



StarFive
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Using VisionFive 2 GPIO to Make A Buzzer Beep

with Python

Application Note

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Legal Statements

Important legal notice before reading our documentation.

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Preface

About this guide and technical support information.

About this document

This application note provides steps to use VisionFive 2's GPIO pins to make a buzzer beep through an example program with Python.

Revision History

Table 0-1 Revision History

Version	Released	Revision
1.0	2022/11/30	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.

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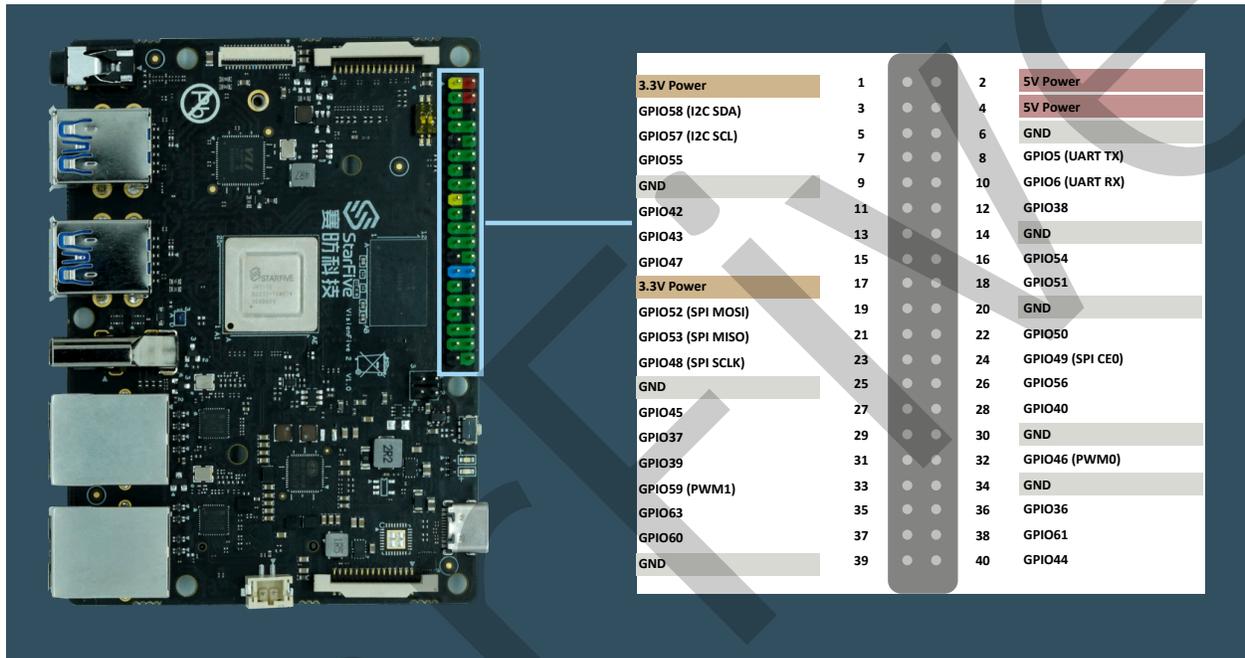
1. Introduction

This application note provides steps to use VisionFive 2's GPIO pins to make a buzzer beep through an example program with Python.

1.1. 40-Pin Header Definition

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

Figure 1-1 40-Pin Definition



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

Prepare the following hardware items before running the demo code:

Table 2-1 Hardware Preparation

Type	M/O*	Item	Notes
General	M	VisionFive 2 single board computer	-
General	M	<ul style="list-style-type: none">• 32 GB (or more) micro-SD card• micro-SD card reader• Computer (Windows/macOS/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 Debian OS into a micro-SD card.
GPIO Demo (Buzzer)	M	A passive buzzer	-



Note:

*: M: Mandatory, O: Optional

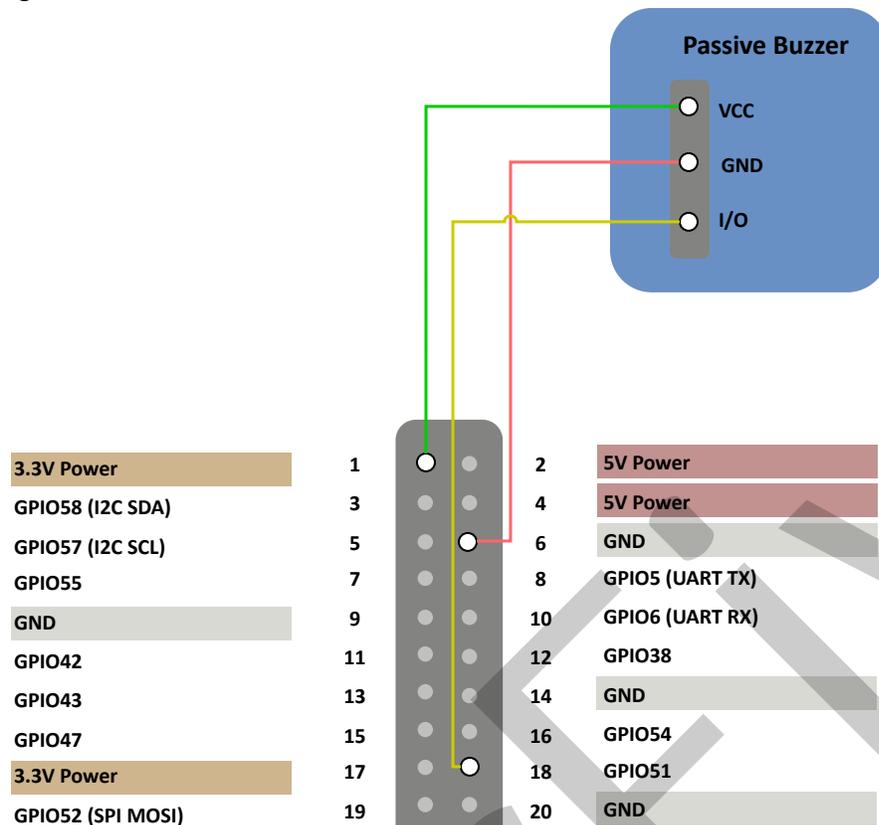
2.2.1. Hardware Setup

The following table and figure describe how to connect the buzzer to the 40-pin GPIO header:

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

Passive Buzzer	40-Pin GPIO Header	
	Pin Number	Pin Name
VCC	1	3.3V Power
GND	6	GND
I/O	18	GPIO51

Figure 2-1 Connect Buzzer to the 40-Pin GPIO 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 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:

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

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

```
sudo pip install VisionFive.gpio
```

Alternatively, you can execute the following command:

```
sudo pip3 install VisionFive.gpio
```

6. (Optional) If you copy the source code to the local directory under VisionFive 2 Debian, execute the following commands under the source code directory:



Tip:

The source code can be downloaded by clicking the following link: [VisionFive.gpio](https://visionfive.gpio).

```
sudo apt-get install python3-dev
sudo python setup.py install
```

Alternatively, you can execute the following command:

```
sudo python3 setup.py install
```

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3. Running Demo Code

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

1. Locate to the directory where the code, `buzzer.py`, exists:
 - a. Execute the following command to get the directory where `VisionFive.gpio` exists:

```
pip show VisionFive.gpio
```

Example 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/
```

2. Under the `sample-code` directory, execute the following command:

```
sudo python buzzer.py
```

Alternatively, you can execute the following command:

```
sudo python3 buzzer.py
```

3. Enter the values as prompted to configure the pitch and the lasting time of the beeps as prompted:

- **Enter Pitch (200 to 20000):** The frequency (Range: 200 to 20,000) of the buzzer. Unit: Hz. For example, 400.



Note:

If the value is out of the range (200 to 20,000 Hz), a warning message will display, and you need to re-enter the pitch value.

- **Enter Cycle (seconds):** The time in seconds when the buzzer keeps beeping. For example, 100.

Example:

```
[riscv@fedora-starfive sample-code]$ sudo python3 buzzer.py
Enter Pitch (200 to 20000): 400
Enter Cycle (seconds): 100
```

Result:

The buzzer keeps beeping for 100 seconds at 400 Hz.

4. Demo Source Code

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

buzzer.py:

```
'''
Please make sure the buzzer is connected to the correct pins.
The following table describes how to connect the buzzer to the 40-pin header.
-----
Passive Buzzer__Pin Number__Pin Name
VCC                1          3.3V Power
GND                6          GND
I/O               18         GPIO51
-----
'''

import VisionFive.gpio as GPIO
import time

buzz_pin = 18
ErrOutOfRange = 0

def setup():
    #Configure the direction of buzz_pin as out.
    GPIO.setup(buzz_pin, GPIO.OUT)
    #Configure the voltage level of buzz_pin as high.
    GPIO.output(buzz_pin, GPIO.HIGH)

def pitch_in_check():
    val_in = input('Enter Pitch (200 to 20000): ')
    val = float(val_in)

    if 200 <= val <= 20000:
        return val
    else:
        print('The input data is out of range (200 to 20,000 Hz). Please re-enter.')
        return ErrOutOfRange

def loop(pitch, cycle):
    delay = 1.0 / pitch
    cycle = int((cycle * pitch)/2)

    #Buzzer beeps.
    while cycle >= 0:
        GPIO.output(buzz_pin, GPIO.LOW)
        time.sleep(delay)
        GPIO.output(buzz_pin, GPIO.HIGH)
        time.sleep(delay)

        cycle = cycle - 1

def destroy():
    GPIO.output(buzz_pin, GPIO.HIGH)
    GPIO.cleanup()

if __name__ == '__main__':
    setup()
    try:
        #Input value of pitch (200 to 20,000 Hz).
        pitch = pitch_in_check()
        while pitch != 0:
            pitch = pitch_in_check()

        #Input value of cycle time (seconds).
        cycle_in = input("Enter Cycle (seconds): ")
        cycle = int(cycle_in)

        #The buzzer beeps with the specified pitch and cycle.
        loop(pitch, cycle)
```

```
finally:  
    destroy()
```

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