

Arduino UNO IO Library for Codesys on Raspberry

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Order of steps is important!

You can brick your Raspberry if you connect Arduino's 5V to Raspberry's 3.3 V!

→ Be sure to upload the Arduino sketch before wiring and connecting the devices!

Or use a level shifter 3.3 <-> 5.0

Step 1: Upload the Arduino UNO sketch slave.ino

It is responsible for I2C communication and IO functionality of the Arduino.

Define for each Arduino the variable I2C_ADDRESS before flashing (number between 1 and 127).

All steps from here are in Codesys

Step 2: Install device ArduinoUNO.devdesc.xml

Step 3: Install library IoDrvArduinoUNO.library

Step 4: Configure your Arduino UNO in the setting tab with I2C address and IOs.

Use your Arduinos like any other IO device!

Remarks:

Arduino UNO's analog input A4 and A5 are used for I2C. So you cannot use them with this library.

Analog input is 10 bit.

Analog output (PWM) is 8 bit.

In each cycle the raspberry sends 12 bytes to the Arduino and receives 10 bytes from the Arduino (independently from the settings).

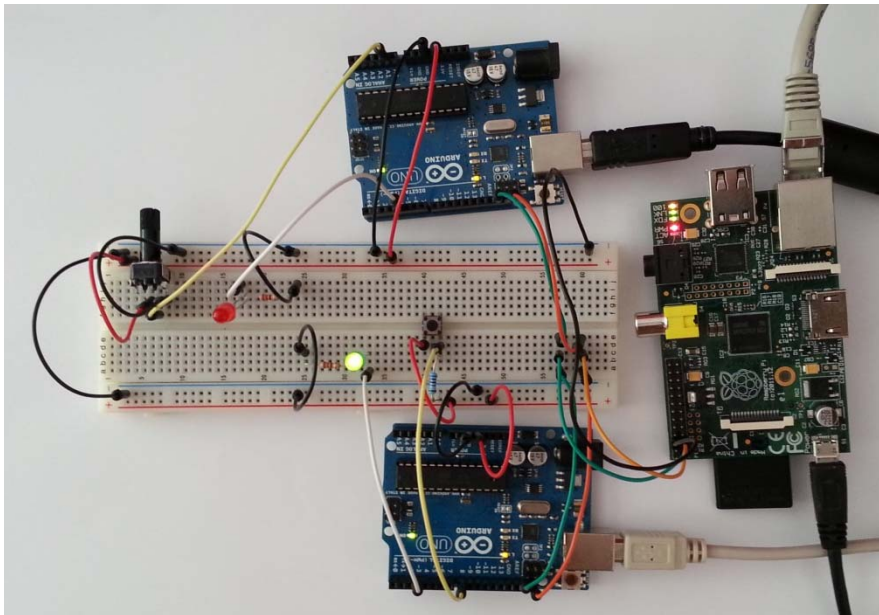
Example:

Two Arduino UNO and one raspberry
connected with I2C (SDA and SCL), same ground

Arduino_1: - Pin D4 is used for digital output
- Pin A1 is used for analog input

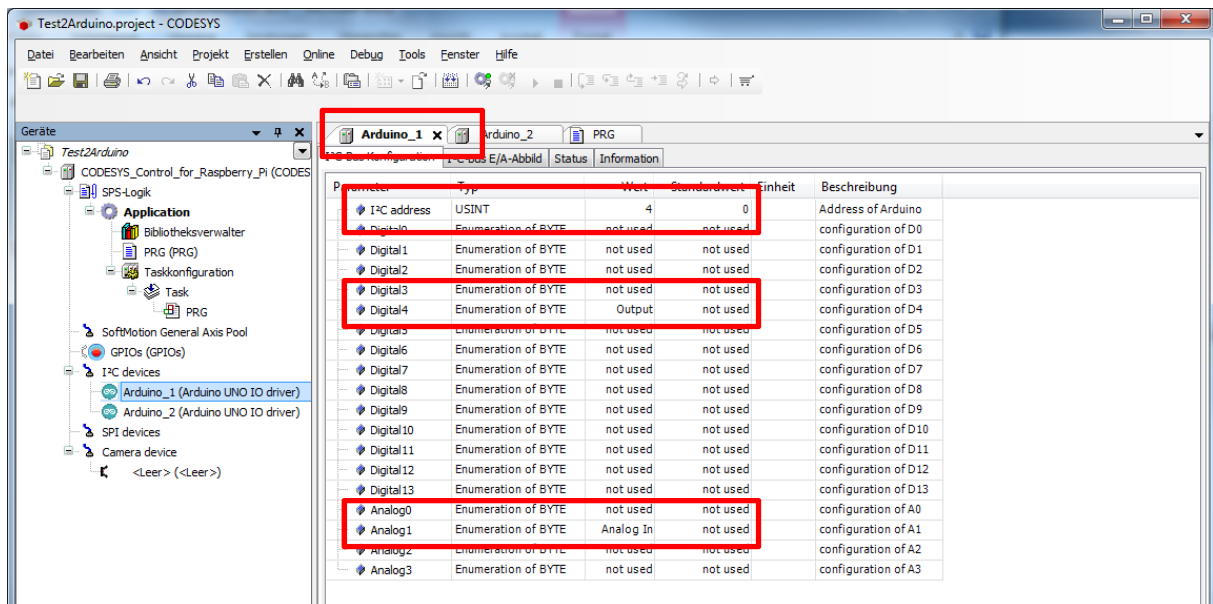
Arduino_2: - Pin D3 is used for analog output (PWM)
- Pin D8 is used for digital input

A potentiometer is attached to the analog input of Arduino_1.
A button is attached to the digital input of Arduino_2.
LEDs are attached to the outputs.



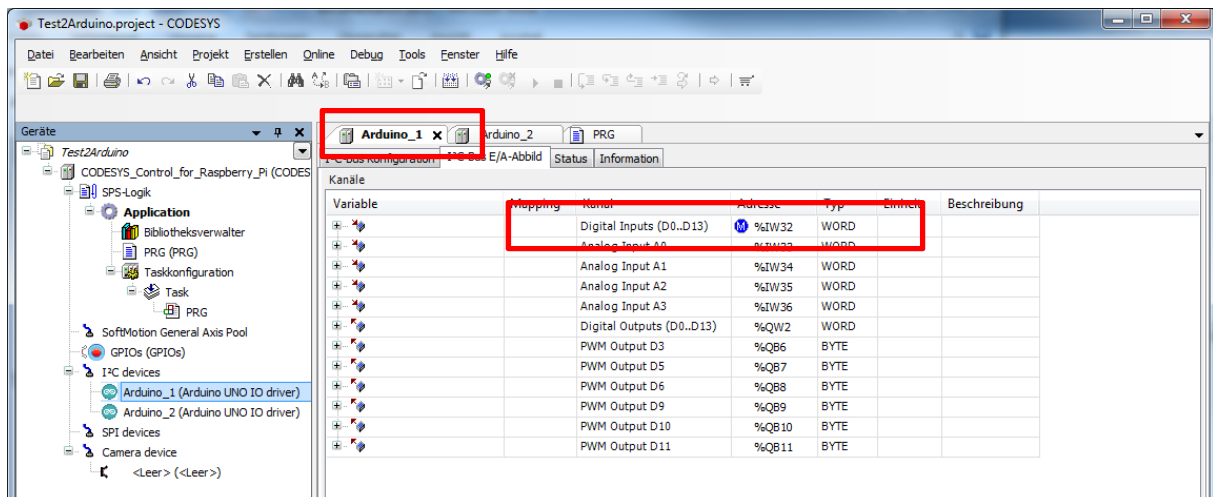
Codesys screenshots:

Configuration of Arduino 1:



The screenshot shows the CODESYS interface for 'Test2Arduino.project'. The 'Geräte' (Devices) tree on the left shows 'Arduino_1 (Arduino UNO IO driver)' selected. The main window displays the 'Parameter' table for the selected device.

Parameter	Typ	Wert	Standardwert	Einheit	Beschreibung
I2C address	USINT	4	0		Address of Arduino
Digital0	Enumeration of BYTE	not used	not used		configuration of D0
Digital1	Enumeration of BYTE	not used	not used		configuration of D1
Digital2	Enumeration of BYTE	not used	not used		configuration of D2
Digital3	Enumeration of BYTE	not used	not used		configuration of D3
Digital4	Enumeration of BYTE	Output	not used		configuration of D4
Digital5	Enumeration of BYTE	not used	not used		configuration of D5
Digital6	Enumeration of BYTE	not used	not used		configuration of D6
Digital7	Enumeration of BYTE	not used	not used		configuration of D7
Digital8	Enumeration of BYTE	not used	not used		configuration of D8
Digital9	Enumeration of BYTE	not used	not used		configuration of D9
Digital10	Enumeration of BYTE	not used	not used		configuration of D10
Digital11	Enumeration of BYTE	not used	not used		configuration of D11
Digital12	Enumeration of BYTE	not used	not used		configuration of D12
Digital13	Enumeration of BYTE	not used	not used		configuration of D13
Analog0	Enumeration of BYTE	not used	not used		configuration of A0
Analog1	Enumeration of BYTE	Analog In	not used		configuration of A1
Analog2	Enumeration of BYTE	not used	not used		configuration of A2
Analog3	Enumeration of BYTE	not used	not used		configuration of A3



The screenshot shows the CODESYS interface for 'Test2Arduino.project'. The 'Geräte' (Devices) tree on the left shows 'Arduino_1 (Arduino UNO IO driver)' selected. The main window displays the 'Kanäle' (Channels) table for the selected device.

Variable	Mapping	Kanal	Adresse	Typ	Einheit	Beschreibung
		Digital Inputs (D0..D13)	%IW32	WORD		
		Analog Input A0	%IW33	WORD		
		Analog Input A1	%IW34	WORD		
		Analog Input A2	%IW35	WORD		
		Analog Input A3	%IW36	WORD		
		Digital Outputs (D0..D13)	%QW2	WORD		
		PWM Output D3	%QB6	BYTE		
		PWM Output D5	%QB7	BYTE		
		PWM Output D6	%QB8	BYTE		
		PWM Output D9	%QB9	BYTE		
		PWM Output D10	%QB10	BYTE		
		PWM Output D11	%QB11	BYTE		

Configuration of Arduino 2:

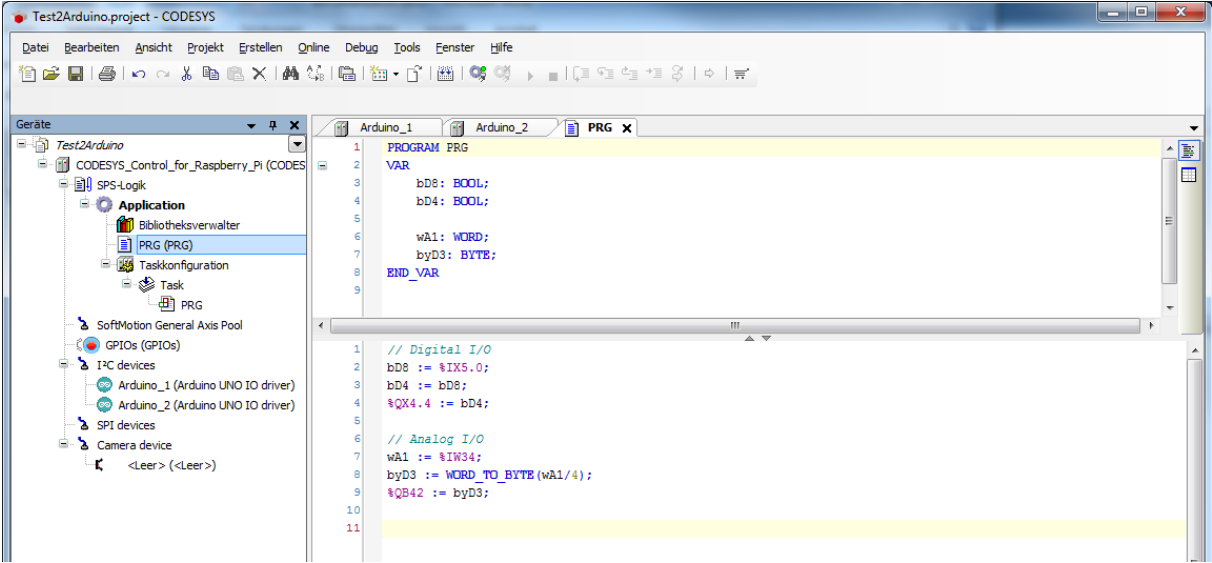
The screenshot shows the 'Parameter' configuration window for 'Arduino_2'. The table below lists the parameters:

Parameter	Typ	Wert	Standardwert	Einheit	Beschreibung
I2C address	USINT	5	0		Address of Arduino
Digital0	Enumeration of BYTE	not used	not used		configuration of D0
Digital1	Enumeration of BYTE	not used	not used		configuration of D1
Digital2	Enumeration of BYTE	not used	not used		configuration of D2
Digital3	Enumeration of BYTE	PWM	not used		configuration of D3
Digital4	Enumeration of BYTE	not used	not used		configuration of D4
Digital5	Enumeration of BYTE	not used	not used		configuration of D5
Digital6	Enumeration of BYTE	not used	not used		configuration of D6
Digital7	Enumeration of BYTE	not used	not used		configuration of D7
Digital8	Enumeration of BYTE	Input	not used		configuration of D8
Digital9	Enumeration of BYTE	not used	not used		configuration of D9
Digital10	Enumeration of BYTE	not used	not used		configuration of D10
Digital11	Enumeration of BYTE	not used	not used		configuration of D11
Digital12	Enumeration of BYTE	not used	not used		configuration of D12
Digital13	Enumeration of BYTE	not used	not used		configuration of D13
Analog0	Enumeration of BYTE	not used	not used		configuration of A0
Analog1	Enumeration of BYTE	not used	not used		configuration of A1
Analog2	Enumeration of BYTE	not used	not used		configuration of A2
Analog3	Enumeration of BYTE	not used	not used		configuration of A3

The screenshot shows the 'Kanäle' configuration window for 'Arduino_2'. The table below lists the channels:

Variable	Mapping	Kanal	Adresse	Typ	Einheit	Beschreibung
		Digital Inputs (D0..D13)	%IW2	WORD		
		Analog Input A0	%IW3	WORD		
		Analog Input A1	%IW4	WORD		
		Analog Input A2	%IW5	WORD		
		Analog Input A3	%IW6	WORD		
		Digital Outputs (D0..D13)	%QW20	WORD		
		PWM Output D0	%QB42	BYTE		
		PWM Output D5	%QB43	BYTE		
		PWM Output D6	%QB44	BYTE		
		PWM Output D9	%QB45	BYTE		
		PWM Output D10	%QB46	BYTE		
		PWM Output D11	%QB47	BYTE		

Main program:



```
1 PROGRAM PRG
2 VAR
3     bD8: BOOL;
4     bD4: BOOL;
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6     wA1: WORD;
7     byD3: BYTE;
8 END_VAR
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