ARM® Cortex®-M

32-bit Microcontroller

Arduino User Manual

for NuMicro™ MCU Series

For additional information or questions, please contact: Nuvoton Technology Corporation.

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1 OVERVIEW

Arduino is an open-source electronics platform based on easy-to-use hardware and software.

The NuMicro™ NuEdu Evaluation Board is an Arduino compatible hardware using NuMicro MCU as the microcontroller. Its function can be extended with Arduino add-ons. Users can use Arduino IDE to develop their applications and leverage large number of open source samples.

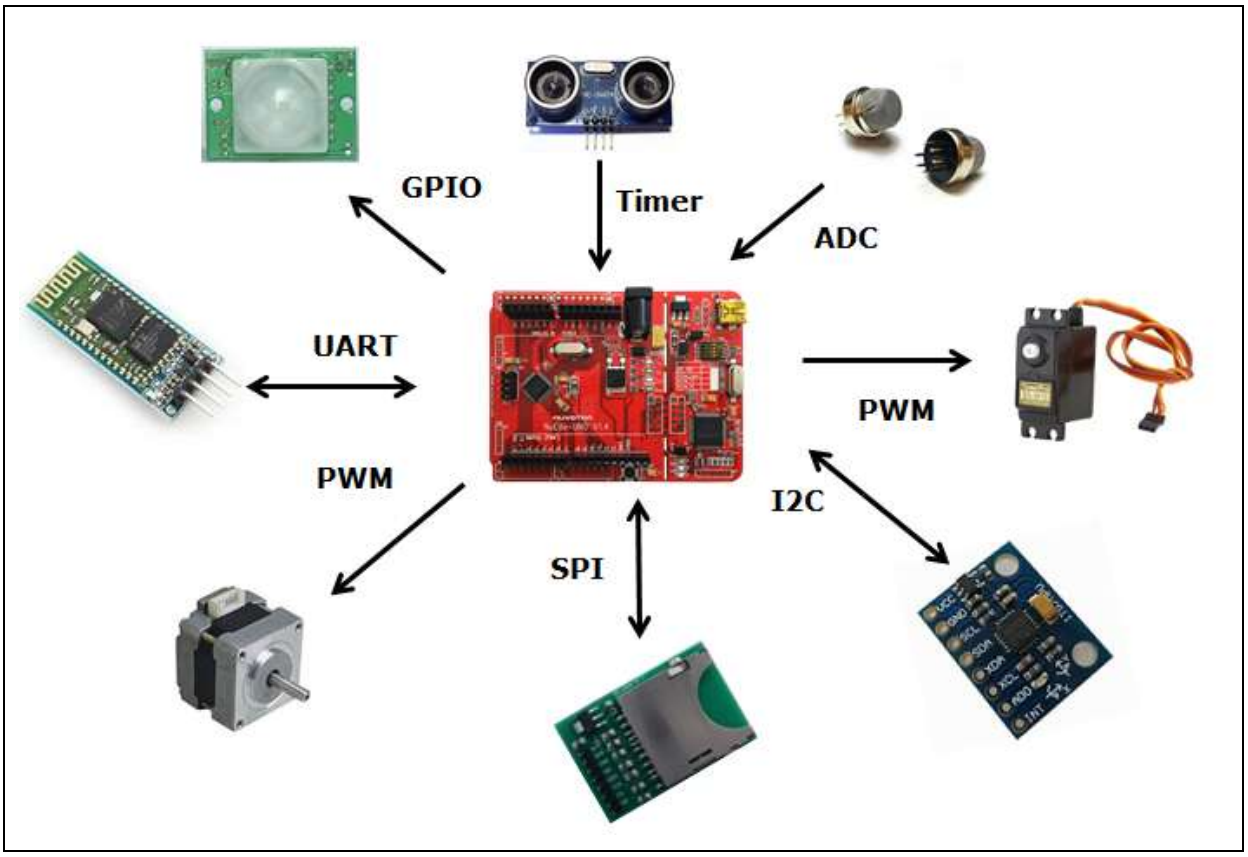

Figure 1-1 NuMicro NuEdu Board with Different Add-ons

The next chapter introduces the steps to install Arduino IDE and apply patch to support NuMicro NuEdu Evaluation Board.

2 ARDUINO IDE INSTALLATION

Please follow the steps below to install Arduino 1.5.8 IDE and apply patch to support NuMicro MCU. Refer to Arduino official website for the usage of Arduino IDE.

1. Download Arduino 1.5.8 IDE from http://arduino.cc/en/Main/OldSoftwareReleases

Figure 2-1 Download Arduino 1.5.8

2. Extract arduino-1.5.8-windows.zip to the installation path.

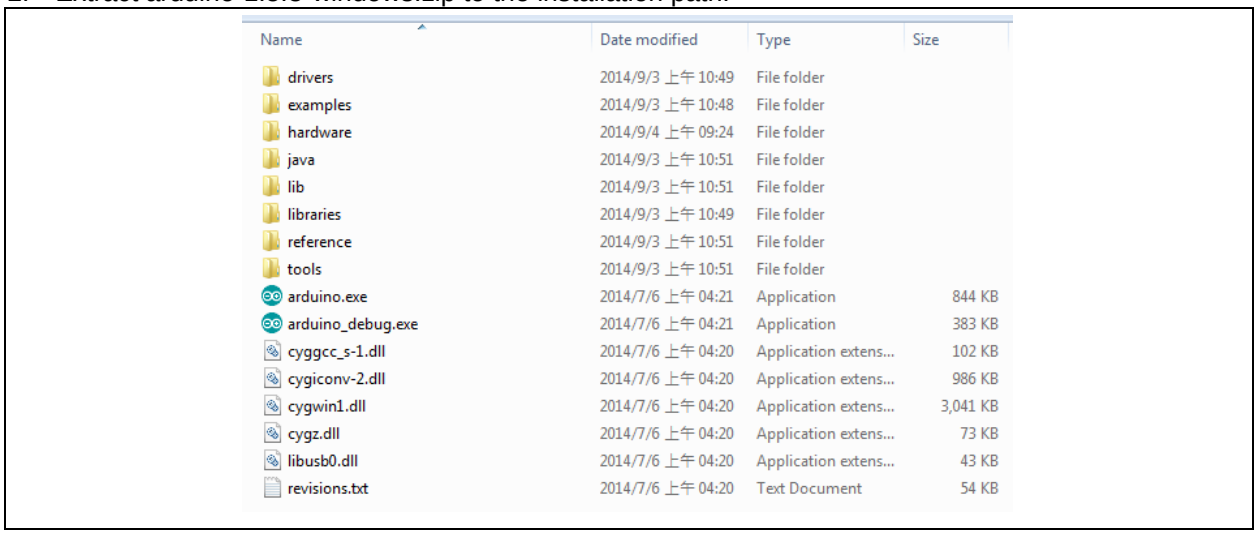

Figure 2-2 Extract Arduino 1.5.8

3. Double-click NuMicro Arduino patch (NuMicro_Patch_For_Arduino1.5.8.exe), and input the Arduino 1.5.8 installation path.

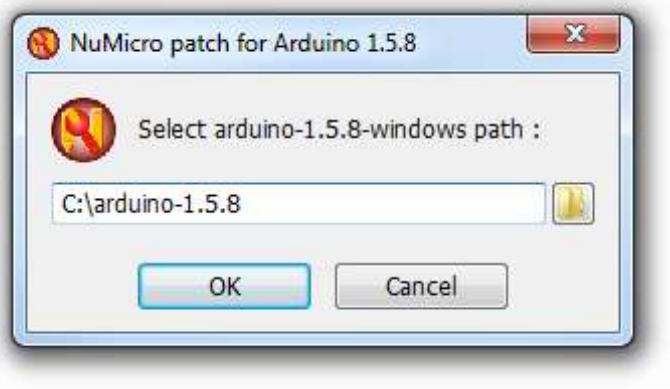

Figure 2-3 Install NuMicro Arduino Patch

4. After successfully applying the patch, five board names NuEdu-M451, NuEdu-NUC240, NuEdu-NANO130, NuEdu-NUC131, and NuMaker-TRIO can be found in Arduino IDE as shown in the figure below.

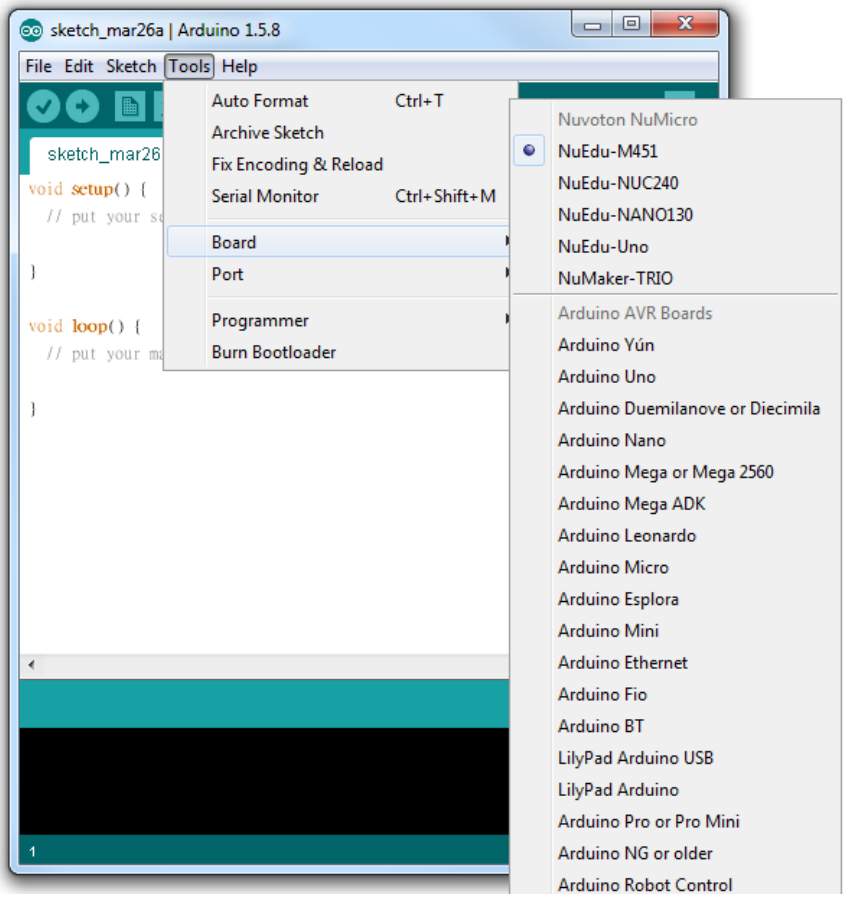

Figure 2-4 Installation Complete

3 HARDWARE SETUP

The Arduino IDE consists of source code editor, project build tool and also supports firmware download and UART debug function. To download firmware to NuEdu evaluation board, PC must be connected with the on-board Nu-Link Me using USB cable. The NuEdu Evaluation Board can print out debug message through the USB virtual COM (VCOM) interface.

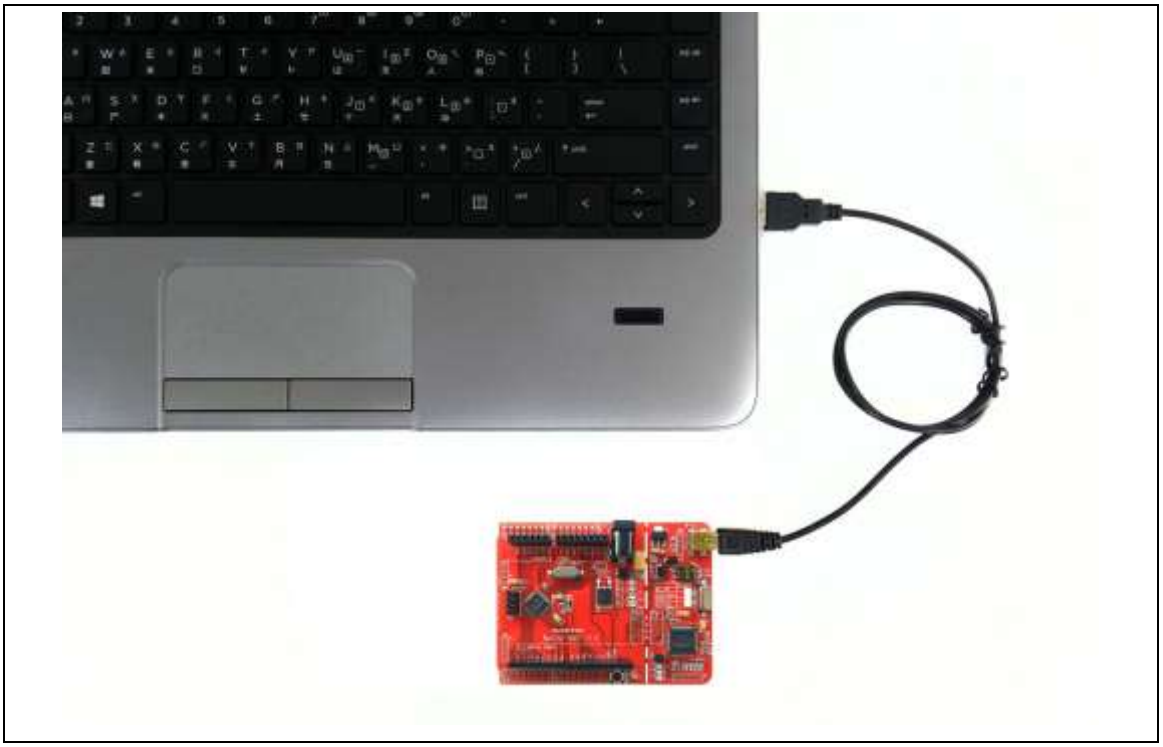

Figure 3-1 NuEdu-UNO Hardware Setup

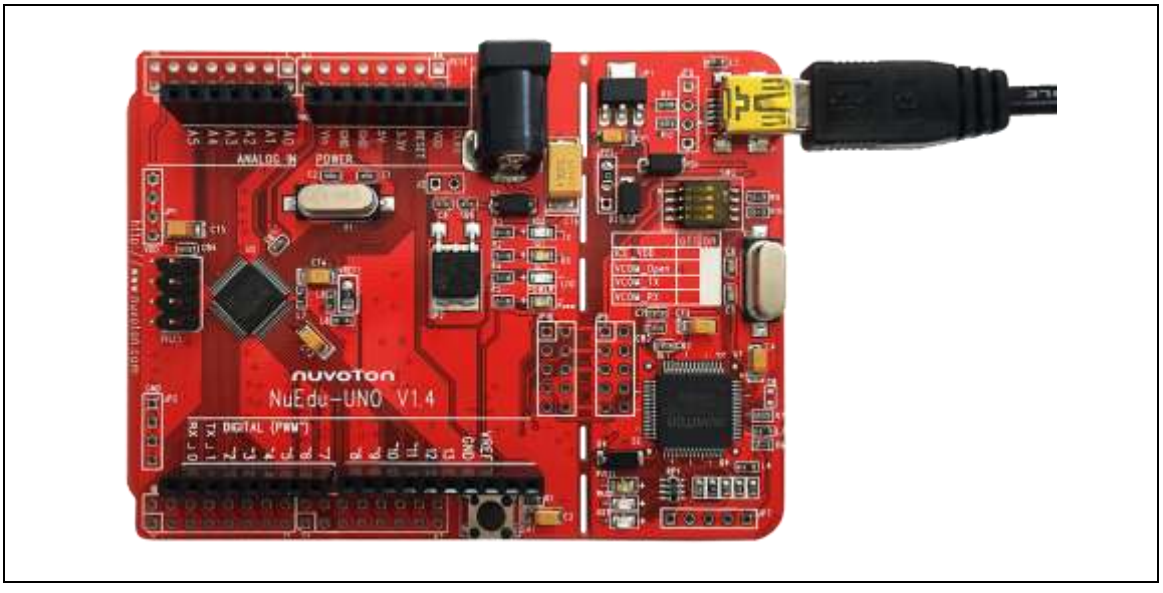

Figure 3-2 USB Connection on NuEdu-UNO

The VCOM function can be used in Arduino IDE, Keil and IAR. To enable VCOM function on Nu-Link Me, all SW2 pins need to turn to ON position. Otherwise, turn pin2~4 to OFF position. For the usage of different NuEdu Evaluation Boards, please refer to the user manual respectively.

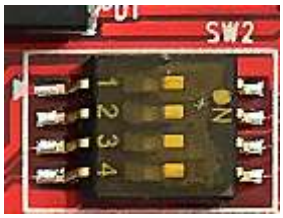

Figure 3-3 Switch Default as UART Mode

Pin Number	Pin Name	Disable VCOM Mode	Enable VCOM Mode
1	ICE_VCC	On	On
2	VCOM_Open	Off	On
3	VCOM_TX	Off	On
4	VCOM_RX	Off	On

4 NUEDU EVALUATION BOARD PIN OUT

This chapter shows the pin out of different NuEdu Evaluation Boards.

4.1 NuEdu-M451 Board

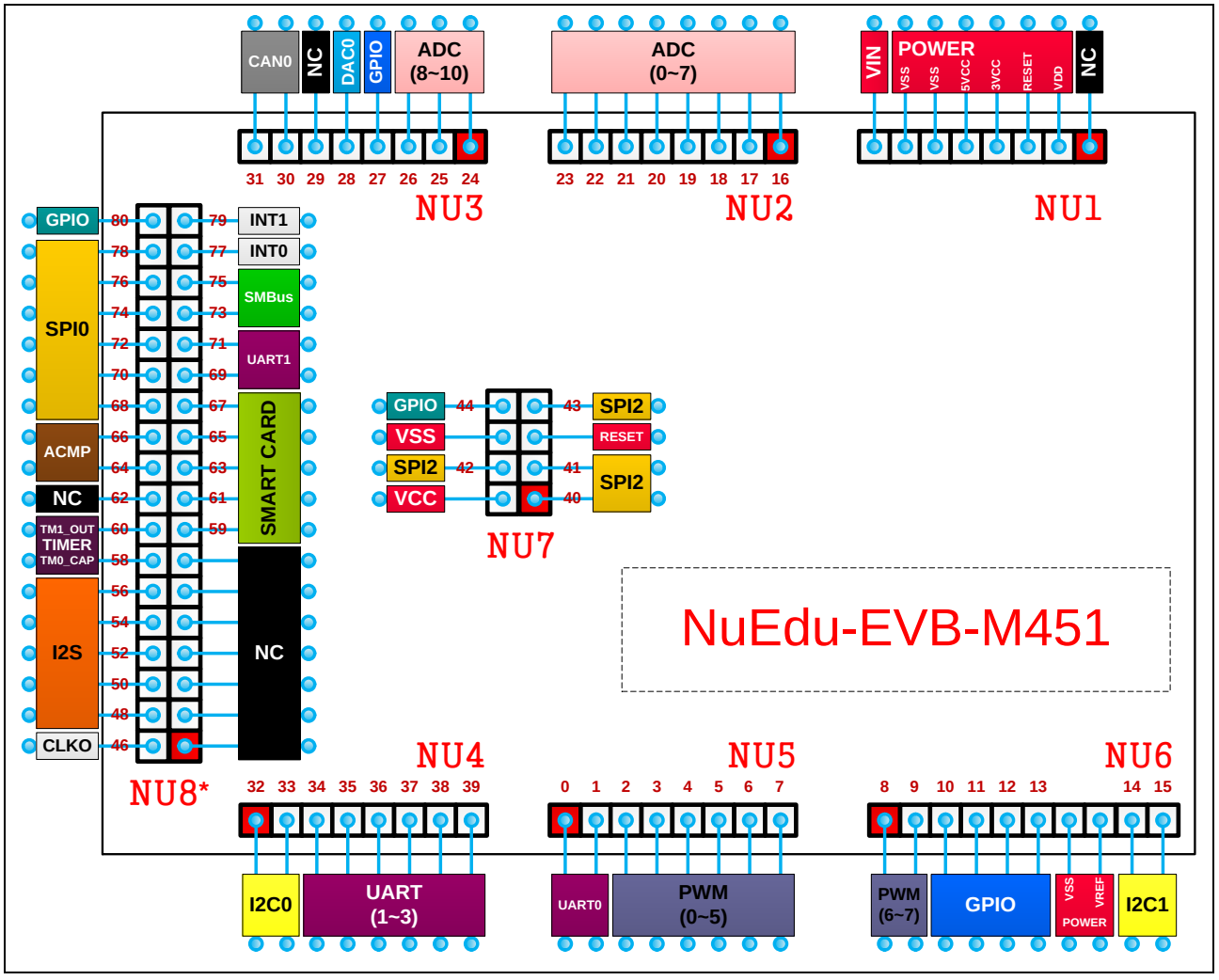

Figure 4-1 NuEdu-M451 Pin Out

4.2 NuEdu-NUC240 Board

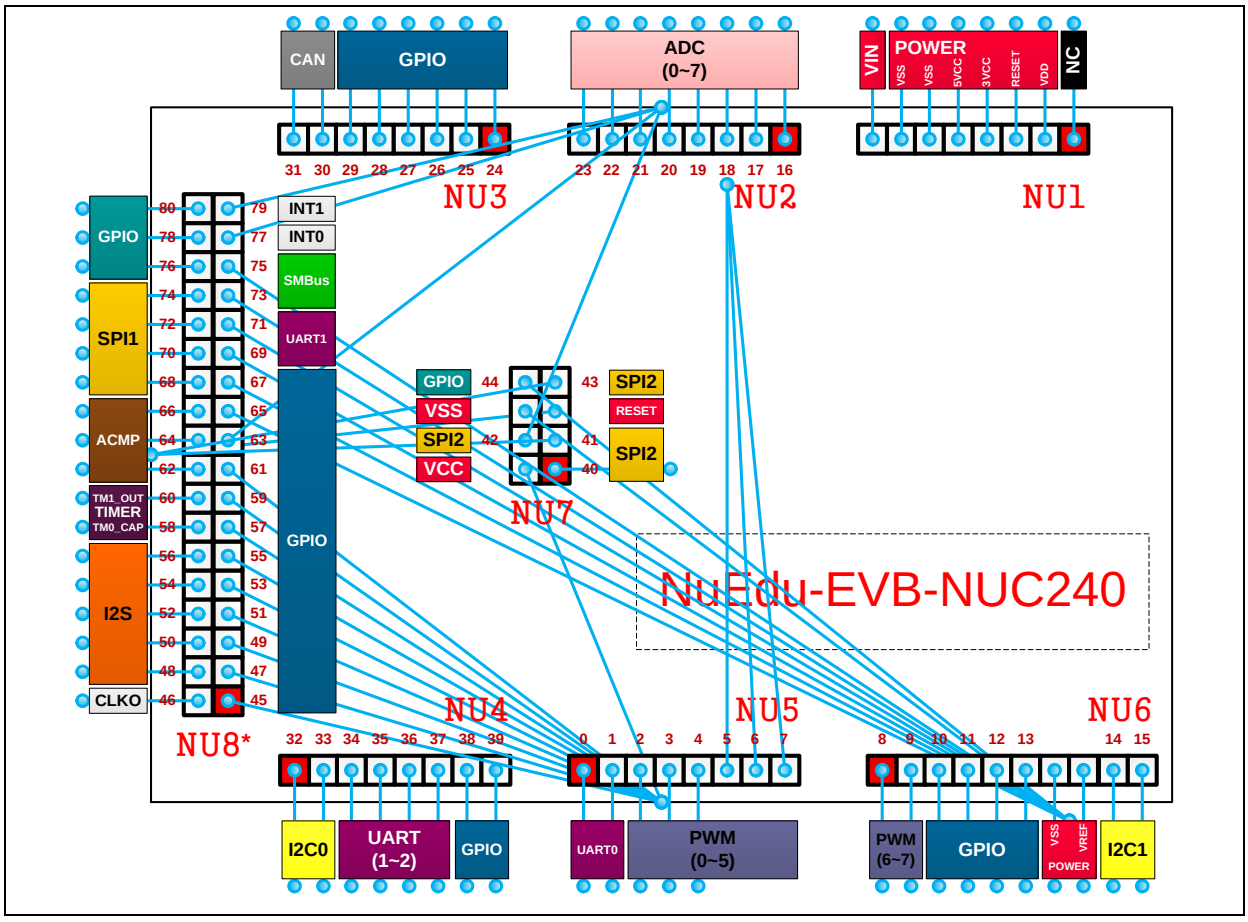

Figure 4-2 NuEdu-NUC240 Pin Out

4.3 NuEdu-NANO130 Board

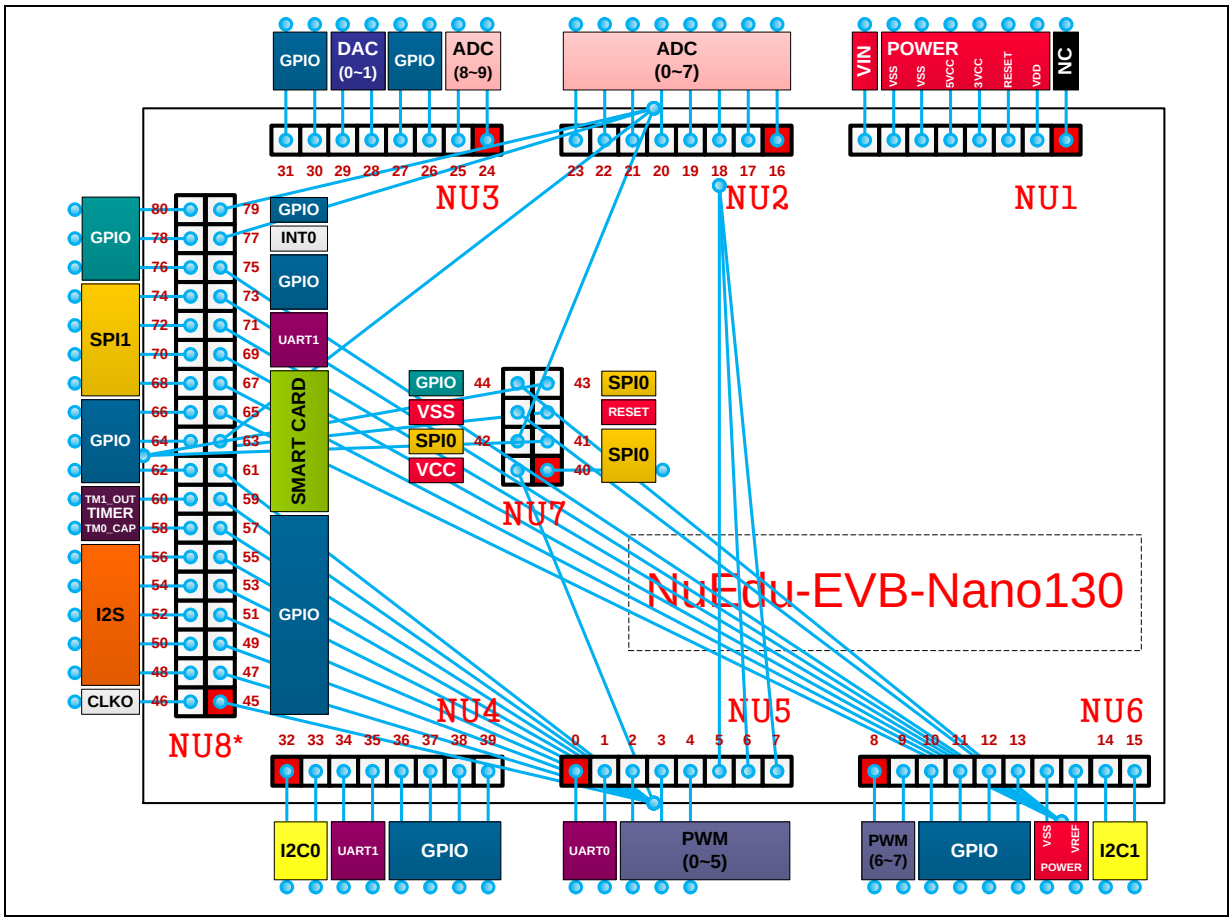

Figure 4-3 NuEdu-NANO130 Pin Out

4.4 NuEdu-UNO Board

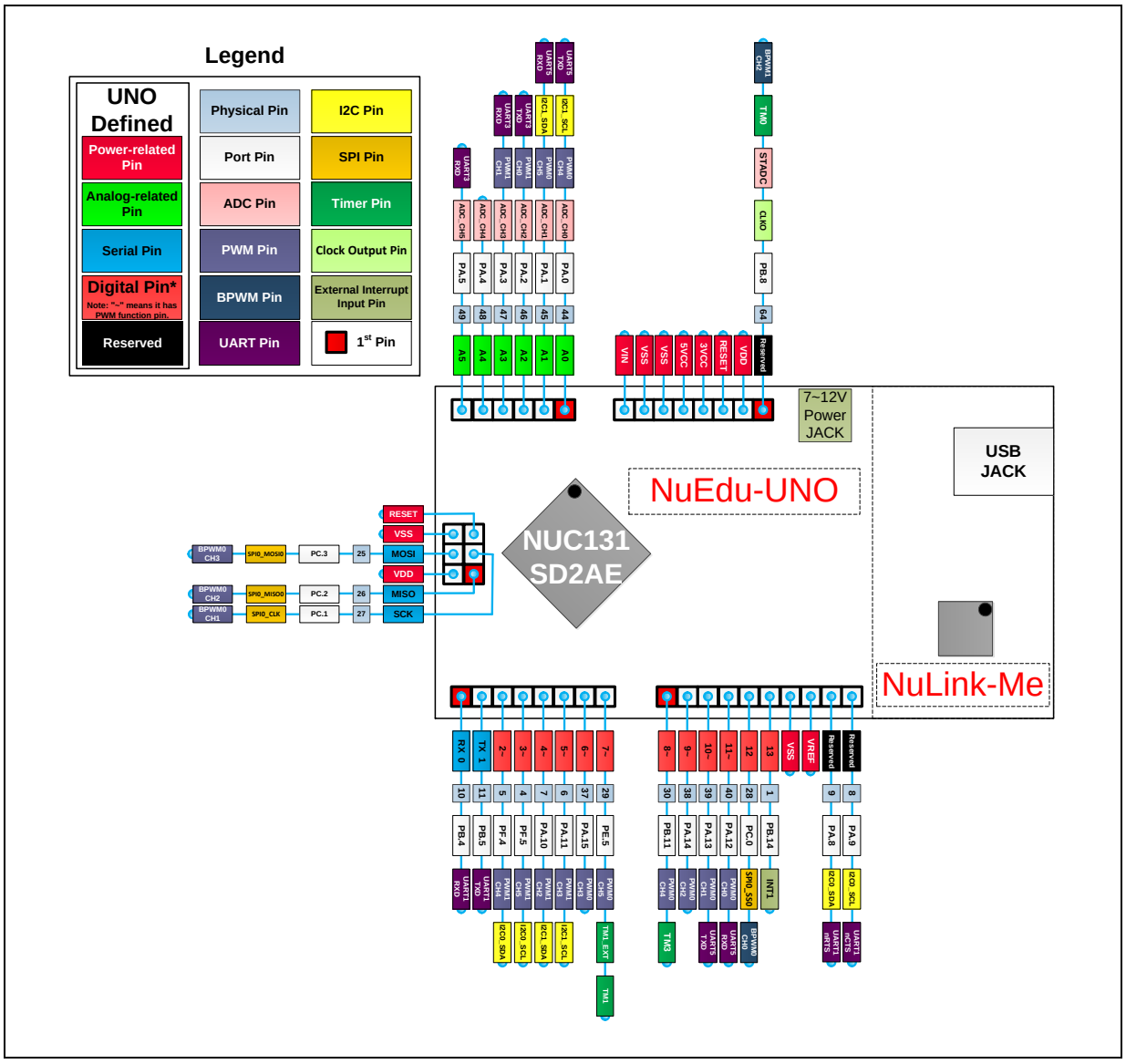

Figure 4-4 NuEdu-UNO Pin Out

5 SAMPLE CODE

5.1 NuEdu-M451 Board

The following table lists the Arduino samples which have been tested on M451 NuEdu board.

01.Basics	Knock	WiFiWebServer	s02_Shock
AnalogReadSerial	**07.Display**	**EEPROM**	s03_Analog_Hall
BareMinimum	barGraph	eeprom_clear	s04_Button
Blink	RowColumnScanning	eeprom_read	s05_Remote_emission
DigitalReadSerial	**08.Strings**	eeprom_write	s06_Passive_Buzzer
Fade	CharacterAnalysis	**SPI**	s07_Laser_transmit
ReadAnalogVoltage	StringAdditionOperator	LoopBack	s08_full_color_LED
02.Digital	StringAppendOperator	SPIFlashID	s09_Light_break
BlinkWithoutDelay	StringCaseChanges	**Wire**	s10_two_color_LED
Button	StringCharacters	master_reader	s11_Buzzer
Debounce	StringComparisonOperators	master_writer	s12_Analog_temperature
DigitalInputPullup	StringConstructors	programming_EEPROM	s13_Digital_Temperature_Humi
StateChangeDetection	StringIndexOf	slave_receiver	s14_full_color_LED
toneKeyboard	StringLength	slave_sender	s15_mercury_tilt_switch
03.Analog	StringLengthTrim	**CAN_BUS**	s16_Photoresistor
AnalogInOutSerial	StringReplace	receive_check	s17_Relay
AnalogInput	StringStartsWithEndsWith	receive_interrupt	s18_tilt_switch
AnalogWriteMega	StringSubstring	send	s19_mini_reed
Calibration	StringToInt	set_mask_filter_recv	s20_Remote_Receive
Fading	StringToIntRGB	**OneWire**	s21_Joystick_PS2
Smoothing	**10.StarterKit**	DS18x20_Temperature	s22_Linear_Hall
04.Communication	p02_SpaceshipInterface	**NuEdu_Basic**	s23_reed
ASCIITable	p03_LoveOMeter	ADCtoPWM	s24_Flame
Dimmer	p04_ColorMixingLamp	Button	s25_Magic_light_cup
Graph	p06_LightTheremin	Buzzer	s26_Digital_Temperature
Midi	p07_Keyboard	EEPROM	s27_two_color_LED
MultiSerialMega	p08_DigitalHourglass	IRremote	s28_Knock
PhysicalPixel	p09_MotorizedPinwheel	LED	s29_Avoid
ReadASCIIString	p10_Zoetrope	RGBLED	s30_7_color_LED
SerialCallResponse	p14_TweakTheArduinoLogo	SevenSegmentDisplay	s31_Analog_hall_magnetic
SerialCallResponseASCII	p15_HackingButtons	SPIFlash	s32_touch
SerialEvent	**SD**	USB\Keyboard\KeyboardLogout	s33_High_sensitive_voice
VirtualColorMixer	CardInfo	USB\Keyboard\KeyboardMessage	s34_microphone_sound
05.Control	Datalogger	USB\Keyboard\KeyboardReprogr	s35_Finger_measuring_heartbe
Arrays	DumpFile	USB\Keyboard\KeyboardSerial	s36_Tracking
ForLoopIteration	Files	USB\KeyboardAndMouseControl	s37_Rotate_encode
IfStatementConditional	listfiles	USB\Mouse\ButtonMouseControl	
switchCase	ReadWrite	USB\Mouse\JoystickMouseContro	
switchCase2	**WIFI**	USBH\KeyboardController	
WhileStatementConditional	ConnectNoEncryption	USBH\MouseController	
06.Sensors	ConnectWithWPA	**SernsorsKit_37in1**	
ADXL3xx	ScanNetworks	s01_18b20	

5.2 NuEdu-NUC240 Board

The following table lists the Arduino samples which have been tested on NUC240 NuEdu board.

01.Basics	Knock	WiFiWebServer	s04_Button
AnalogReadSerial	**07.Display**	**EEPROM**	s05_Remote_emission
BareMinimum	barGraph	eeprom_clear	s06_Passive_Buzzer
Blink	RowColumnScanning	eeprom_read	s07_Laser_transmit
DigitalReadSerial	**08.Strings**	eeprom_write	s08_full_color_LED
Fade	CharacterAnalysis	**SPI**	s09_Light_break
ReadAnalogVoltage	StringAdditionOperator	LoopBack	s10_two_color_LED
02.Digital	StringAppendOperator	SPIFlashID	s11_Buzzer
BlinkWithoutDelay	StringCaseChanges	**Wire**	s12_Analog_temperature
Button	StringCharacters	master_reader	s13_Digital_Temperature_Hu
Debounce	StringComparisonOperators	master_writer	s14_full_color_LED
DigitalInputPullup	StringConstructors	programming_EEPROM	s15_mercury_tilt_switch
StateChangeDetection	StringIndexOf	slave_receiver	s16_Photoresistor
toneKeyboard	StringLength	slave_sender	s17_Relay
03.Analog	StringLengthTrim	**CAN_BUS**	s18_tilt_switch
AnalogInOutSerial	StringReplace	receive_check	s19_mini_reed
AnalogInput	StringStartsWithEndsWith	receive_interrupt	s20_Remote_Receive
AnalogWriteMega	StringSubstring	send	s21_Joystick_PS2
Calibration	StringToInt	set_mask_filter_recv	s22_Linear_Hall
Fading	StringToIntRGB	**OneWire**	s23_reed
Smoothing	**10.StarterKit**	DS18x20_Temperature	s24_Flame
04.Communication	p02_SpaceshipInterface	**NuEdu_Basic**	s25_Magic_light_cup
ASCIITable	p03_LoveOMeter	ADCtoPWM	s26_Digital_Temperature
Dimmer	p04_ColorMixingLamp	Button	s27_two_color_LED
Graph	p06_LightTheremin	Buzzer	s28_Knock
Midi	p07_Keyboard	EEPROM	s29_Avoid
MultiSerialMega	p08_DigitalHourglass	IRremote	s30_7_color_LED
PhysicalPixel	p09_MotorizedPinwheel	LED	s31_Analog_hall_magnetic
ReadASCIIString	p10_Zoetrope	RGBLED	s32_touch
SerialCallResponse	p14_TweakTheArduinoLogo	SevenSegmentDisplay	s33_High_sensitive_voice
SerialCallResponseASCII	p15_HackingButtons	SPIFlash	s34_microphone_sound
SerialEvent	**SD**	USB\Keyboard\KeyboardLogout	s35_Finger_measuring_heartb
VirtualColorMixer	CardInfo	USB\Keyboard\KeyboardMessage	s36_Tracking
05.Control	Datalogger	USB\Keyboard\KeyboardReprogra	s37_Rotate_encode
Arrays	DumpFile	USB\Keyboard\KeyboardSerial	
ForLoopIteration	Files	USB\KeyboardAndMouseControl	
IfStatementConditional	listfiles	USB\Mouse\ButtonMouseControl	
switchCase	ReadWrite	USB\Mouse\JoystickMouseControl	
switchCase2	**WIFI**	**SernsorsKit_37in1**	
WhileStatementConditional	ConnectNoEncryption	s01_18b20	
06.Sensors	ConnectWithWPA	s02_Shock	
ADXL3xx	ScanNetworks	s03_Analog_Hall	

5.3 NuEdu-NANO130 Board

The following table lists the Arduino samples which have been tested on NANO130 NuEdu board.

01.Basics	Knock	WiFiWebServer	s09_Light_break
AnalogReadSerial	**07.Display**	**EEPROM**	s10_two_color_LED
BareMinimum	barGraph	eeprom_clear	s11_Buzzer
Blink	RowColumnScanning	eeprom_read	s12_Analog_temperature
DigitalReadSerial	**08.Strings**	eeprom_write	s13_Digital_Temperature_Humidity
Fade	CharacterAnalysis	**SPI**	s14_full_color_LED
ReadAnalogVoltage	StringAdditionOperator	LoopBack	s15_mercury_tilt_switch
02.Digital	StringAppendOperator	SPIFlashID	s16_Photoresistor
BlinkWithoutDelay	StringCaseChanges	**Wire**	s17_Relay
Button	StringCharacters	master_reader	s18_tilt_switch
Debounce	StringComparisonOperators	master_writer	s19_mini_reed
DigitalInputPullup	StringConstructors	programming_EEPROM	s20_Remote_Receive
StateChangeDetection	StringIndexOf	slave_receiver	s21_Joystick_PS2
toneKeyboard	StringLength	slave_sender	s22_Linear_Hall
03.Analog	StringLengthTrim	**OneWire**	s23_reed
AnalogInOutSerial	StringReplace	DS18x20_Temperature	s24_Flame
AnalogInput	StringStartsWithEndsWith	**NuEdu_Basic**	s25_Magic_light_cup
AnalogWriteMega	StringSubstring	ADCtoPWM	s26_Digital_Temperature
Calibration	StringToInt	Button	s27_two_color_LED
Fading	StringToIntRGB	Buzzer	s28_Knock
Smoothing	**10.StarterKit**	EEPROM	s29_Avoid
04.Communication	p02_SpaceshipInterface	IRremote	s30_7_color_LED
ASCIITable	p03_LoveOMeter	LED	s31_Analog_hall_magnetic
Dimmer	p04_ColorMixingLamp	RGBLED	s32_touch
Graph	p06_LightTheremin	SevenSegmentDisplay	s33_High_sensitive_voice
Midi	p07_Keyboard	SPIFlash	s34_microphone_sound
MultiSerialMega	p08_DigitalHourglass	USB\Keyboard\KeyboardLogout	s35_Finger_measuring_heartbeat
PhysicalPixel	p09_MotorizedPinwheel	USB\Keyboard\KeyboardMessage	s36_Tracking
ReadASCIIString	p10_Zoetrope	USB\Keyboard\KeyboardReprogram	s37_Rotate_encode
SerialCallResponse	p14_TweakTheArduinoLogo	USB\Keyboard\KeyboardSerial	
SerialCallResponseASCII	p15_HackingButtons	USB\KeyboardAndMouseControl	
SerialEvent	**SD**	USB\Mouse\ButtonMouseControl	
VirtualColorMixer	CardInfo	USB\Mouse\JoystickMouseControl	
05.Control	Datalogger	**SernsorsKit_37in1**	
Arrays	DumpFile	s01_18b20	
ForLoopIteration	Files	s02_Shock	
IfStatementConditional	listfiles	s03_Analog_Hall	
switchCase	ReadWrite	s04_Button	
switchCase2	**WIFI**	s05_Remote_emission	
WhileStatementConditional	ConnectNoEncryption	s06_Passive_Buzzer	
06.Sensors	ConnectWithWPA	s07_Laser_transmit	
ADXL3xx	ScanNetworks	s08_full_color_LED	

5.4 NuEdu-UNO Board

The following table lists the Arduino samples which have been tested on NUC131 NuEdu board.

01.Basics	**07.Display**	**EEPROM**	s17_Relay
AnalogReadSerial	barGraph	eeprom_clear	s18_tilt_switch
BareMinimum	RowColumnScanning	eeprom_read	s19_mini_reed
Blink	**08.Strings**	eeprom_write	s20_Remote_Receive
DigitalReadSerial	CharacterAnalysis	**SPI**	s21_Joystick_PS2
Fade	StringAdditionOperator	LoopBack	s22_Linear_Hall
ReadAnalogVoltage	StringAppendOperator	SPIFlashID	s23_reed
02.Digital	StringCaseChanges	**Wire**	s24_Flame
BlinkWithoutDelay	StringCharacters	master_reader	s25_Magic_light_cup
Button	StringComparisonOperators	master_writer	s26_Digital_Temperature
Debounce	StringConstructors	programming_EEPROM	s27_two_color_LED
DigitalInputPullup	StringIndexOf	slave_receiver	s28_Knock
StateChangeDetection	StringLength	slave_sender	s29_Avoid
toneKeyboard	StringLengthTrim	**OneWire**	s30_7_color_LED
03.Analog	StringReplace	DS18x20_Temperature	s31_Analog_hall_magnetic
AnalogInOutSerial	StringStartsWithEndsWith	**NuEdu_Basic**	s32_touch
AnalogInput	StringSubstring	ADCtoPWM	s33_High_sensitive_voice
AnalogWriteMega	StringToInt	Button	s34_microphone_sound
Calibration	StringToIntRGB	Buzzer	s35_Finger_measuring_heartbeat
Fading	**10.StarterKit**	EEPROM	s36_Tracking
Smoothing	p02_SpaceshipInterface	IRremote	s37_Rotate_encode
04.Communication	p03_LoveOMeter	LED	
ASCIITable	p04_ColorMixingLamp	RGBLED	
Dimmer	p06_LightTheremin	SevenSegmentDisplay	
Graph	p07_Keyboard	SPIFlash	
Midi	p08_DigitalHourglass	**SernsorsKit_37in1**	
PhysicalPixel	p09_MotorizedPinwheel	s01_18b20	
ReadASCIIString	p10_Zoetrope	s02_Shock	
SerialCallResponse	p14_TweakTheArduinoLogo	s03_Analog_Hall	
SerialCallResponseASCII	p15_HackingButtons	s04_Button	
SerialEvent	**SD**	s05_Remote_emission	
VirtualColorMixer	CardInfo	s06_Passive_Buzzer	
05.Control	Datalogger	s07_Laser_transmit	
Arrays	DumpFile	s08_full_color_LED	
ForLoopIteration	Files	s09_Light_break	
IfStatementConditional	listfiles	s10_two_color_LED	
switchCase	ReadWrite	s11_Buzzer	
switchCase2	**WiFi**	s12_Analog_temperature	
WhileStatementConditional	ConnectNoEncryption	s13_Digital_Temperature_Humidity	
06.Sensors	ConnectWithWPA	s14_full_color_LED	
ADXL3xx	ScanNetworks	s15_mercury_tilt_switch	
Knock	WiFiWebServer	s16_Photoresistor	

6 REVISION HISTORY

Date	Revision	Description
2014.11.10	1.00	1. Initially issued.
2015.3.20	1.01	1. Merged NuEdu-M451, NuEdu-NUC240, NuEdu-NANO130, NuEdu-UNO, and NuMaker-TRIO into the same platform group. 2. Updated sample list to include SernsorsKit_37in1 samples.

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