KAMAMI

KAmodRPi ADC DAC

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Źródło: https://wiki.kamamilabs.com/index.php/KAmodRPi_ADC_DAC

Spis treści

Module description

KAmodRPi ADC_DAC module features 10-bit analog to digital converter (ADC) MCP3021 and 10-bit digital to analog converter (DAC) MCP4716. Module connector fits all versions of Raspberry Pi. You can interface MCP3021 and MCP4716 with I2C. ADC input voltage range can be configured to 0-3.3V, 0-5V and 0-10V with a jumper. Sample program will show how to use the module with Raspberry Pi using Python.

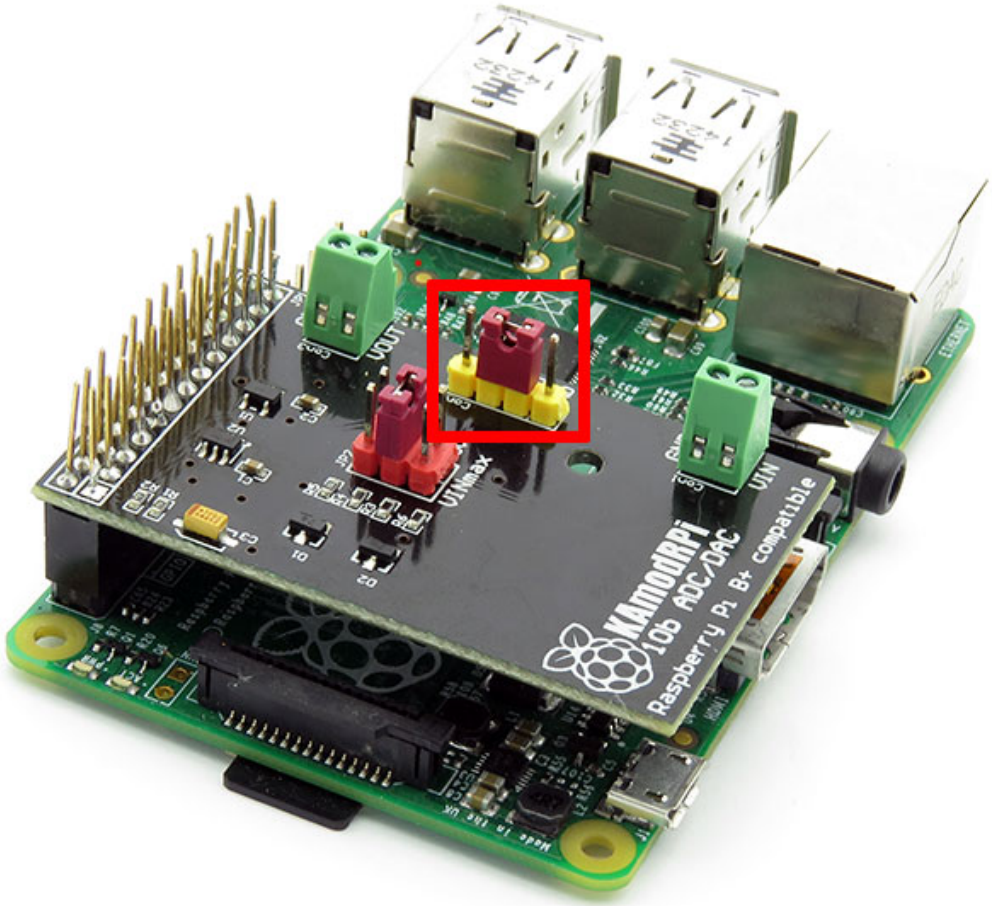
Prerequisites

To run sample program you need

- Raspberry Pi (any version)
- SD card with Raspbian OS
- KAmodRPi ADC_DAC module
- One jumper connector or wire

Hardware setup

- Connect KAmodRPi ADC_DAC module to Raspberry Pi
- Connect pins VIN and VOU with jumper or wire



Configuration

First of all we need to enable I2C support in Raspbian, run:

```
sudo raspi-config
```

Select //Advanced Options//, //I2C//, then select //Yes// twice, then reboot Raspberry Pi. Now install i2c-tools:

```
sudo apt-get install i2c-tools
```

Let's check if Raspberry Pi can communicate with module:

```
i2cdetect -y 1
```

Output should look like this:

```
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:          -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- 4d -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: 60 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
70: -- -- -- -- -- -- -- --
```

We can see that Raspberry Pi found two I2C devices:

- MCP3021 - address 0x4d
- MCP4716 - address 0x60

Python code

To be able to use I2C in Python we need to install smbus library: `sudo apt-get install python-smbus` Now you can use simple library, put the code below into file KAmodRPiADCDAC.py:

```
import smbus

class KAmodRPiADCDAC:

        VINmax = 10
        bus = smbus.SMBus(1)
        adAddress = 0x4d
        daAddress = 0x60

        def setVINmax(self, v):
                self.VINmax = v

        def readMCP3021(self):
                rd = self.bus.read_word_data(self.adAddress, 0)
                return ((rd & 0xFF) << 8) | ((rd & 0xFF00) >> 8)

        def readMCP3021Voltage(self):
                val = self.readMCP3021() >> 2
                return float(self.VINmax) * float(val) / float(0x3FF)

        def writeMCP4716(self, level):
                self.bus.write_i2c_block_data(self.daAddress, (level & 0x3C0) >> 6, [(level &
0x3F) << 2])
```

No we can create simple program that will set DAC output level to value which you select with up/down cursors and will read ADC input:

```
import time
import sys
import curses
import KAmodRPiADCDAC

screen = curses.initscr()
curses.noecho()
curses.cbreak()
screen.keypad(True)

try:
        KAmod = KAmodRPiADCDAC.KAmodRPiADCDAC()

        # Set VINmax to the same value as JP2 jumper on KAmod board
        KAmod.setVINmax(5)

        daValue = 0
        while True:

                # Write daValue to DAC
                KAmod.writeMCP4716(daValue)

                # Read voltage from ADC
```

```
                voltage = KAmod.readMCP3021Voltage()

                screen.addstr('\rADC Voltage = %.2fV, DAC Value = %d      ' % (voltage,
daValue))
```

Links

- File:Kamodrpiadcdac.zip

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