MonitorPi

Universal OLED digital audio display and signal analyzer for Raspberry Pi

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Sep.1, 2022 Ver. 0.9b

A. Introduction

MonitorPi is a universal OLED display panel that works for all kinds of Raspberry Pi audio applications. To install a MonitorPi, all you need to do is just simply plug it into the GPIO port. It has never been that easy to add a high-performance display screen to an RPi audio system until MonitorPi was developed.

Benefiting from the unique built-in high speed signal analyzer, MonitorPi detects the digital audio format and the I2S/DSD signal status in real time and shows the true music information on the OLED screen. Additionally, it integrates a FifoPi Q7 controller and an IR receiver inside. MonitorPi can also be a great help to debug a RaspberryPi based audio project.

B. Features and Specifications

- Built-in high speed real-time digital analyzer monitors the true digital music signals up to 128MHz
- Music format display range up to PCM1536KHz and DSD1024
- 1.3" PMOLED screen
- Adjustable Brightness
- Dim screen button
- Configurable screen saver functions
- Software free architecture no need any additional Linux driver.
- Can be an external display screen when working with a universal GPIO extension KIT
- Works with any Raspberry Pi audio applications as long as they use GPIO port
- Would be a great help to debug an audio system by inspecting the real music signals
- Integrates FifoPiQ7 controller function to display FIFO status and config FifoPiQ7 settings
- Has an IR receiver to control player software
- Internal flash memory to save all the settings.
- DIY friendly and easy to install. Plug and play.
- Compact size
- GPIO I2S/DSD signal configurations:

  Pin12 (GPIO18): SCK

  Pin35 (GPIO19): LRCK/DL

  Pin40 (GPIO21): DATA/DR

C. Getting started

1. Plug the MonitorPi into the GPIO port that contains the digital music signals.

   The GPIO port can be:

   A. The GPIO port of a Raspberry Pi

   B. The GPIO port on your DAC or streamer HAT

   C. The non-isolated GPIO or AUX GPIO on FifoPiQ3, Q7 or FifoPiMa

   D. The GPIO on the universal GPIO extension KIT

   E. The AUX GPIO on the ShieldPi SMT

   F. So on…

2. Turn on the power supply.

3. Play music and then the real time digital music signal information will be displayed on the OLED screen. You can also use an IR- remote control if it was properly setup in the player software.

Note1: The glass of the OLED screen is very thin. To prevent from cracking, please don't press the screen at any time. Please hold the ears of the MonitorPi PCB when plugging in and out.

Note2: The MonitorPi pins have to be properly installed into the GPIO port. Wrong or shift positions can cause damage when turning on the power supply.

D. Information on the screen

Screen area	Information
Center	Format of digital music
Top left	Music status: Play or Mute
Top right	Data depth (if applicable)
Bottom left	Real-time monitoring signal status: SCK (Pin12 of GPIO) frequency LRCK/DL (Pin35 of GPIO) frequency DATA/DR (Pin40 of GPIO) frequency
Bottom right	GPIO pin numbers or FifoPi status if it being installed to FifoPi Q7 non-isolated GPIO

E. Operations

1. Dim screen

    Press the control button at the top-right corner of the MonitorPi, the countdown page will appear. And then the screen will go dim in three seconds. Press the control button again, the screen will be back to display. The LED at back side of the MonitorPi PCB will be flashing if the screen is dimmed.

2. OLED brightness setup

    Go to the setting page by pressing the control button again within the three seconds when the countdown page is showing. And then at the setting page, continuously press the control button, the selecting bar will go through all the setting items. You can enable the brightness setting by holding the button when the brightness item is to be selected. Keep pressing the button, you will see all the brightness options:

    LOW, MID, MIDHI, HIGH.

    Stop at the option that you want to change to, MonitorPi will automatically confirm and apply that setting option in three seconds. Lower brightness can help to extend the lifetime of the OLED screen.

3. Enable screen saver

    When the screen saver is enabled, MonitorPi will dim the screen automatically after the dim time is up. The screen can wake up for display if the music signal is changed or the control button is pressed. The screen will be dimmed again after the next dim time up.

    To enable the screen saver, you need to enable the DimOLED setting in the setting page and then

stopped at one of the four screen saving options that you want to select:

Manual: Disable screen saver (default)

AFT3s: Enable screen saver, dim time is 3 seconds

AFT8s: Enable screen saver, dim time is 8 seconds

AFT15s: Enable screen saver, dim time is 15 seconds

Note: There is no 'Return' option in the setting menu. Please just leave the screen there, it will return or apply the settings automatically in three seconds.
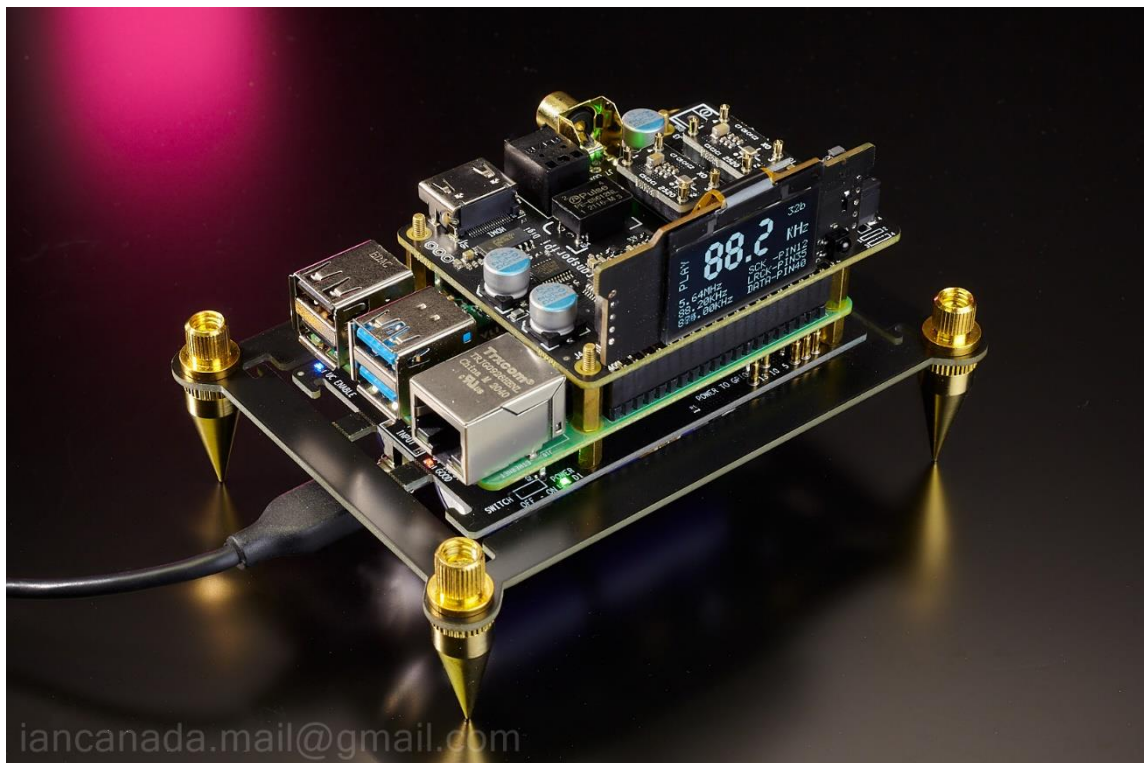
F. MonitorPi application examples

1. Ultra-low jitter audiophile grade TransportPi Digi streamer
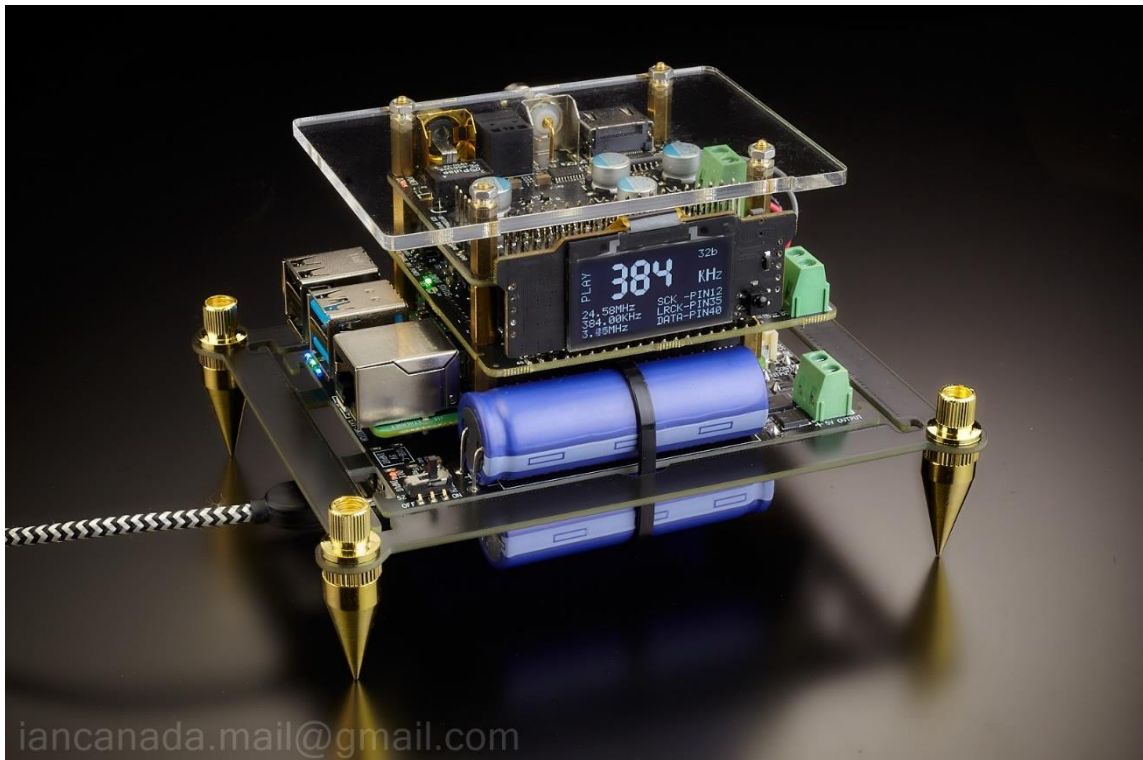
A: MonitorPi

B: TransportPi Digi

C: RaspberryPi

D: UcPi (Optional)

2. Advanced RaspberryPi streamer transport

   A. MonitorPi

   B. TransportPi MKII

   C. FifoPiMa

   D. Rapberry Pi

   E. PurePi

3. Flagship RaspberryPi streamer transport

   A. FifoPi Q7

   B. HdmiPi Por or TransportPi AES

   C. StationPi pro

   D. RaspberryPi 4

   E. LinearPi Solo with UcConditioner 5V

   F. LifePO4 Mini 3.3V with UcConditioner 3.3V

   G. Universal GPIO extension KIT

   H. MonitorPi

4. **Upgrade a low-cost Raspberry Pi DAC or Steamer with a MonitorPi**
   A. MonitorPi

   B. Hifiberry DAC+ Pro or Hifiberry Digi Pro

   C. Raspberry Pi or Raspberry Pi Zero 2

5. **Being the bast patterner of a FifoPiQ7 with the internal FifoPi controller**
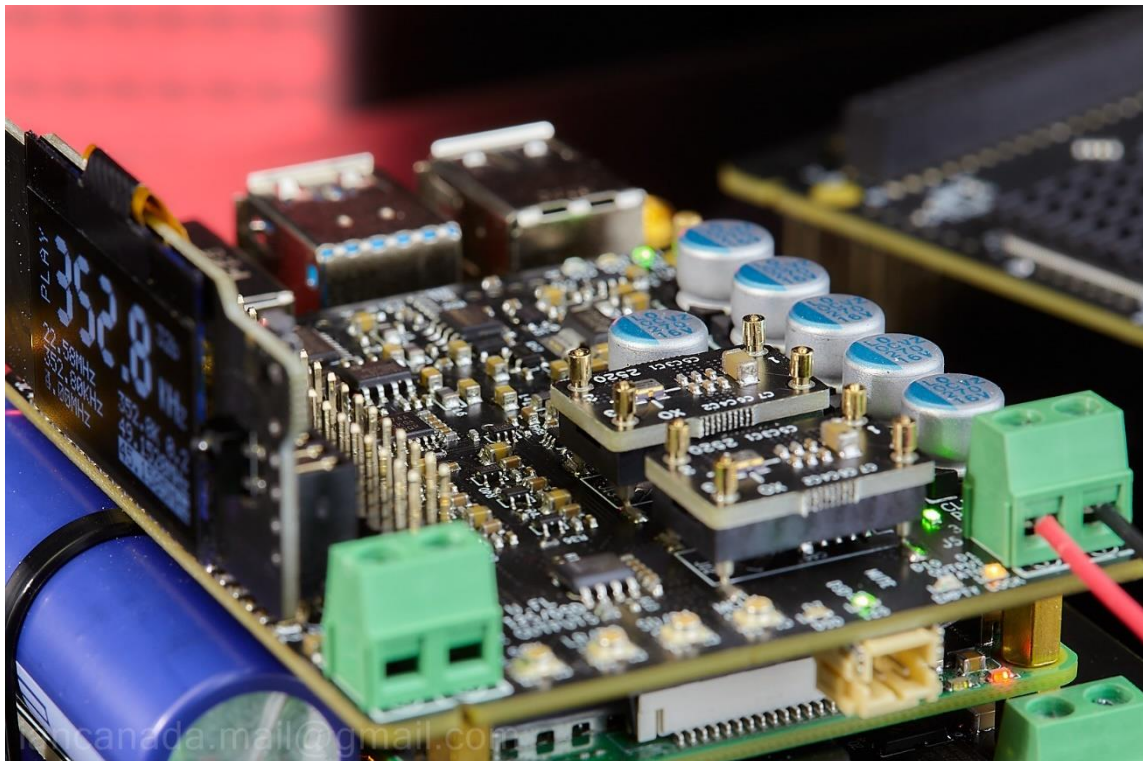
G. Q & A

1. **MonitorPi is showing the 192KHz 32bit on the screen when I play a 192KHz 24bit music file, why?**

   Please no worries at all. That's normal. The reason is that the music file can be in 192KHz 24bit format, but the player outputs the signals in a 32bit package according to the I2S specification. MonitorPi will tell the real signal status. Please always trust the MonitorPi.

2. **I installed a MonitorPi in a new system. But the screen shows no signal and all frequencies are zero. There is also no music output. What's happened?**

   There should be no real music signal at GPIO if the MonitorPi shows all frequencies are zero. Normally this is a software setup issue. Please check the player settings. You need to enable the I2S DAC and select the correct driver according to the audio HAT that you are using.

3. **MonitorPi is showing 176.4KHz rather than the DSD format on the screen when I play a DSD file. How can I get the correct native DSD output?**

   Raspberry Pi doesn't output the native DSD signals over GPIO, so we need to enable DoP output in the settings of the player software. DoP is a kind of protocol that integrates the native DSD data into the PCM package. If DoP is enabled, a DSD64 music will be placed into a 176.4KHz PCM package. To play the DSD music file in real native DSD format, you need to install a FifoPiQ7 (Q3) or a FifoPiMa in the system because of they have built-in DoP decoder. After that, you will have correct DSD format displayed on the MonitorPi screen.

4. **How to know the revision number of my MonitorPi?**

   The revision number shows at countdown page. You can see the revision number at anytime when you access the countdown page by pressing the control button.

5. **How can I move the MonitorPi to the front panel?**

   You can move the MonitorPi to the front panel by using a universal GPIO extension KIT. There are two FFC/FPC cables, 6" and 12". You can use any of them according to the requirement of the application.

   Please refer the picture below for how to use the universal GPIO extension KIT to move the MonitorPi.

H. History of revising

Sep. 4, 2022 V0.9b released