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Run RPi Demo on VisionFive 2 to make LED Blink at the PWM Frequency

with Python

Application Note

Version: 1.1

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Legal Statements

Important legal notice before reading this documentation.

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Preface

About this guide and technical support information.

About this document

This application note provides steps to run RPi GPIO demo on VisionFive 2 to make an LED blink at the PWM frequency.

Version History

Table 0-1 Version History

Version	Released	Revision
1.1	2023/06/08	Updated the method for installing `VisionFive.gpio` package in Preparing Software *(on page 11)*.
1.0	2023/05/31	The first official release.

Notes and notices

The following notes and notices might appear in this guide:

- **Tip:**
  Suggests how to apply the information in a topic or step.

- **Note:**
  Explains a special case or expands on an important point.

- **Important:**
  Points out critical information concerning a topic or step.

- **CAUTION:**
  Indicates that an action or step can cause loss of data, security problems, or performance issues.

- **Warning:**
  Indicates that an action or step can result in physical harm or cause damage to hardware.

1. Introduction

This application note provides steps to run RPi GPIO demo on VisionFive 2 to make an LED blink at the PWM frequency.

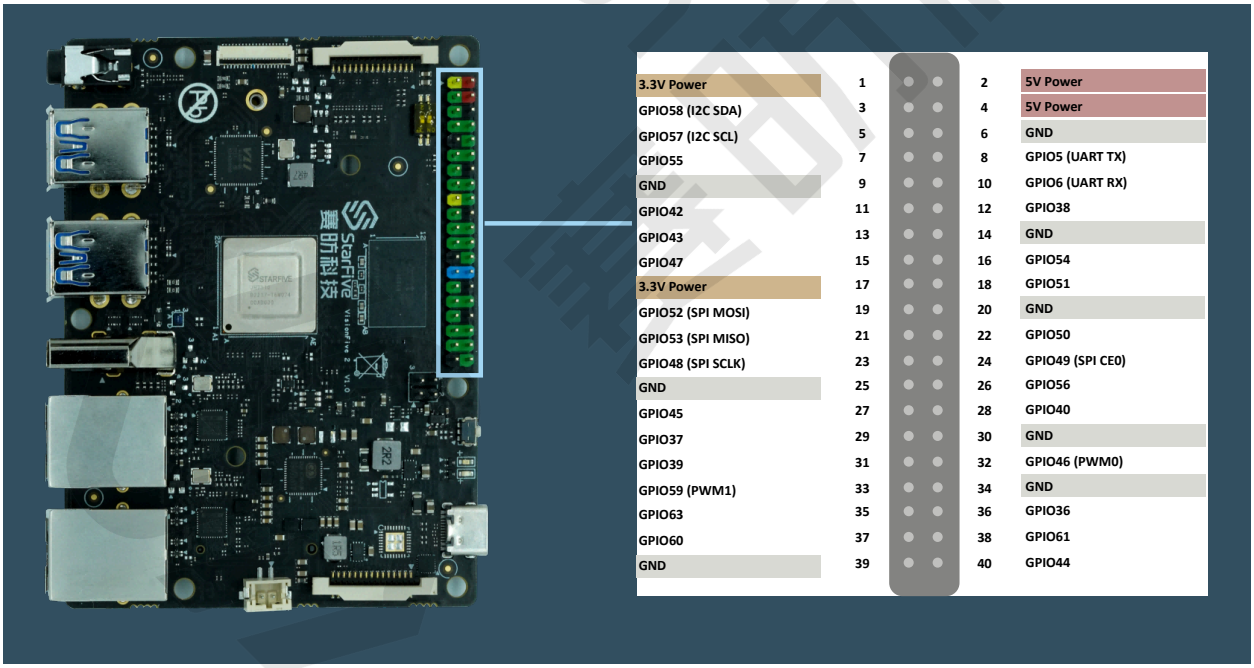
Tip:

`VisonFive.gpio` is compatible with the `RPi.GPIO` command, which means that the `RPi.GPIO` python demo can be run on VisionFive 2. In addition, the callback function of API `add_event_detect()` has been optimized compared to `RPi.GPIO`, which adds a *edge_type* parameter in callback function. Therefore, the python demo of `RPi.GPIO` related to callback functions needs to be modified manually by adding *edge_type* parameter.

1.1. 40-Pin GPIO Header Definition

The following figure shows the location of the 40-pin header on VisionFive 2.

Figure 1-1 40-Pin GPIO Header Definition



Note:

The multiplexed pin has been initialized and cannot be used as a general GPIO.

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2. Preparation

Before executing the demo program, make sure you prepare the following:

2.1. Environment Requirements

The environment requirements are as follows:

- Linux Kernel: Linux 5.15
- OS: Debian 12
- SBC: VisionFive 2
- SoC: JH7110

2.2. Preparing Hardware

Before executing the demo program, make sure you prepare the following:

Table 2-1 Hardware Preparation

Type	M/O*	Item	Notes
General	M	VisionFive 2 Board	-
General	M	• 32 GB (or more) micro-SD card • Micro-SD card reader • Computer (Windows/Mac OS/ Linux) • USB to serial converter (3.3 V I/ O) • Ethernet cable • Power adapter (5 V / 3 A) • USB Type-C Cable	These items are used for flashing Fedora OS into a micro-SD card.
GPIO Demo (PWM)	M	• An LED • A Breadboard • Two Male-Female jumper wires • 470 Ω color ring resistor	• LED stands for Light Emitting Diode, and glows when electricity is passed through it. The longer leg (known as the 'anode'), is always connected to the positive supply of the circuit. The shorter leg (known as

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Table 2-1 Hardware Preparation (continued)

Type	M/O*	Item	Notes
			the 'cathode') is connected to the negative side of the power supply, known as 'ground'. • Breadboard: Refer to Breadboard Introduction *(on page 9)*. • Resistor: Resistors are a way of limiting the amount of electricity going through a circuit; specifically, they limit the amount of 'current' that is allowed to flow.

Note:
*: M: Mandatory, O: Optional

Breadboard Introduction

The breadboard is a way of connecting electronic components to each other without having to solder them together. They are often used to test a circuit design before creating a Printed Circuit Board (PCB). As shown in the following figure, there are two lines at the top and the bottom respectively of the breadboard. These two lines are used for power connection: the blue line is for negative and the red line is for positive. Besides, they are divided into two sections, and the holes in each section are connected.

In each column (from A to E, and F to J), holes are connected electrically. In each row (from 1 to 57), holes are not connected.

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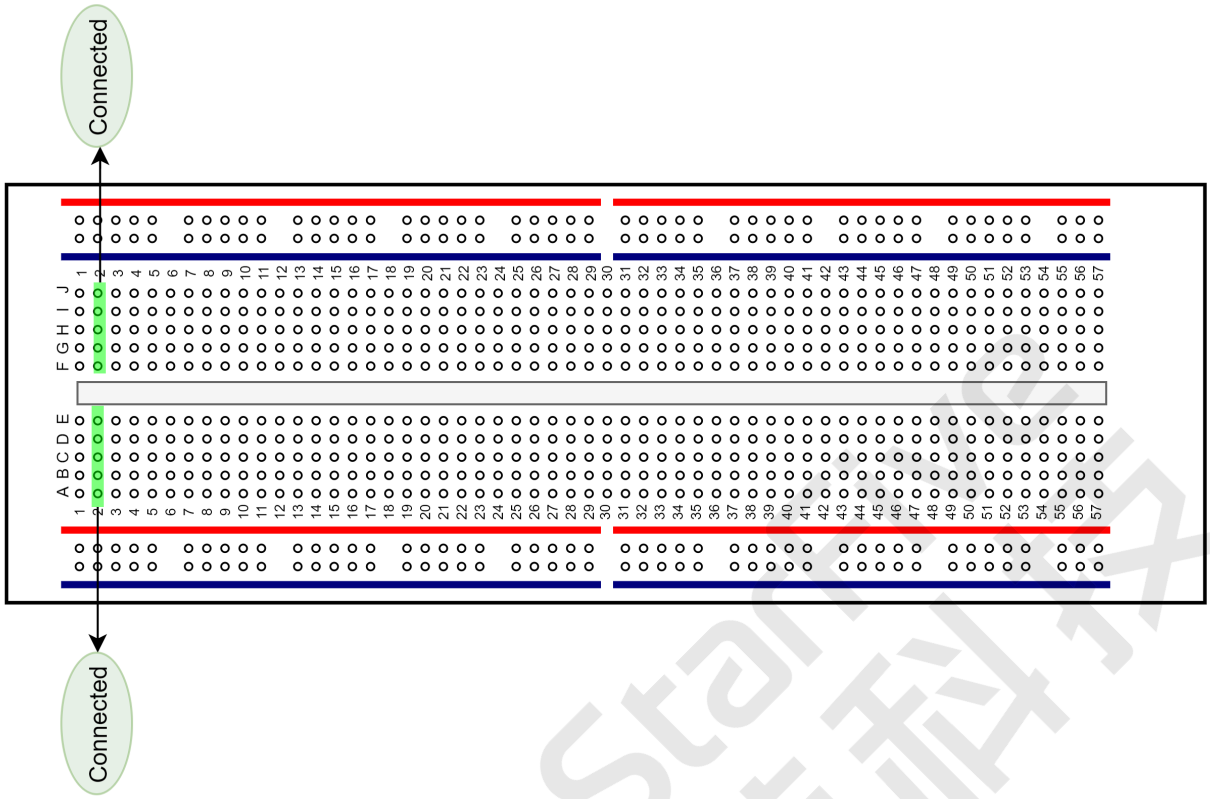
Figure 2-1 Breadboard Overview



2.2.1. Hardware Setup

The following table and figure describe how to connect LED to the 40-pin GPIO Header:

Table 2-2 Connect LED to the 40-Pin Header

LED	40-Pin GPIO Header	
	Pin Number	Pin Name
Positive	36	GPIO40
Negative	34	GND

Perform the following to connect the LED to the 40-pin GPIO Header:

1. Connect GPIO36 pin of VisionFive 2 to the red line of the breadboard.
2. Set up the resistor as shown in the following figure.
3. Connect the longer leg of the LED to the red line of the breadboard.
4. Connect the shorter leg of the LED to the blue line of the breadboard.
5. Connect the GND pin of VisionFive 2 to the blue line of the breadboard.

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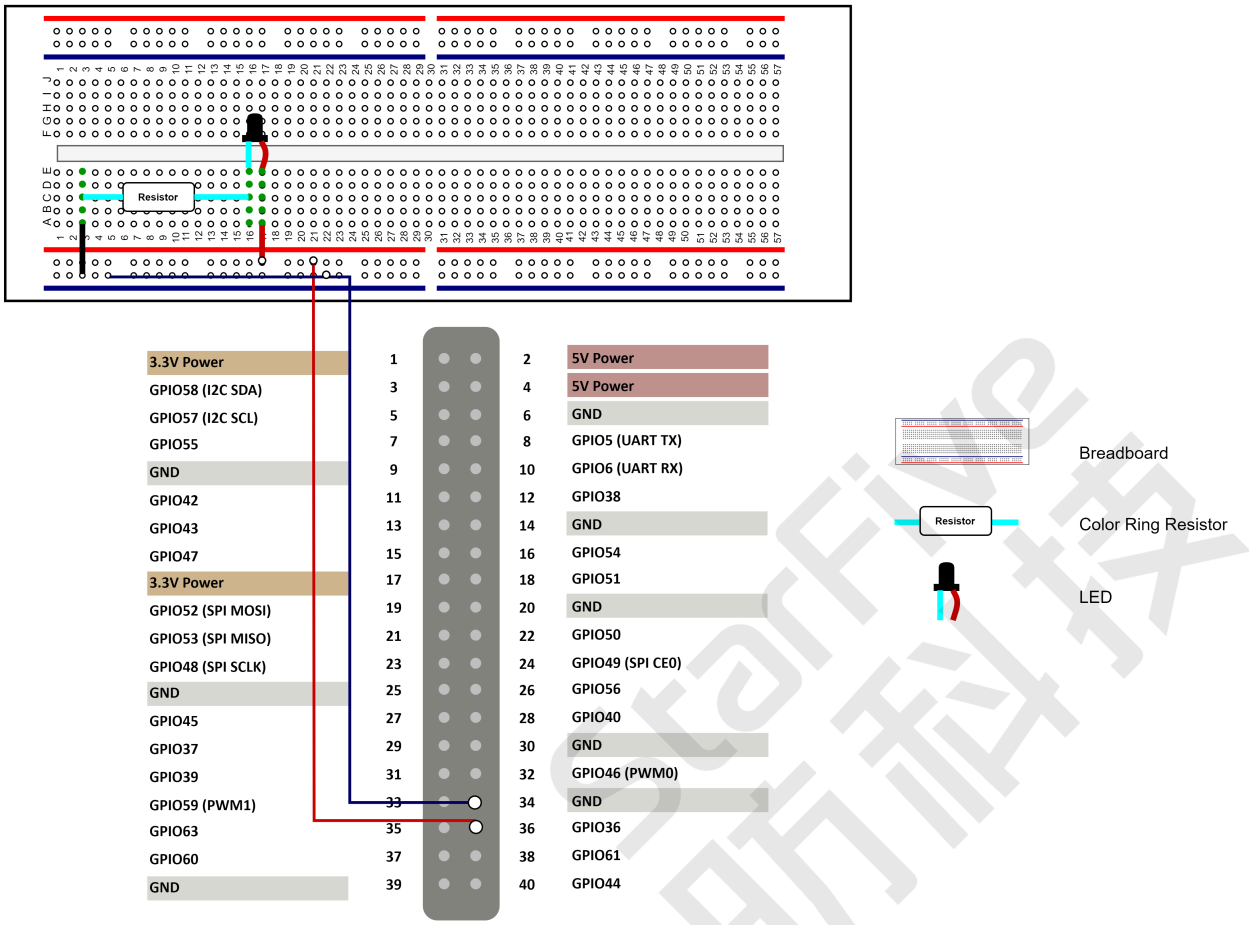
Figure 2-2 Connect LED, resistor to the 40-Pin Header



2.3. Preparing Software

Make sure the following procedures are performed:

Note:
The python project, `VisionFive.gpio`, is applicable for VisionFive, VisionFive 2 and JH7110 EVB.

1. Flash Debian OS into a Micro-SD card as described in the *Flashing Fedora OS to a Micro-SD Card* section in the *VisionFive 2 Single Board Computer Quick Start Guide*.
2. Log into the Debian and make sure VisionFive 2 is connected to the Internet. For detailed instructions, refer to the Using SSH over Ethernet or *Using a USB to Serial Converter* section in the *VisionFive 2 Single Board Computer Quick Start Guide*.
3. Extend the partition on Debian as described in *Extend Partition* in the *VisionFive 2 Single Board Computer Quick Start Guide*.
4. Execute the following command to install PIP on Debian:

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```
apt-get install python3-pip
```

5. Execute the `pip` command on VisionFive 2 Debian to install the `VisionFive.gpio` package:

Note:

Due to the fact that `pypi.org` official website does not yet support uploading `whl` installation packages for the RISC-V platform, so it cannot directly execute `pip install VisionFive.gpio` command to install online.

Please follow the steps below to install the `VisionFive.gpio` package.

a. Execute the following command to install dependent package:

```
apt install libxml2-dev libxslt-dev
python3 -m pip install requests wget bs4
```

b. Execute the following command to run the installation script `Install_VisionFive_gpio.py`:

```
python3 Install_VisionFive_gpio.py
```

The installation script codes are as follows:

```
import requests
import wget
import sys
import os
from bs4 import BeautifulSoup

def parse_data(link_addr, class_type, key_str):
    req = requests.get(url=link_addr)
    req.encoding = "utf-8"
    html=req.text
    soup = BeautifulSoup(req.text,features="html.parser")
    package_version = soup.find(class_type,class_=key_str)
    dd = package_version.text.strip()
    data = dd.split()
    return data

def parse_link(link_addr, class_type, key_str):
    req = requests.get(url=link_addr)
    req.encoding = "utf-8"
    html=req.text
    soup = BeautifulSoup(req.text,features="html.parser")
    search_data = soup.find(class_type,class_=key_str)
    search_data_2 = search_data.find("a")
    dl_link_get = search_data_2.get("href")
    return dl_link_get
```


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```
def get_dl_addr_page():
    link_address
 = "https://pypi.org/project/VisionFive.gpio/#history"
    key_str = "release__version"
    class_key = "p"
    data_get = parse_data(link_address, class_key, key_str)
    latest_version = data_get[0]

    dl_addr_page
 = "https://pypi.org/project/VisionFive.gpio/{}/#files".for
mat(latest_version)

    return dl_addr_page

def get_dl_addr_of_latest_version(link_addr):
    key_str = "card file__card"
    class_key = "div"
    addr_get = parse_link(link_addr, class_key, key_str)

    return addr_get

def main():
    dl_addr_p =  get_dl_addr_page()
    whl_dl_addr = get_dl_addr_of_latest_version(dl_addr_p)

    whl_name = whl_dl_addr.split("/")[-1]
    whl_name_suffix = os.path.splitext(whl_name)[-1]
    whl_name_prefix = os.path.splitext(whl_name)[0]
    whl_name_prefix_no_platform = whl_name_prefix[0:
 len(whl_name_prefix) - 3]
    new_platform = "linux_riscv64"

    rename_whl_name
 = "{}{}{}".format(whl_name_prefix_no_platform,
 new_platform, whl_name_suffix)

    wget.download(whl_dl_addr, out=rename_whl_name)

    os.system("pip install " + rename_whl_name)
    os.system("rm -rf " + rename_whl_name)


if __name__ == '__main__':
    sys.exit(main())
```


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3. Running Demo Codes

To run the demo code, perform the following on VisionFive 2 Debian:

1. To run the RPi demo on VisionFive 2, you need to replace the `import RPi.GPIO as GPIO` command with `import VisionFive.gpio as GPIO` in the RPi Python demo.
2. Locate to the directory where the test code, `RPi_demo_#PWM#_run_on_VisionFive.py`, exists:
   a. Execute the following command to get the directory where `VisionFive.gpio` exists:

   ```
   pip show VisionFive.gpio
   ```

   Result:

   ```
   Location: /usr/local/lib64/python3.9/site-packages
   ```

   Note:

   The actual output depends on how the application is installed.

   b. Execute the following to enter the directory, for example, `/usr/local/lib64/python3.9/site-packages` as indicated in the previous step output:

   ```
   cd /usr/local/lib64/python3.9/site-packages
   ```

   c. Execute the following command to enter the `sample-code` directory:

   ```
   cd ./VisionFive/sample-code/
   ```

3. Under the `sample-code` directory, execute the following command to execute the demo code:

   ```
   sudo python RPi_demo_#PWM#_run_on_VisionFive.py
   ```

   Alternatively, you can execute the following command:

   ```
   sudo python3 RPi_demo_#PWM#_run_on_VisionFive.py
   ```

   Result:

   The LED blinks and the blink frequency will change according to the PWM frequency.

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4. Demo Source Code

The Python source code of this demo is provided for reference purpose only.

`RPi_demo_#PWM#_run_on_VisionFive.py`:

```
#import RPi.GPIO as GPIO
#*******************************************************
#Note: above command must be replaced with command below
import VisionFive.gpio as GPIO
#*******************************************************
from time import sleep

ledpin = 36    # PWM pin connected to LED
GPIO.setwarnings(False)      # disable warnings
GPIO.setmode(GPIO.BOARD)     # set pin numbering system
GPIO.setup(ledpin,GPIO.OUT)
pi_pwm = GPIO.PWM(ledpin,1000)  # create PWM instance with frequency
pi_pwm.start(0)          # start PWM of required duty cycle
while True:
    for duty in range(0,101,1):
        pi_pwm.ChangeDutyCycle(duty)         # provide duty cycle in the
 range 0-100
        sleep(0.01)
    sleep(0.5)

    for duty in range(100,-1,-1):
        pi_pwm.ChangeDutyCycle(duty)
        sleep(0.01)
    sleep(0.5)
```


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5. Resources

Click on this tab to find all SBC relevant resources.

StarFive provides the following resources to guide you through an extraordinary experience on using the VisionFive 2 SBC.

- RVspace Wiki
- Application Center
- Documentation Center
- Technical Forum
- VisionFive 2 GitHub Repository
- VisionFive 2 Debian OS Download
- Code download
- View All PDF Documents

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6. Buy Now

Click on this tab to find all the online shops and compatible accessories.

Buy SBC

Use the following page to find your nearest sales channel or the global channels for purchasing a VisionFive 2 Single Board Computer (SBC).

- Buy VisionFive 2

Buy Parts

Use the following page to find the parts that are tested as compatible to VisionFive 2.

- Buy Accessory

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