Nano RPI Module

User Guide

Rev 1.0, Apr 2017

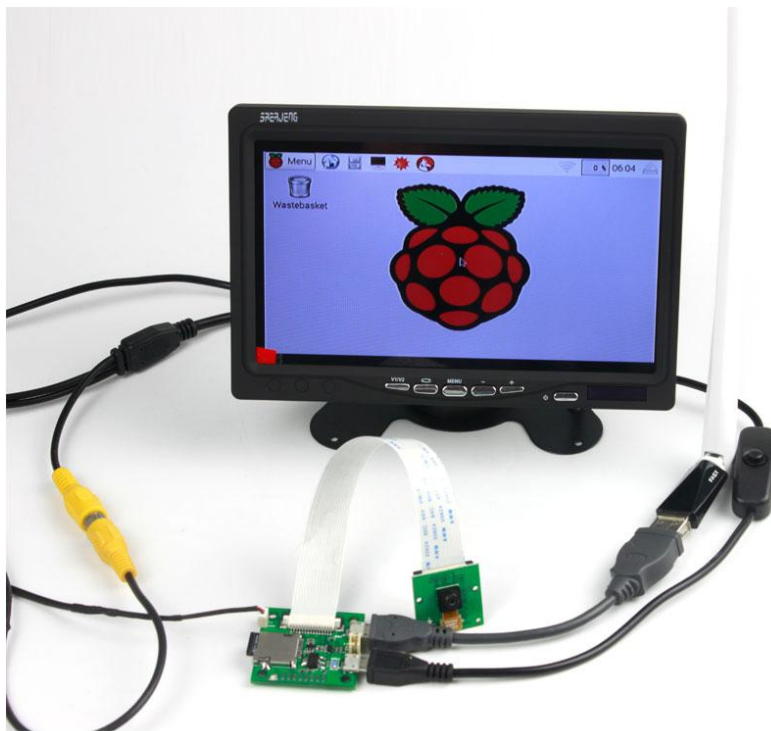## Table of Contents

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1 Introduction

ArduCAM Nano RPI module is 24x24mm coin size Raspberry Pi compute module which is designed for the applications where the size and weight is a matter. The board is based on Broadcom BCM2835 processor which has 600MHz ARM1176JZ-K and VideoCore IV GPU inside. The Nano RPI has rich peripherals including two CSI camera interface, PAL video output, SPI, I2C, UART, GPIO and etc. Together with its mother board, it can be a quick prototype dual camera system.
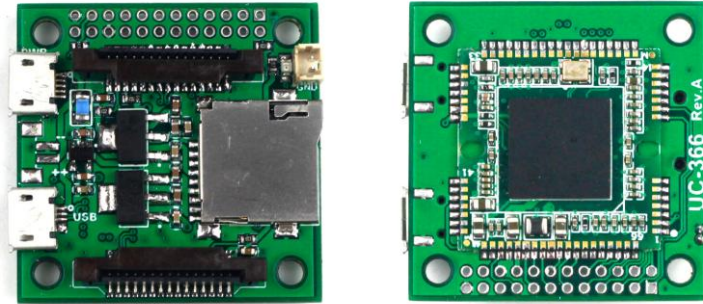

Figure 1 ArduCAM Nano Raspberry Pi Compute Module

2 Application

➢ stereo camera
➢ Robot controller
➢ UAV controller
➢ smart watch
➢ Other battery-powered products

3 Features

➢ Processor: 600Mhz BCM2835 ARM1176JZ-K with VideoCore IV
➢ Memory: 512MByte DDR2
➢ Dual CSI-2 interface
➢ SDTV: PAL output
➢ Peripherals: USB,SPI, I2C, UART, GPIO
➢ Power input: micro-USB or Battery
➢ Small form of factor, mother board is 36x36mm

4 Key Specifications

■ Power supply
   microUSB :5V
   Battery: 3.7V
■ Nano RPI Size: 24 x 24 mm
■ Mother board size: 36 x 36mm

■ CPU speed: 600MHz
■ Memory : 512MB DDR2
■ 30fps 1080p H.264 video encode/decode
■ Temperature: -25℃～+85℃
■ Weight: 10g

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5 Pin Definition

The mother board pin out is derived from the nano RPI module's pin out. See the Table 1 and Table 2 for the detail pin out of Nano RPI module and its mother board.

Table 1 Nano RPI module Pin Definition

Pin No.	PIN NAME	TYPE	DESCRIPTION
1	GPIO15	34	CAM1_DP1
2	GPIO16	35	CAM1_DN1
3	GPIO17	36	GND
4	GPIO8	37	USB_DP
5	GPIO9	38	USB_DN
6	GPIO10	39	VDAC(+2.5V)
7	GPIO0	40	TVDAC
8	GPIO5	41	CAM1_DP0
9	GPIO11	42	CAM1_DN0
10	SD_D0	43	GND
11	SD_CMD	44	USB_OTGID
12	SD_D1	45	CAM0_DP1
13	+1.8V	46	CAM0_DN1
14	GND	47	GPIO2
15	SD_D2	48	GPIO3
16	SD_D3	49	GPIO1
17	SD_CLK	50	GPIO19
18	GND	51	GND
19	CAM0_DN0	52	VBAT(+3.3V)
20	CAM0_DP0	53	RUN
21	GND	54	GPIO7
22	CAM0_CN	55	GPIO44
23	CAM0_CP	56	+3.3V
24	GND	57	GPIO20
25	CAM1_DN3	58	GPIO45
26	CAM1_DP3	59	GPIO40
27	GND	60	GPIO31
28	CAM1_DN2	61	GPIO30
29	CAM1_DP2	62	GPIO29
30	GND	63	GPIO14
31	CAM1_CN	64	GPIO21
32	CAM1_CP	65	GPIO18
33	GND	66	GPIO28

Table 2 Mother board Pin Definition
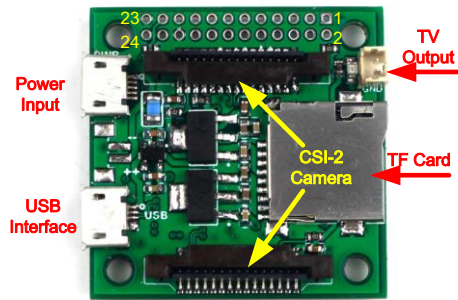
Pin No.	PIN NAME	TYPE	DESCRIPTION
1	GPIO11	2	GPIO15
3	GPIO5	4	GPIO8
5	GPIO17	6	GPIO10
7	GPIO9	8	GPIO21
9	GPIO18	10	GPIO14
11	GPIO45	12	GPIO40
13	GPIO44	14	GPIO20
15	RUN	16	GPIO7
17	GPIO19	18	+3.3V
19	TVDAC	20	GND
21	USB_OTGID	22	USB_DN
23	GND	24	USB_DP

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6 Operation System

The Nano RPI module use the same operation system Raspbain like the standard Raspberry pi boards. User can download the OS from the link: https://www.raspberrypi.org/downloads/

7 Quick Start Guide
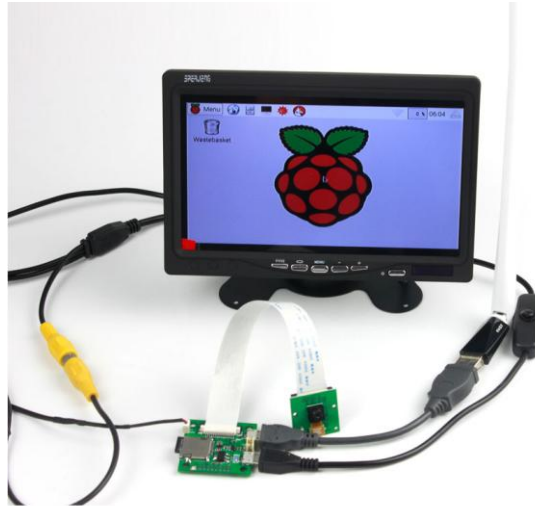
7.1 Hardware Reqirement

User need to prepare the following items to run the Nano RPI module.

LCD screen with AV input

AV adapter cable

Micro-USB power cable

Micro-USB to USB type A adapter cable

USB-hub for keyboard/mice

7.2 Start the Raspbian System

Plug in the AV cable to the AV output connector. Insert the preinstall the Raspbian operation system into the TF-card socket, then power up the board with micro-USB power supply. After few seconds, the boot information will be displayed on the LCD screen, and the Raspbian will enter into the desktop after successfully boot.

7.3 Enable Standard Dual Camera Support

First copy the provided dt-blob.bin into the /boot partition then plug in two standard pi camera boards into the CSI-2 camera interface and reboot the system. Using the follow command to determine if the system support the dual camera.

```
sudo vcgencmd get_camera
```

There should be support camera = 2, detected camera = 2.

7.4 Enable Share Oscillator Stereo Camera

The following step needed for shared oscillator stereo camera, because both of the camera should be powered before running the stereo camera command.

Run the following command to generate new dtb file. Then reboot the OS. Copy this dt-blob.bin to /boot partition then reboot.

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> *dtc -I dts -O dtb -o /boot/dt-blob.bin dt-blob-dualcam-sync.dts*

Now that the camera GPIOs are released the control from GPU, it is the responsibility of user to take care of these signals.

Raspi-gpio is a good tool to control the GPIOs from the command line, using the following command to install the package.

> *sudo apt-get install raspi-gpio*

Using the command below to figure out how to use the raspi-gpio command, and the meaning of the parameters.

> *raspi-gpio help*

Before running the cameras, the following commands should be ran first each time after reboot.

> *raspi-gpio set 2 op pn dh*
> *raspi-gpio set 3 op pn dh*
> *raspi-gpio set 30 op pn dh*
> *raspi-gpio set 31 op pn dh*

Normal read operation reads each image data by sending a read command in one SPI read operation cycle. While burst read operation only need to send a read command then read multiple image data in one SPI read operation cycle. It is recommended to use burst read operation to get better throughput performance.

7.5   Run the Stereo Camera

Now you can run the stereo camera with the following command.

> *raspivid -w 1280 -h 480 -3d sbs -o stereo.264*

The captured stereo.264 video file will look like this, side by side view.