

# EXT.IO2

SKU:U011-B



## Description

**EXT.IO2** is an **IO extended unit**, based on STM32F030 main controller, using I2C communication interface and providing 8 IO expansion. Each IO supports independent configuration of **digital I/O**, **ADC**, **SERVO control**, **RGB LED control** modes. Supports configuration of device I2C address, which means that users can mount multiple **EXT.IO2** UNITS on the same I2C BUS to extend more IO resources. Suitable for multiple digital/analog signal acquisition, with lighting/servo control applications.

## Product Features

- 8-channel input and output expansion.
  - Digital I/O
  - ADC input
  - SERVO control (PWM)
  - RGB LED control
- I2C communication interface:
  - Supports configuration of I2C address

## Included

- 1x EXT.IO2 UNIT
- 1x I2C 0-4B cable

# Applications

- IO Expansion
- Servo Control
- Multiple lighting control
- Multiple analog signal acquisition

# Specifications

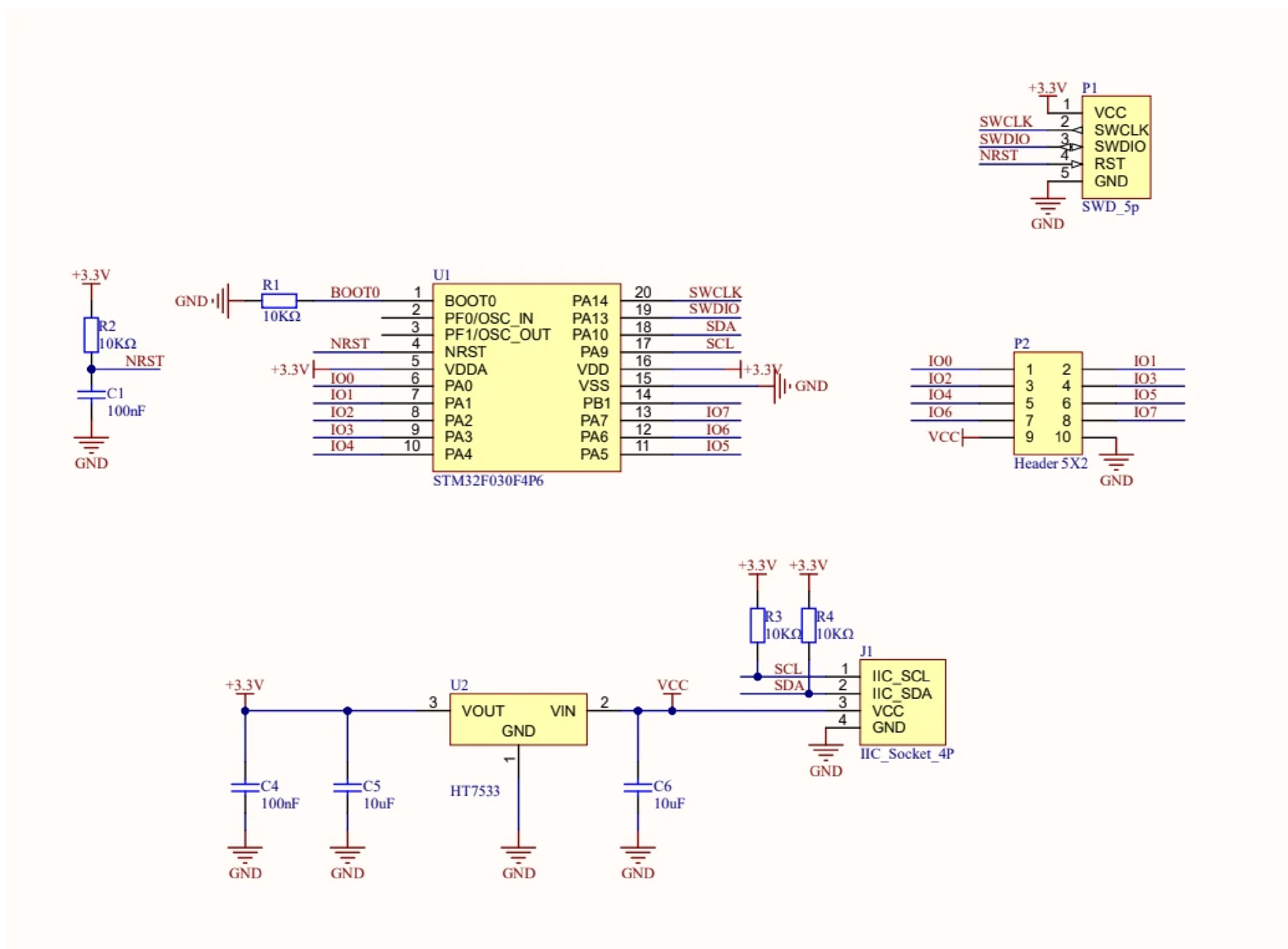
Specification	Parameters
MCU	STM32F030
I2C Address	0x45(default)
Number of IO extensions	8
IO interface PIN spacing	2.54mm
IOSupport Mode	Digital input/output, ADC, SERVO control, RGB LED control
IO Input/Output Level Support	3.3V
Net Weight	5g
Gross Weight	13g
Product Size	32*24*11mm
Package Size	93*138mm



# Pin Mapping

M5Core(PORT A)	GPIO22	GPIO21	5V	GND
EXT.IO2 Unit	SCL	SDA	5V	GND

# Schematics



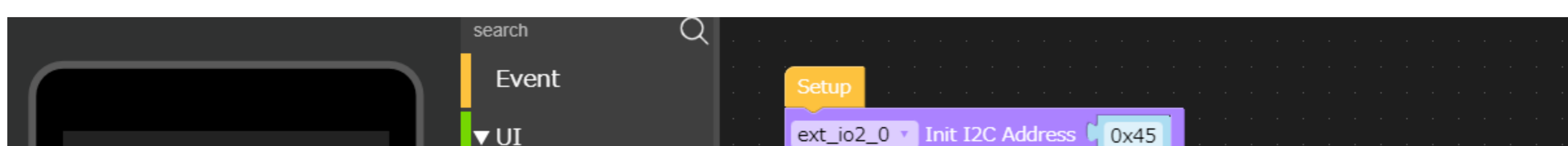
# Example

## Arduino

- ADC Input
- Digital Input/Output
- RGB LED Control
- Servo Control

## UIFlow example

- Digital Input

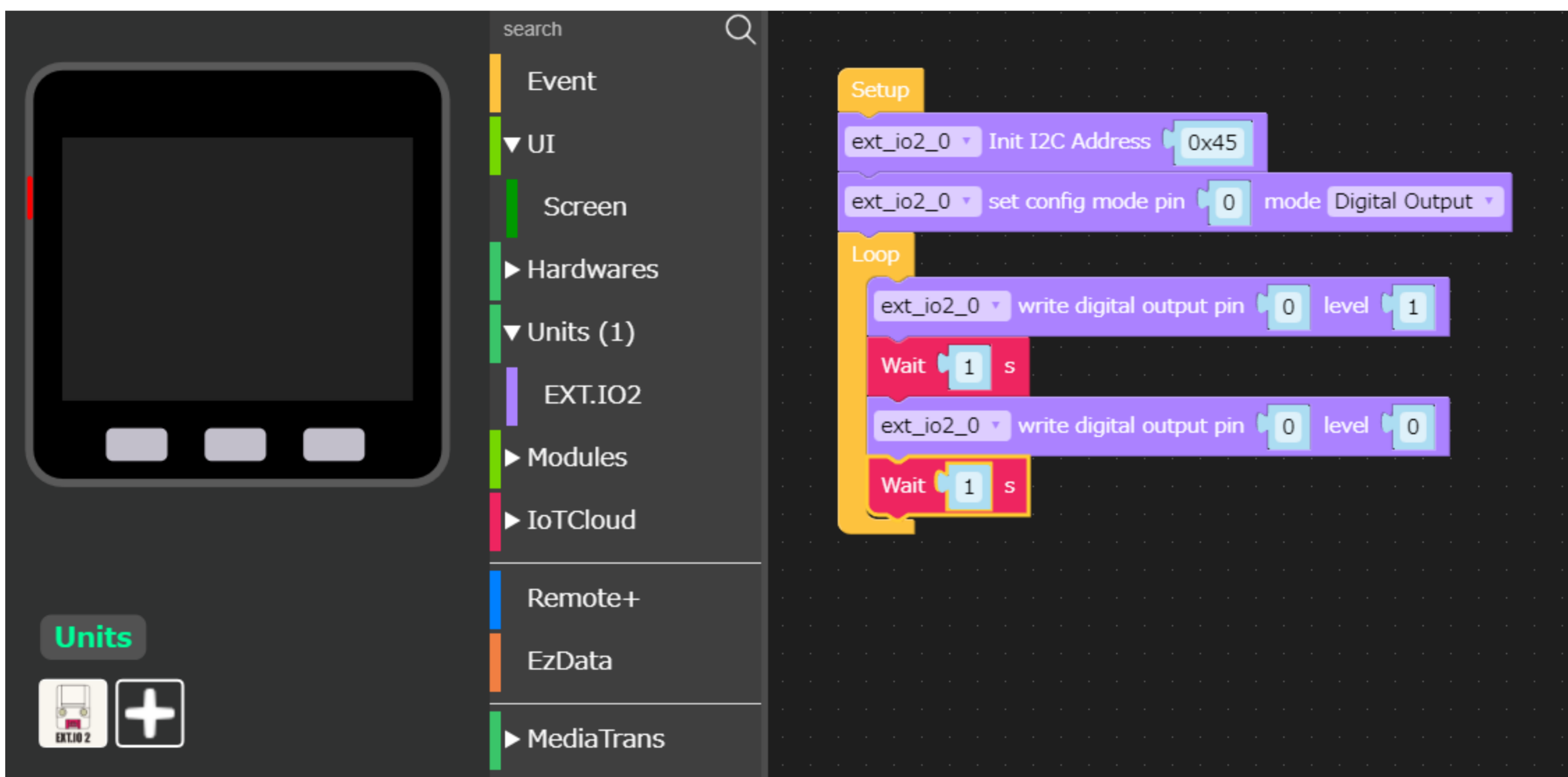




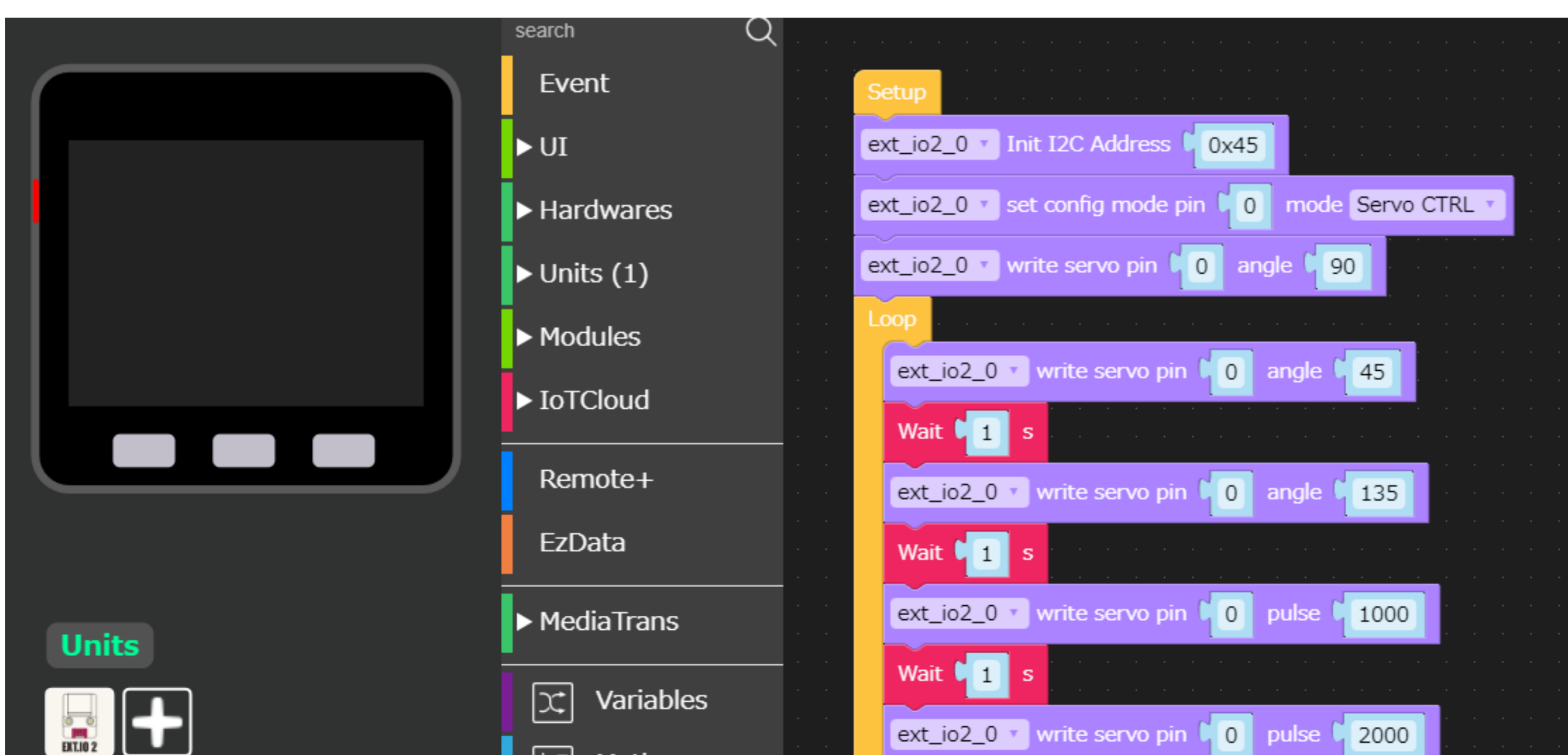
o Analog Input



o Digital Output

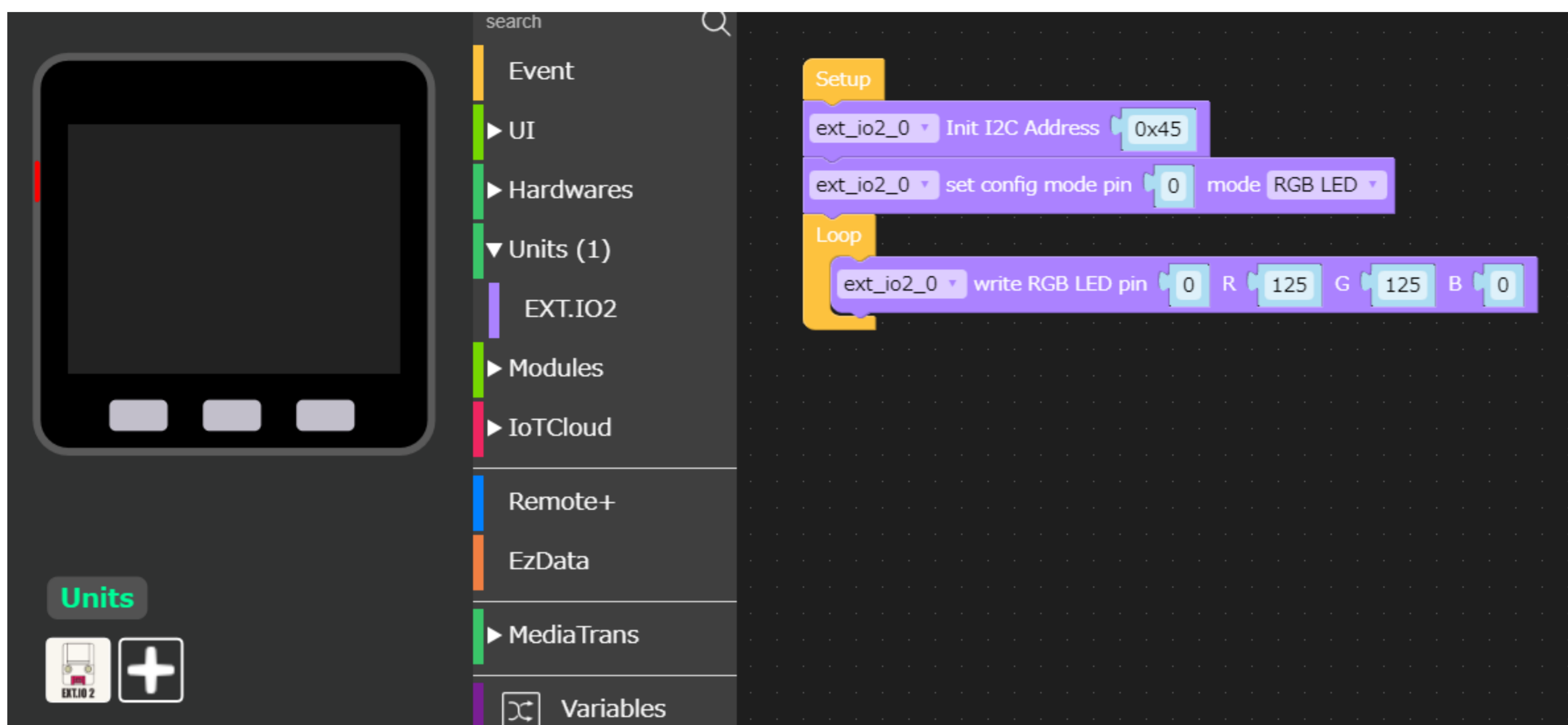


o Servo Control





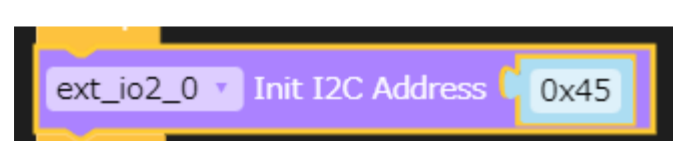
- RGB LED



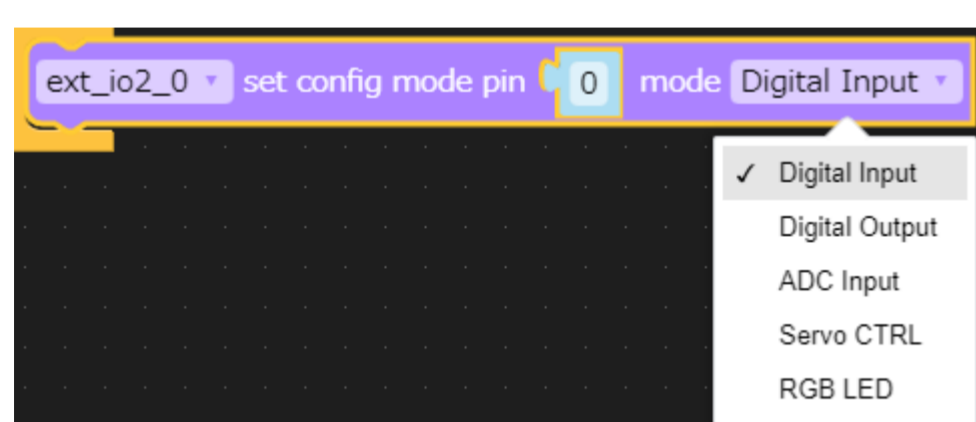
# UIFlow

## Init:

- Init Device

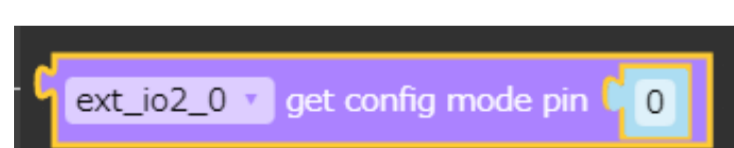


- set config mode pin

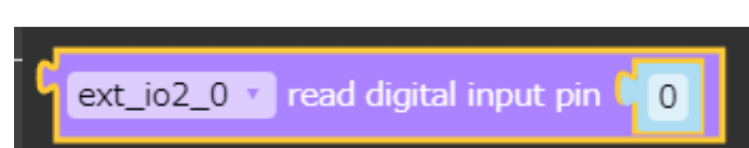


## Read:

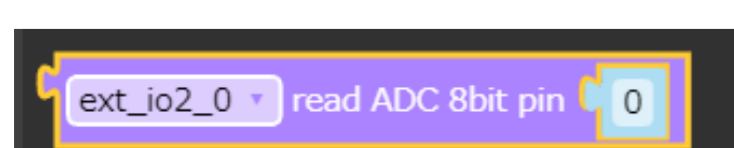
- get config mode



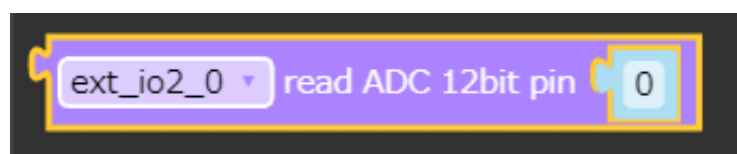
- read digital input



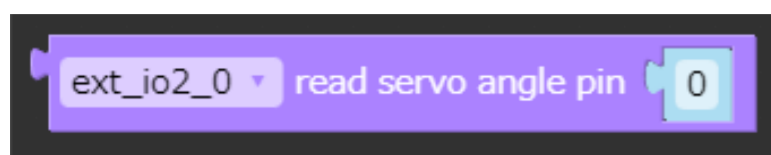
- read ADC 8bit



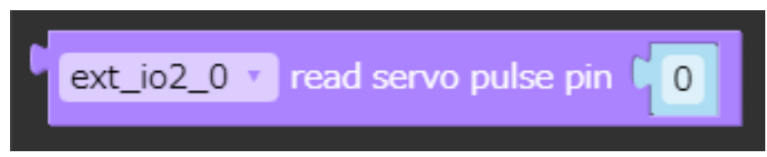
- read ADC 12bit



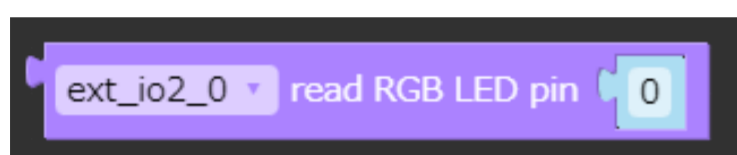
- read servo angle



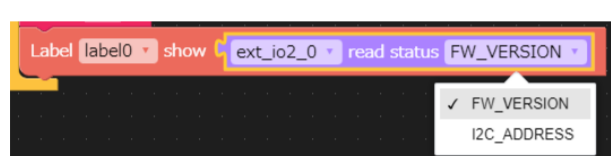
- read servo pulse



- read RGB LED

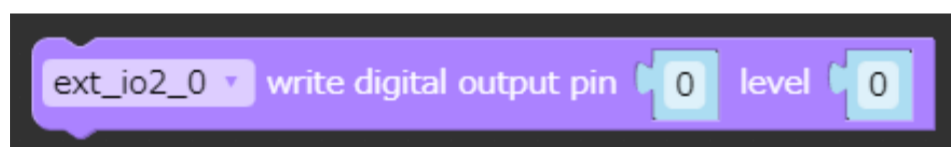


- read status

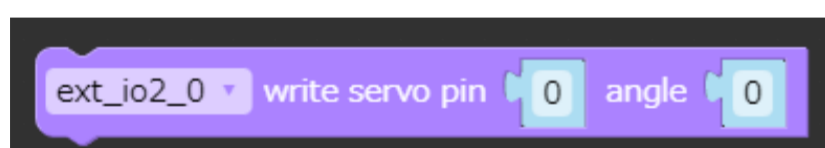


## Write:

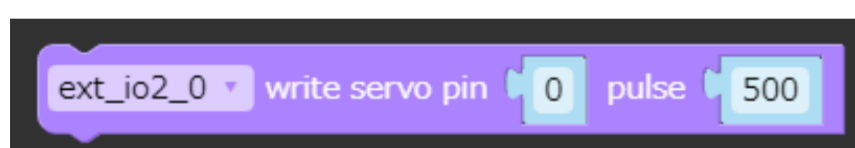
- write digital output



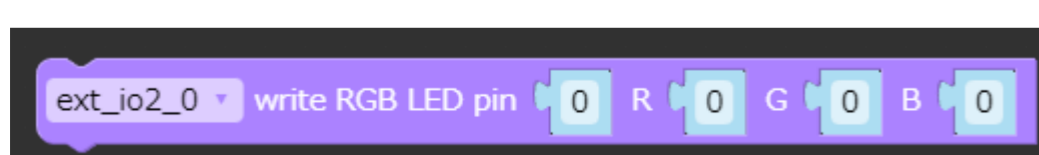
- write servo angle



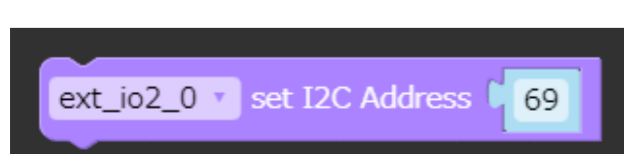
- write servo pulse



- write RGB LED



- write I2C Address



# Firmware

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# Communication protocols

## MODE CONFIG

REG	DESC	LEN	R/W
0x00	MODE_CH_1	1 BYTE	R/W
0x01	MODE_CH_2	1 BYTE	R/W
0x02	MODE_CH_3	1 BYTE	R/W
0x03	MODE_CH_4	1 BYTE	R/W
0x04	MODE_CH_5	1 BYTE	R/W
0x05	MODE_CH_6	1 BYTE	R/W
0x06	MODE_CH_7	1 BYTE	R/W
0x07	MODE_CH_8	1 BYTE	R/W

- o Value:

**DIGITAL\_INPUT\_MODE=0**  
**DIGITAL\_OUTPUT\_MODE=1**  
**ADC\_INPUT\_MODE=2**  
**SERVO\_CTL\_MODE=3**  
**RGB\_LED\_MODE=4**

## DIGITAL INPUT/OUTPUT

REG	DESC	LEN	R/W
0x10	OUTPUT_CTL_REG_CH_1	1 BYTE	W
0x11	OUTPUT_CTL_REG_CH_2	1 BYTE	W

0x12	OUTPUT_CTL_REG_CH_3	1 BYTE	W
0x13	OUTPUT_CTL_REG_CH_4	1 BYTE	W
0x14	OUTPUT_CTL_REG_CH_5	1 BYTE	W
0x15	OUTPUT_CTL_REG_CH_6	1 BYTE	W
0x16	OUTPUT_CTL_REG_CH_7	1 BYTE	W
0x17	OUTPUT_CTL_REG_CH_8	1 BYTE	W
0x20	DIGITAL_INPUT_REG_CH_1	1 BYTE	R
0x21	DIGITAL_INPUT_REG_CH_2	1 BYTE	R
0x22	DIGITAL_INPUT_REG_CH_3	1 BYTE	R
0x23	DIGITAL_INPUT_REG_CH_4	1 BYTE	R
0x24	DIGITAL_INPUT_REG_CH_5	1 BYTE	R
0x25	DIGITAL_INPUT_REG_CH_6	1 BYTE	R
0x26	DIGITAL_INPUT_REG_CH_7	1 BYTE	R
0x27	DIGITAL_INPUT_REG_CH_8	1 BYTE	R

○ Value:

HIGH:1 / LOW:0

## 8B ANALOG INPUT

REG	DESC	LEN	R/W
0x30	ANALOG_INPUT_8B_REG_CH_1 Value: 0-255	1 BYTE	R
0x31	ANALOG_INPUT_8B_REG_CH_2 Value: 0-255	1 BYTE	R
0x32	ANALOG_INPUT_8B_REG_CH_3 Value: 0-255	1 BYTE	R



REG	DESC	LEN	R/W
0x33	ANALOG_INPUT_8B_REG_CH_4 Value: 0-255	1 BYTE	R
0x34	ANALOG_INPUT_8B_REG_CH_5 Value: 0-255	1 BYTE	R
0x35	ANALOG_INPUT_8B_REG_CH_6 Value: 0-255	1 BYTE	R
0x36	ANALOG_INPUT_8B_REG_CH_7 Value: 0-255	1 BYTE	R
0x37	ANALOG_INPUT_8B_REG_CH_8 Value: 0-255	1 BYTE	R

## 12B ANALOG INPUT

REG	DESC	LEN	R/W
0x40	ANALOG_INPUT_12B_REG_CH_1 Value: 0-4095	2 BYTE	R
0x42	ANALOG_INPUT_12B_REG_CH_2 Value: 0-4095	2 BYTE	R
0x44	ANALOG_INPUT_12B_REG_CH_3 Value: 0-4095	2 BYTE	R
0x46	ANALOG_INPUT_12B_REG_CH_4 Value: 0-4095	2 BYTE	R
0x48	ANALOG_INPUT_12B_REG_CH_5 Value: 0-4095	2 BYTE	R
0x4A	ANALOG_INPUT_12B_REG_CH_6 Value: 0-4095	2 BYTE	R
0x4C	ANALOG_INPUT_12B_REG_CH_7 Value: 0-4095	2 BYTE	R

0x4C	Value: 0-4095	2 BYTE	R
0x4E	ANALOG_INPUT_12B_REG_CH_8 Value: 0-4095	2 BYTE	R

## SERVO ANGLE CTL

REG	DESC	LEN	R/W
0x50	SERVO_ANGLE_8B_REG_CH_1 Value: 0-180deg	1 BYTE	R/W
0x51	SERVO_ANGLE_8B_REG_CH_2 Value: 0-180deg	1 BYTE	R/W
0x52	SERVO_ANGLE_8B_REG_CH_3 Value: 0-180deg	1 BYTE	R/W
0x53	SERVO_ANGLE_8B_REG_CH_4 Value: 0-180deg	1 BYTE	R/W
0x54	SERVO_ANGLE_8B_REG_CH_5 Value: 0-180deg	1 BYTE	R/W
0x55	SERVO_ANGLE_8B_REG_CH_6 Value: 0-180deg	1 BYTE	R/W
0x56	SERVO_ANGLE_8B_REG_CH_7 Value: 0-180deg	1 BYTE	R/W
0x57	SERVO_ANGLE_8B_REG_CH_8 Value: 0-180deg	1 BYTE	R/W

## SERVO PULSE CTL

REG	DESC	LEN	R/W
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REG	DESC	LEN	R/W
0x60	SERVO_PULSE_16B_REG_CH_1 Value: 500-2500us	2 BYTE	R/W
0x62	SERVO_PULSE_16B_REG_CH_2 Value: 500-2500us	2 BYTE	R/W
0x64	SERVO_PULSE_16B_REG_CH_3 Value: 500-2500us	2 BYTE	R/W
0x66	SERVO_PULSE_16B_REG_CH_4 Value: 500-2500us	2 BYTE	R/W
0x68	SERVO_PULSE_16B_REG_CH_5 Value: 500-2500us	2 BYTE	R/W
0x6A	SERVO_PULSE_16B_REG_CH_6 Value: 500-2500us	2 BYTE	R/W
0x6C	SERVO_PULSE_16B_REG_CH_7 Value: 500-2500us	2 BYTE	R/W
0x6E	SERVO_PULSE_16B_REG_CH_8 Value: 500-2500us	2 BYTE	R/W

## RGB LED CTL

REG	DESC	LEN	R/W
0x70	RGB_24B_REG_CH_1: RGB 888	3 BYTE	R/W
0x73	RGB_24B_REG_CH_2: RGB 888	3 BYTE	R/W
0x76	RGB_24B_REG_CH_3: RGB 888	3 BYTE	R/W
0x79	RGB_24B_REG_CH_4: RGB 888	3 BYTE	R/W
0x7C	RGB_24B_REG_CH_5: RGB 888	3 BYTE	R/W
0x7F	RGB_24B_REG_CH_6: RGB 888	3 BYTE	R/W
0x82	RGB_24B_REG_CH_7: RGB 888	3 BYTE	R/W

0x85	RGB_24B_REG_CH_8: RGB 888	3 BYTE	R/W
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Note: Do not write to the I2C address configuration register repeatedly at high frequency.

## CONFIG

REG	DESC	LEN	R/W
0xFE	FW VERSION	1 BYTE	R
0xFF	I2C ADDR CONFIG (warn: Repeated writing may cause partition damage)	1 BYTE	R/W

## FAQ