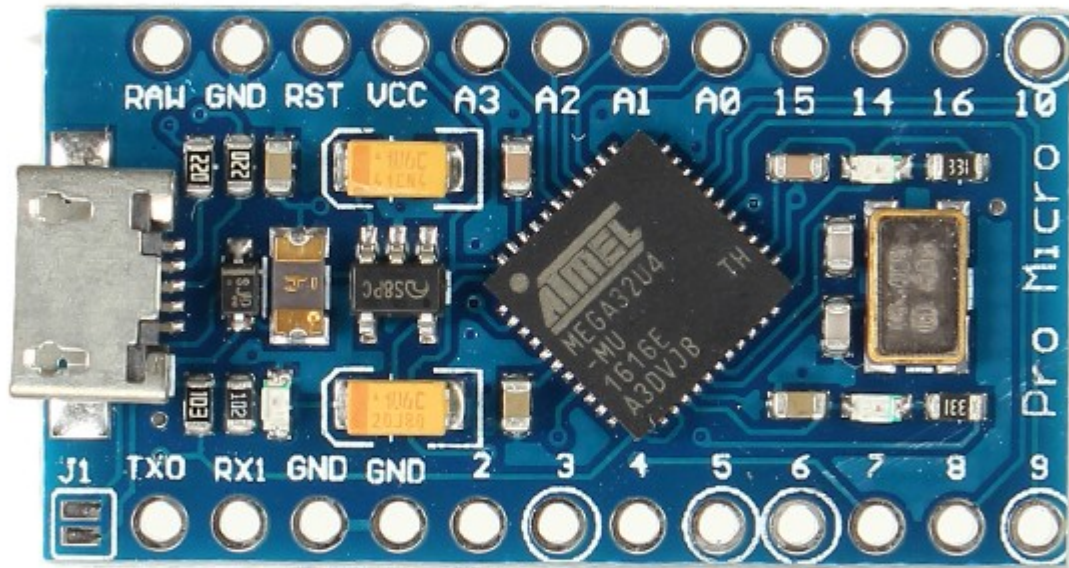


Arduino Controller



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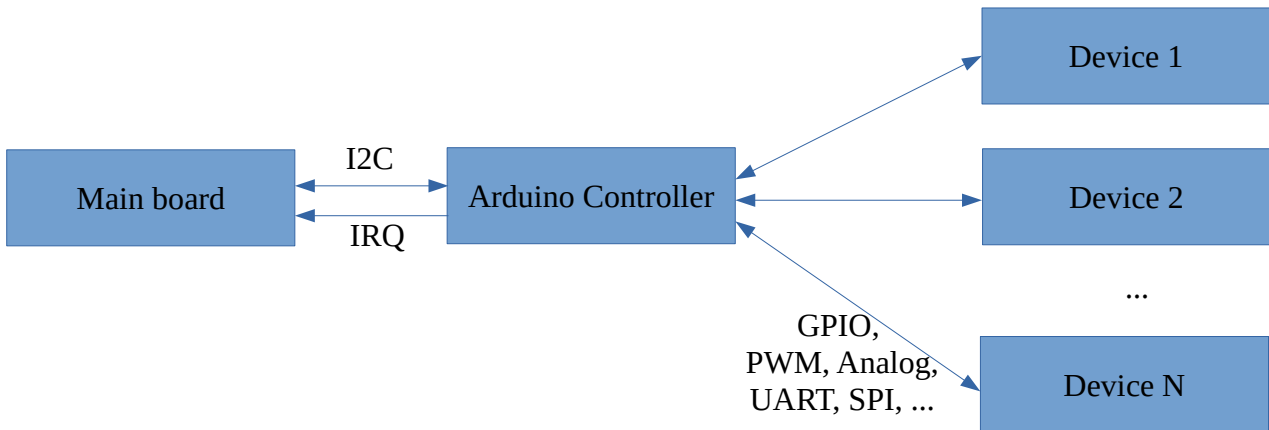
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1 Presentation

1.1 Introduction

Arduino Controller allows a main board (Raspberry Pi Arduino, or any micro with I2C interface) to control multiple devices with an Arduino (or any other micro-controller). The following image shows the overall architecture.



To communicate with the Arduino Controller, the [I2C](#) interface and an optional IRQ are used. I2C is the main protocol used to communicate. All commands and status packets are sent or received from the I2C. The IRQ allows the Arduino Controller to tell the main board that the status of a device has changed.

On the other hand, the Arduino Controller is connected to several devices that can be controlled using different methods: a simple GPIO, PWM, Analog output, UART, SPI... The list of the devices available is specific to the implementation of the Arduino Controller, see example in Annexe A with Robot HMI.

1.2 I2C configuration

1.2.1 Specification

The Main board is the I2C master and the Arduino Controller is a slave with an address between 0x61 and 0x69.

The default I2C speed of Arduino Controller is 400 kbit/s (Fast Mode).

1.2.2 Communication

To control or get information, the main board sends Command packets and the Arduino Controller sends Status packets.

2 Command packet

[Device] [ID] [Command] [Parameter 1] ... [Parameter N]

[Device] The device family to send the command (led, gpio, servo, switch, ...)
[ID] Id of the device to send the command
[Command] Command device to execute
[Parameter 1 ... N] Associated command parameter

A command packet without parameter is a read request and the status packet will return the value of each parameter.

When a command is tag with RO (Read-only), only a read request can be done.

3 Status packet

Return the status of the last command received:

[Device] [ID] [Status]

In case of a read request, the status of the command and the value of each parameter is returned:

[Device] [ID] [Status] [Value 1] ... [Value N]

List of the status.

Value	Name	Comment
0x00	OK	No error
0x01	INVALID	Invalid command received
0x02	UNSUPPORTED	Command not supported by the device
0x03	ERROR	Device error

4 Devices

The following table list all the devices available.

Device	Name	Comment
0x00	SYSTEM	Internal instruction to the Arduino Controller
0x01	GPIO	Simple gpio input or output
0x02	LED	LED monocolor
0x03	LED_RGB	LED RGB
0x04	SWITCH	Simple push switch or switch
0x05	SERVO	Servo controlled by PWM
0x06	AX12	Servo dynamixel AX12
0x07	7SEG_4DIG	7 segments display with 4 digits

0x08	MOTOR	Drive a CC motor
...		
0xFF	IRQ	Reserved for IRQ mask

4.1 LED

The following table list the commands supported by the LED device.

Command	Name	Parameters	Comment
0x01	POWER	[power]	power boolean: 0 = off other value = on
0x02	INTENSITY	[intensity]	intensity [0 – 255]: 0 = 0% 255 = 100%
0x03	BLINK	[period MSB] [period LSB] [duty cycle]	period in ms [0-65535] duty cycle [0-255]: 0 = 0% 255 = 100%

4.2 LED_RGB

The following table list the commands supported by the LED_RGB device.

Command	Name	Parameters	Comment
0x01	POWER	[power]	power boolean: 0 = off other value = on
0x02	COLOR	[color]	Color (wikipedia): 0 = none 1 = red 2 = orange 3 = yellow 4 = green chartreuse 5 = green 6 = green spring 7 = cyan 8 = blue azure 9 = blue 10 = violet 11 = magenta 12 = rose 13 = white
0x03	PWM	[red] [green] [blue]	pwm red, green and blue [0 – 255]:

			0 = 0% 255 = 100%
0x04	BLINK	[period MSB] [period LSB] [duty cycle]	period in ms [0-65535] duty cycle [0-255]: 0 = 0% 255 = 100%

4.3 SWITCH

The following table list the commands supported by the SWITCH device.

Command	Name	Parameters	Comment
0x01 (RO)	STATUS	[status]	power boolean: 0 = unpress other value = press

SWITCH are IRQ compatible.

4.4 7SEG_4DIG

The following table list the commands supported by the 7SEG_4DIG device.

Command	Name	Parameters	Comment
0x01	POWER	[power]	power boolean: 0 = off other value = on
0x02	INTENSITY	[intensity]	intensity [0 – 255]: 0 = 0% 255 = 100%
0x03	CHAR	[dig0] [dig1] [dig2] [dig3]	Dig{0,1,2,3} are ASCII characters
0x04	RAW	[dig0] [dig1] [dig2] [dig3]	Dig{0,1,2,3}: bit0 = seg a bit1 = seg b bit2 = seg c bit3 = seg d bit4 = seg e bit5 = seg f bit6 = seg g bit7 = seg dot
0x05	BLINK	[period MSB] [period LSB] [duty cycle]	period in ms [0-65535] duty cycle [0-255]: 0 = 0% 255 = 100%

4.5 IRQ

Only a read command is supported for IRQ.

Command	Name	Parameters	Comment
0x01 (RO)	READ	[value]	Reset after each reading

Annex A: Robot HMI v1

The Robot HMI I2C address is 0x61.

Pinmux of the Robot HMI

Device	ID	PIN	Comment
LED	0x01	A0	LED red
LED	0x02	A1	LED green
LED_RGB	0x01	5 / 6 / 9	LED RGB
SWITCH	0x01	7	Starting cord
SWITCH	0x02	0	Push switch 1
SWITCH	0x03	1	Push switch 2
SWITCH	0x04	4	Rocker switch
7SEG_4DIG	0x01	10 / 16 / 15	Display controlled by MAX7219 connected by SPI

IRQ mask

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
				SWITCH 0x04	SWITCH 0x03	SWITCH 0x02	SWITCH 0x01