
Servo Shield: Raspberry Pi Serial Communication Shield

User Manual

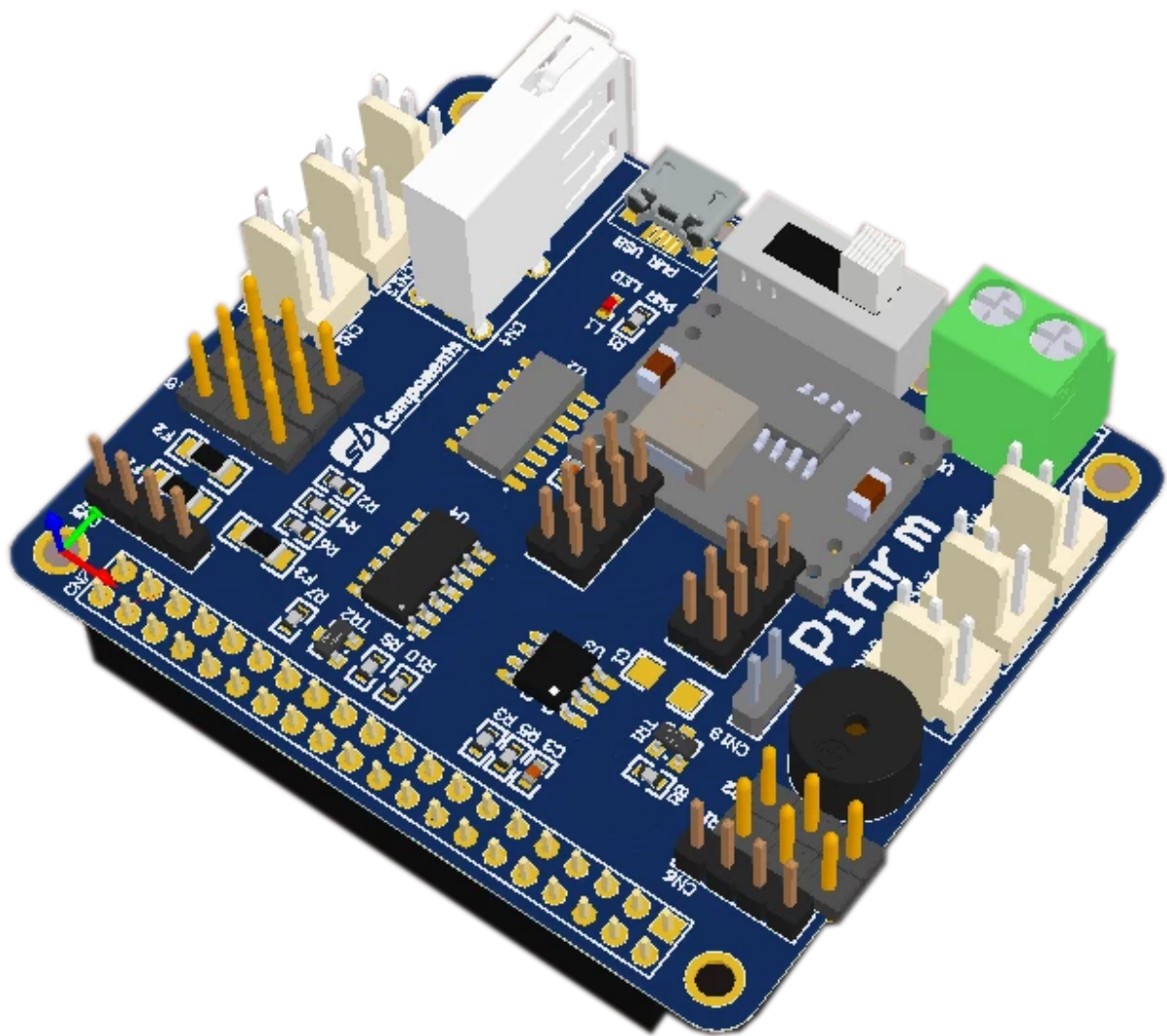


Table Of Content

| | |
|-----------------------|---|
| Summary | 3 |
| Features and Benefits | 3 |
| Applications | 3 |
| Hardware | 4 |
| Pinout | 5 |
| How to Use | 7 |
| Hardware Setup | 7 |
| Software Setup | 9 |

Summary

Servo shield is a Raspberry Pi compatible board for Servos with serial communication. This shield is compatible with half-duplex serial communication devices. It is made for driving serial servo motors at up to 12 volts.

The Servo Shield is made for use in robotic applications. User can integrate serial servos, ultrasonic sensors, or infrared sensors with servo shield. It is being used in **PiArm, PiMecha**, etc.

Features and Benefits

- Supports Up To 12-volt servo
- USB and GPIO Serial Communication
- Raspberry Pi Zero/Zero W/Zero WH/2B/3B/3B+/4B Compatible
- 6 Servo Connecting Ports
- 2 IR Interface and 1 Ultrasonic Interface Pins
- Easy access to power pins
- LED and Buzzer Power Indicator
- Dimensions: 65mm × 56mm

Applications

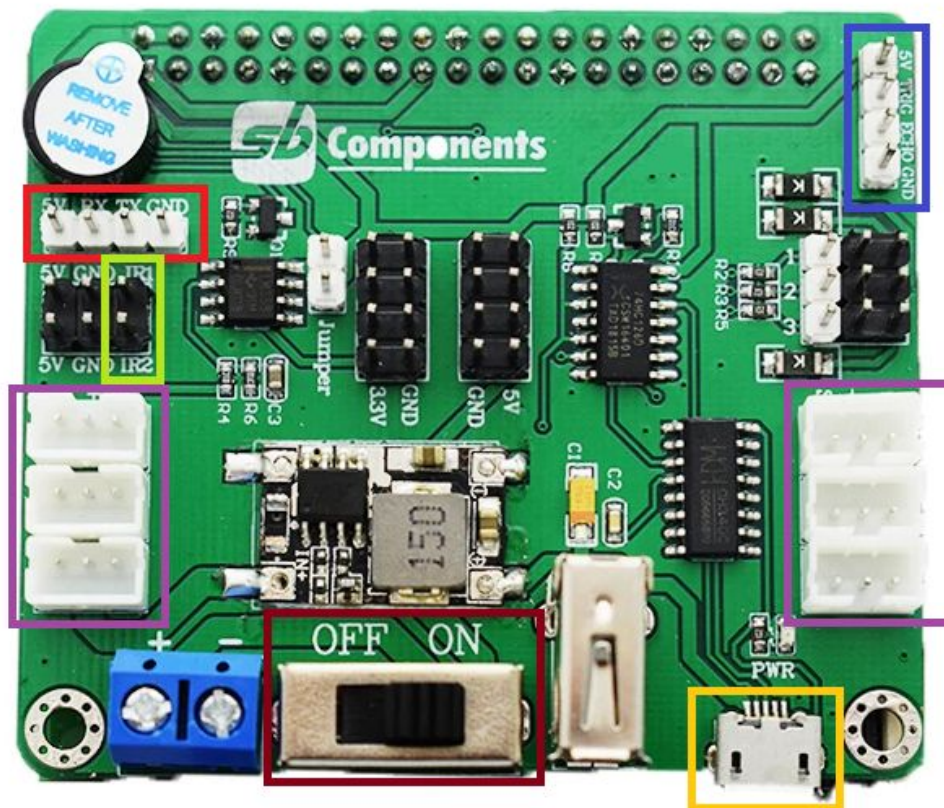
- Drive Servo Motors
- Robotics
- USB-serial Communication
- Half Duplex to Full Duplex Communication

Hardware

Servo Shield is an easily stackable Raspberry Pi shield with dimensions of around 65mm x 56 mm. There are lots of connector pins over the shield.

For USB to serial communication Servo Shield uses CH340G IC. A 74HC126 general-purpose logic IC converts full-duplex UART into half-duplex communication and vice-versa.

The shield can work on the max voltage of 12 volts, the shield has also an onboard supply for Raspberry Pi which means you don't need a separate power supply for Raspberry Pi. The voltage you apply at Servo Shield will be converted to 5 volts for Raspberry Pi.



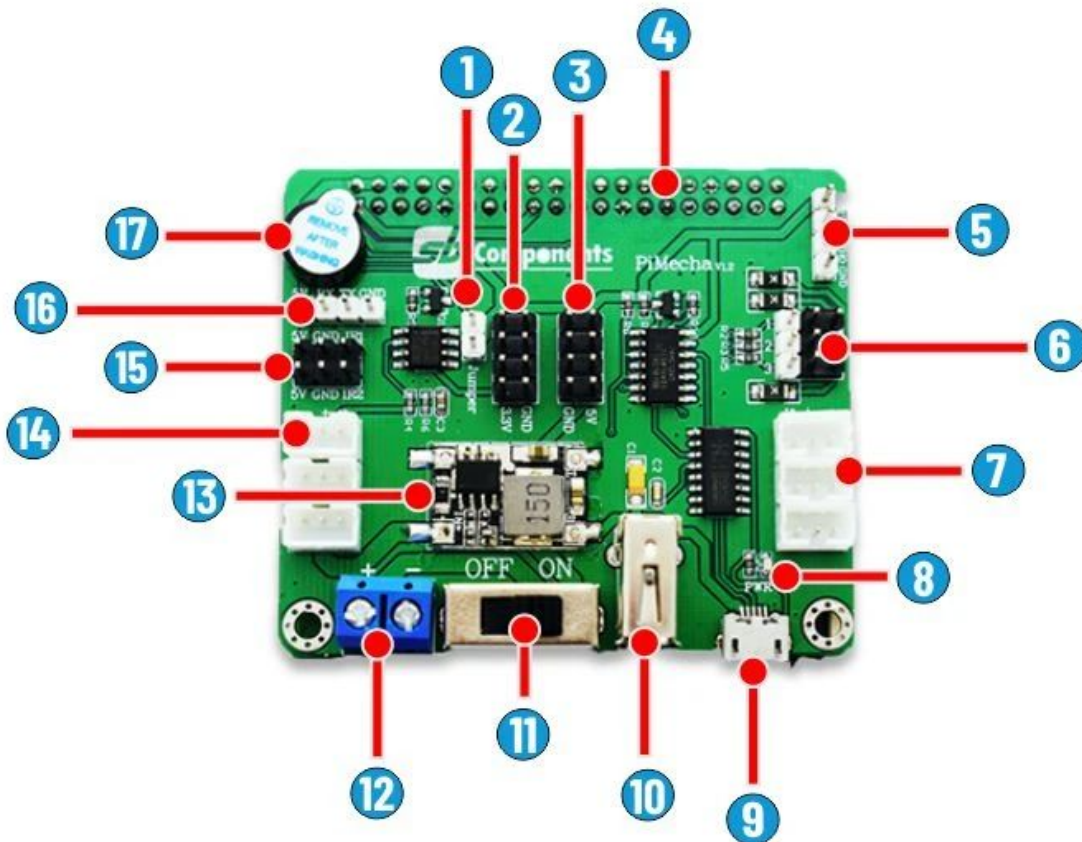
The 3 wire cables available with the PiArm and PiMecha can easily be inserted into the white sockets given on the board. For USB communication, the micro USB cable can directly be inserted into the USB port on the board.

Pinout

| Servo Shield | Raspberry Pi Board Pin | Functions |
|--------------|------------------------|-------------------------------|
| Transmitter | 8 | UART transmitting pin |
| Receiver | 10 | UART receiving pin |
| Trig | 31 | Ultrasonic trigger pin output |
| Echo | 29 | Ultrasonic echo pin input |
| IR1 | 7 | Take IR sensor digital input |
| IR2 | 12 | |
| S(signal) | NA | Half-duplex UART pin |

Note: The other pins are connected with the indicated pin number/name.

You can interface 3 sensors with the Servo Shield. 4 pins for the sensors are provided. You can use it for any I/O purpose but they are designed to support IR and ultrasonic sensors. The 'S' which stands for the signal is the half-duplex pin to the servo or any other device you want to drive.



- | | |
|--|-----------------------------------|
| 1 Jumper For Low Voltage Indication | 10 PWR USB for LCD |
| 2 3.3V Connector | 11 ON/OFF Switch |
| 3 5V Connector | 12 Battery Connector |
| 4 GPIO Header | 13 DC-DC Convertor |
| 5 Ultrasonic Sensor Connector | 14 Digital Servo Connector |
| 6 Analog Servo Connector | 15 IR Sensor Connector |
| 7 Digital Sensor Connector | 16 Bluetooth Connector |
| 8 Power LED | 17 Buzzer |
| 9 Serial Comm. USB | |

How To Use

Servo Shield is made for controlling serial servo motors operating at 6v to 12v voltage and 2 Amps current. These servos are used for Robotic and other applications. By providing a power supply at the blue pvt connector and the switch turned on, the voltage at the servo connector pins will be same as the input voltage. With this arrangement, there is no need to power the Raspberry Pi separately.

It is fully compatible with all 40 pins Raspberry Pis. It can be easily stacked over the Raspberry Pi board.

Hardware Setup

Before stacking Servo Shield over the Raspberry Pi keep the power unplugged. The female headers of the shield will head over to male headers on the Raspberry Pi.

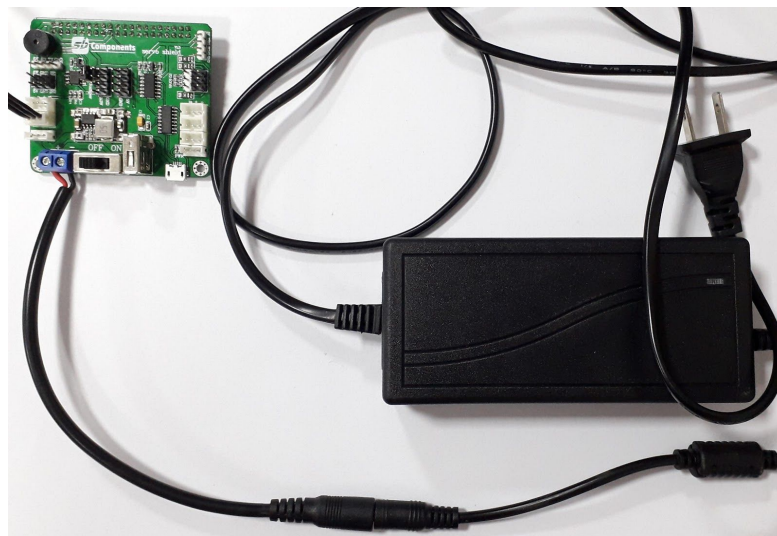
Align shield over the Raspberry pi such that both le and female headers are over each other.



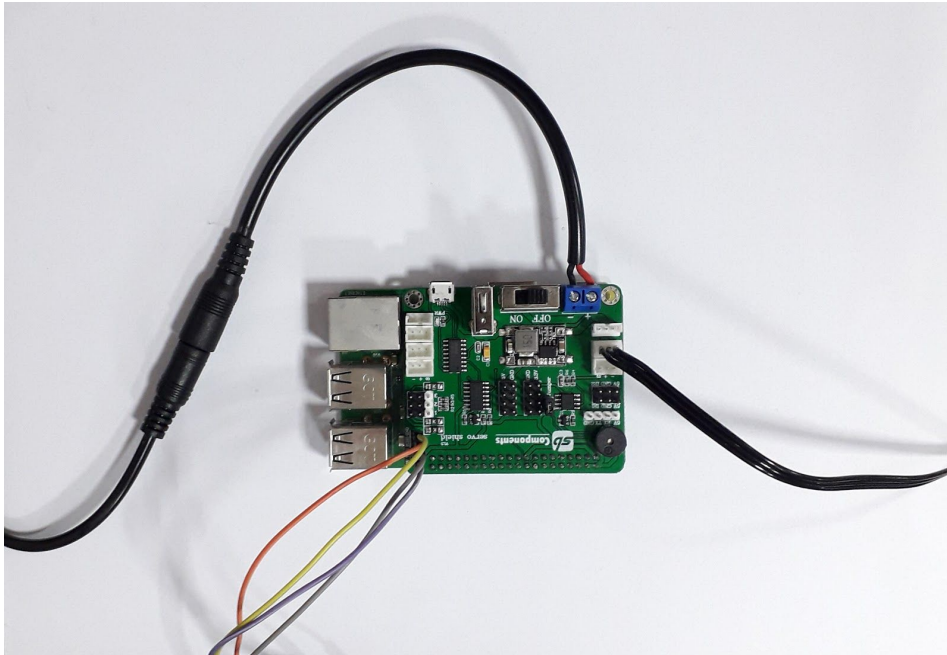
With the power adapter connect the 2 wire DC connector. The red wire from the connector is positive and black wire is negative, you should check the polarity of the wires with a multimeter by yourself once.



Connect the two-wire connector with the blue pvt connector on servo shield(make sure the polarity is correct). Once the connection is set up connect your servo motor's wire into the white connector



Stack the servo shield over the Raspberry Pi, and connect the sensor wires if required.



Or you can also use USB serial communication, USB communication will work the same way as GPIO. With USB serial communication it's up to you if you want the Servo Shield stacked over the Raspberry Pi or not.

After all the connections, plug the adapter into the socket and turn on the ON/OFF switch on the shield.

Software Setup

With Servo Shield, you do not need any added driver or software support. You can use your serial ports the same way you were using earlier. But the difference is you can either receive or transmit data at a time.

After the hardware setup is complete, use your serial communication libraries and the same port numbers you were using earlier. For Raspberry Pi 3 and 4, the port is `ttyS0`.

For USB serial communication you will need to change the port to USB serial port which is mostly `ttyUSB0`.