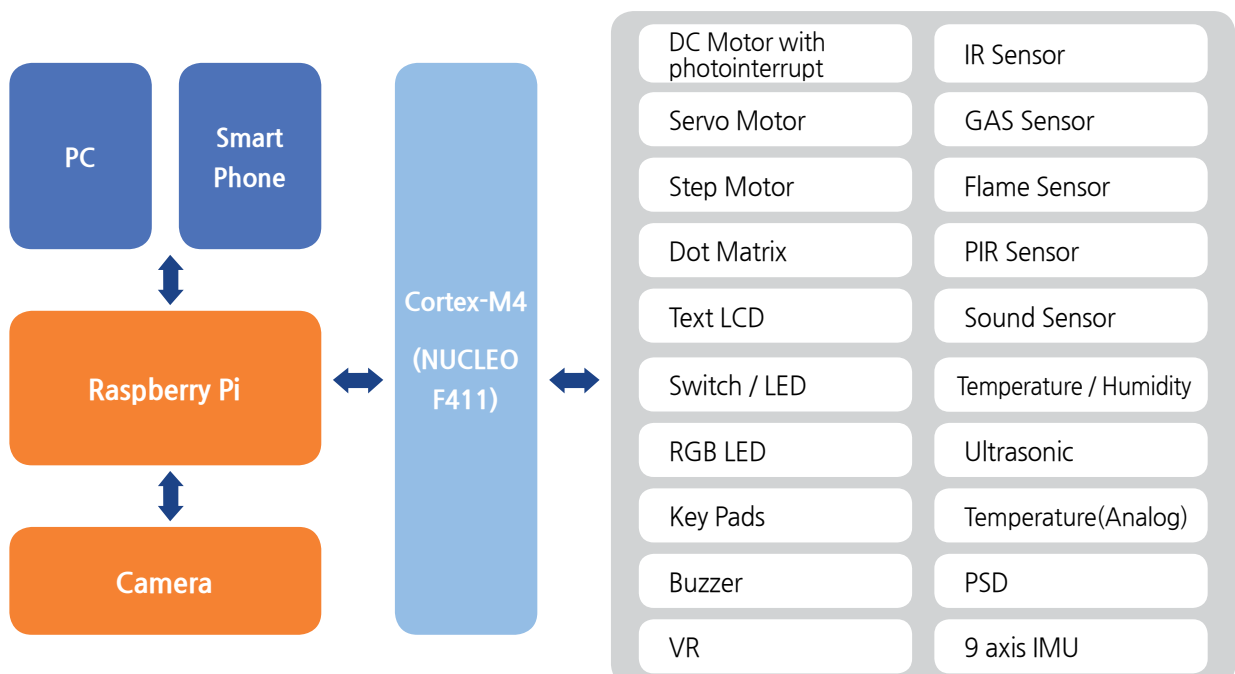## Cortex-M4 practice equipment using ST's NUCLEO board

SMART NUCLEO

- Controls more than 20 kinds of sensors
- Displays sensor data in the form of graph or 3D airplane
- UX / UI related education contents

Features

- Sensor data collection is implemented around open hardware platform, making it easy for anyone to experience IoT service
- ARM Cortex M4-based modules can be used to control various sensors and actuators
- Provides basics and application examples for controlling 20 types of sensor data and driving devices
- Cortex-M4 module supports Open Compiler-mbed Compiler, Offline Compiler supports ST's Free Compiler
- Provides unit module practice funcion using firmware to acquire sensor information and actuator control exercises for acquiring IoT basic skills by modules
- By building a gateway, various projects can be conducted through sensor information monitoring and remote access control function
- Sensor data can be viewed graphically via PC software
- Among the sensor data, 9 axis sensor (IMU) is displayed in 3D form of airplane shape
- Supports Cloud service based on Amazon Web Service

Block Diagram

PC	Smart Phone

Raspberry Pi

Camera

Cortex-M4 (NUCLEO F411)

DC Motor with photointerrupt	IR Sensor
Servo Motor	GAS Sensor
Step Motor	Flame Sensor
Dot Matrix	PIR Sensor
Text LCD	Sound Sensor
Switch / LED	Temperature / Humidity
RGB LED	Ultrasonic
Key Pads	Temperature(Analog)
Buzzer	PSD
VR	9 axis IMU

Hardware Specifications

Gateway Block

| Category	Specification
Chip	Brodcom BCM2837 Soc
Core Architecture	Quad-Core ARM Cortex-A53, 1.2GHz
Memory	1GB LPDDR2
Bluetooth	Bluetooth 4.1 Classic, Bluetooth Low Energy
Networking	10/100 Ethernet, 2.4GHz 802.11n wireless
Power	Micro USB Socket, 5V, 2.5A
TFT LCD	Resolution : 320*480(Pixel), SPI Interface
Camera	Up to 3Mega Pixels, USB Interface

Cortex-M4 Block

Category	Specification
MCU	STM32F411RE, 32bit MCU, Speed : 84MHz, Flash : 512KB, SRAM : 96KB
ADC	10 Channel, 12bit ADC 2.4Mps
Extensions	Arduion Uno Revision 3 connectivity
ETC	On-Board ST-LINK/V2-1 debugger/programmer with SWD connector
	User LED
	Two push buttons : User, Reset
I/O Control	I/O connection control using DIP switch

Application

Category	Parts	Specification	Category	Parts	Specification
Peripheral	SW/LED	Push Switch 4EA, LED 4EA	Sensor	Temperature	2~150 Range, Analog Interface
	Key Pads	4 x 4 Key Pads		Temp/ Humidity	ambient temperature and humidity detection. Digital Interface
	Buzzer	Buzzer 1EA		Ultrasonic	2~400cm Range, Digital Interface
Display	RGB LED	RGB LED 3EA, PWM Control		PSD	10~40cm Range, Analog Interface
	Text LCD	2 line 16 char Text LCD		Sound	Sound Detector
	Dot Matrix	8 x 8 Dot matrix, I^2C Control		PIR	PIR Sensor, Sensor Range 110°
Motor	DC Motor	DC Motor with photointerrupt		GAS	Liquefied gas, Natural gas, coal gas
	Step Motor	Unipolar, 1.8° /step		VR	Variable resistance is used to change the value between 0V and 5V
	Servo Motor	0.22sec/60deg		IR	IR proximity sensor
				Flame	Flame Sensor
				9 axis IMU	Gyro 3 axis, Accelometer 3 axis, Magn etic 3 axis

Configuration and Name

Raspberry Pi

Camera

Sensor / Peripheral Block

Cortex-M4

Cable
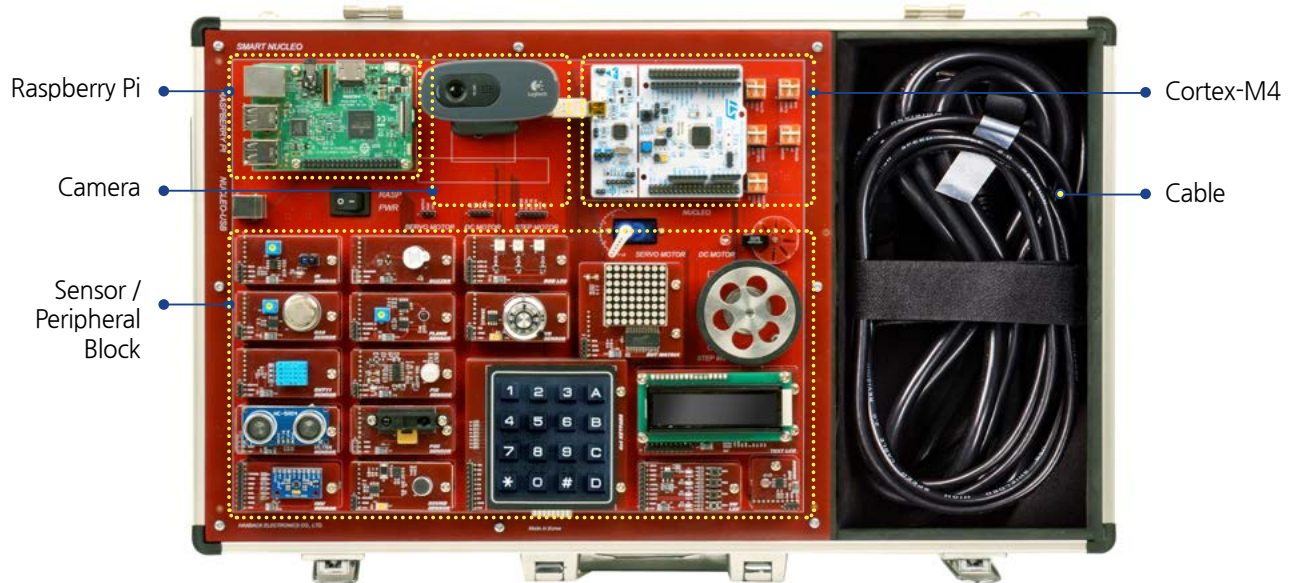
Textbook

Learning 1. IoT with SMART NUCLEO

1. Overview of IoT
2. SMART NUCLEO Configuration
3. Programming with the board
4. Raspberry Pi
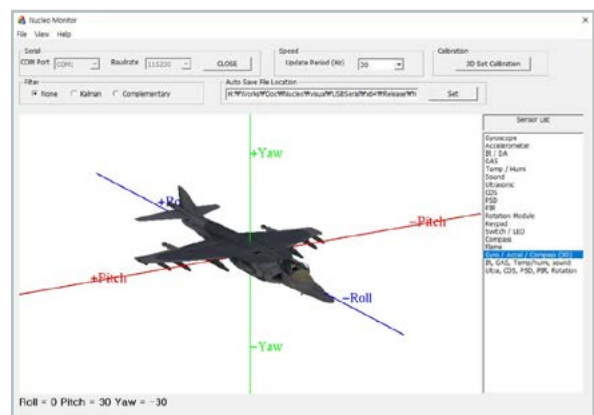5. Cloud Interlocking Practice using Raspberry Pi

Learning Android UX/UI with SMART NUCLEO

1. Overview of Android UX/UI
2. Google Material Design
3. Android UX/UI
4. Interacting with the board and Android

Sensor Display
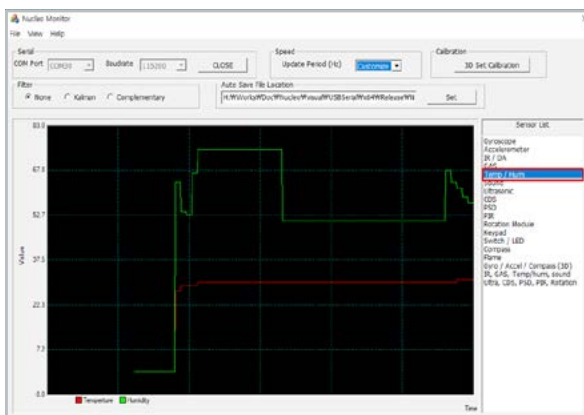
[Sensor Data Graph Display]

[3D Display]