Gravity: Digital Peristaltic Pump SKU: DFR0523

Introduction

Gravity: digital peristaltic pump is a new product developed by DFRobot. This is a new member of our water quality monitoring devices. It is an actuator for the liquid system.

DFRobot peristaltic pump integrates a PPM motor driver on the pump, this is a Gravity interface (PH2.0-3P) motor driver. The control signal is compatible with standard servo motor, you can use Arduino, Raspberry Pi, micro:bit and other kinds of microcontrollers to control its direction and flow speed. The tube in the pump head is made up of BPT material, which is anti-acid and long life. Peristaltic pumps are a kind of positive displacement pump used for delivering small amounts of fluid. The fluid is contained within a flexible tube fitted inside a circular pump casing. When the rotor rotates continuously, the fluid in the tube will be squeezed and deliver to the other side. In this way, the liquid flow rate can be easily accuracy controlled.

As a kind of metering pump, peristaltic pump can be conveniently used for quantitative delivery. It has a wide range of application scenarios, such as science experiment, hydroponics, drip irrigation, tropical fish farming, shrimp cylinder environment control, etc. A large number of titration experiments can be automated with this peristaltic pump, such as potentiometric titration, indicator-based colorimetric titration, pH-based titration, and so on. It is great helpful to improve your working efficiency On the other hand, peristaltic pumps also have a wide range of applications in food, medical and other industries. Making an automatic coffee machine will be a really good idea!

Specification

Driver Board:

- Input Voltage: 5V-6V
- Maximum Continuous Operating Current: 1.8A
- Peak Current: 2.5A
- Quiescent Current: <1mA (No PPM Signal Input)
- PPM Signal Resolution: 1us
- Positive Pulse Width of the PPM Signal: 500us-2500us
- Forward Pulse Width Range: 500us-1400us (500us: max forward speed)
- Stop Pulse Width Range: 1400us-1600us
- Inverted Pulse Width Range: 1600us-2500us (2500us: max inverted speed)
- PPM Frequency: 50Hz (Servo Control Signal)
- Connector: Gravity PH2.0-3P
- Size: 27.4 x 28.7 mm/1.08 x 1.13 inches

Peristaltic Pump

- Motor: DC Motor
- Rated Voltage: 6V
- Rated Power: 5W
- Tube Material: BPT
- Tube Specifications: inner diameter 2.5mm, outer diameter 4.5mm
- Pump Head Material: Engineering Plastics
- Pulsation: Three Rollers, Small Pulsation
- **Flow: ≥45ml/min (almost 1ml/s)**
- Working Conditions: ambient temperature 0 ~ 40 ℃, relative humidity <80%

Board Overview
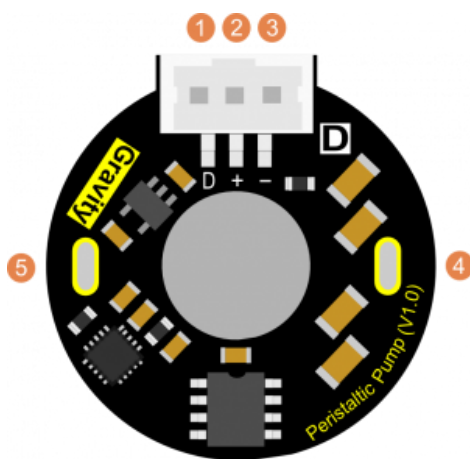
Num	Label	Description
1	D	Control Signal Input(PPM Signal)
2	+	Power VCC(5V~6V)
3	-	Power GND(0V)
4	M-	Motor Negative Pin
5	M+	Motor Positive Pin

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Basic Tutorial

⚠️ Since the motor power consumption (about 5W) is a little large, it's better to add an external power supply on your microcontroller, USB port can only provide 2.5W power supply.

This tutorial will demonstrate how to make this peristaltic pump clockwise rotation, stop rotation, counterclockwise rotation of these three basic functions.

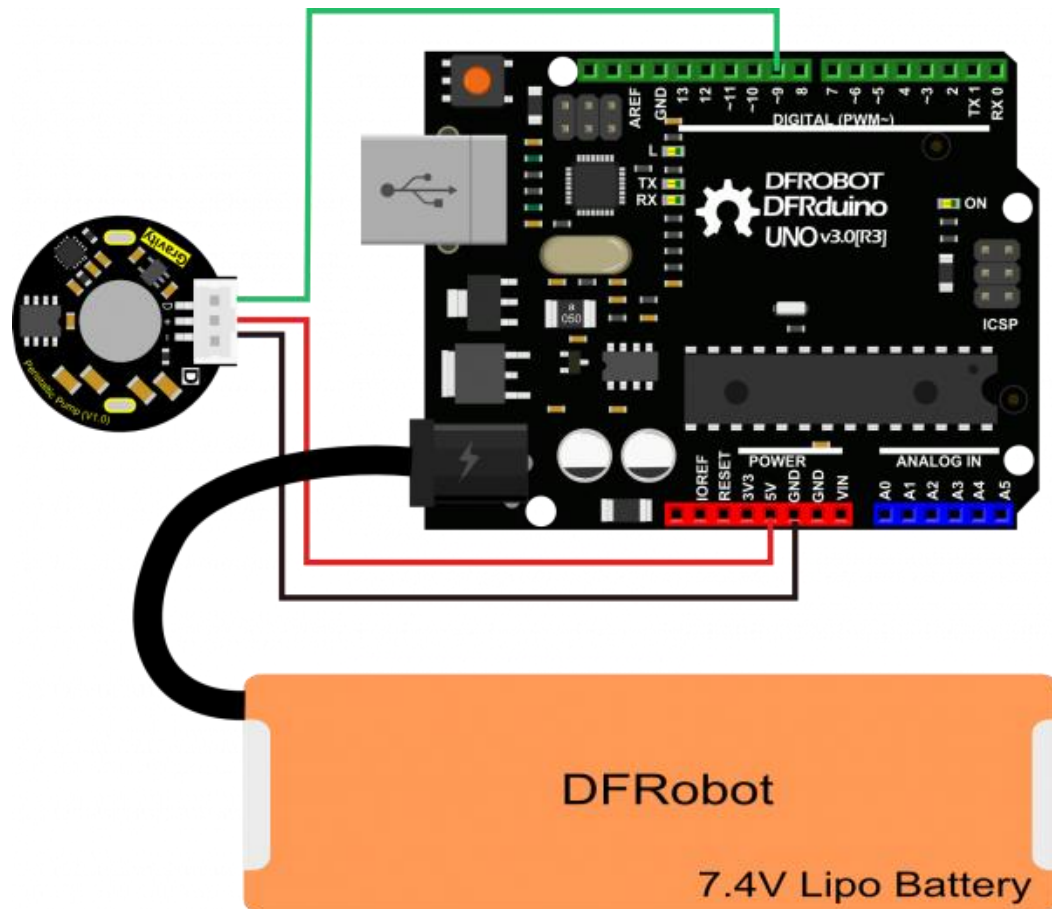The motor driver board uses the PPM signal to control the pump. The corresponding relationship is as follows:

PPM Signal	Peristaltic Pump Status (Top View)
500~1400us (0~81°)	Clockwise maximum speed rotation
1400~1600us (81~99°)	Stop
1600~2500us (99~180°)	Counterclockwise maximum speed rotation

In addition, the closer to 500us(0°) or 2500us(180°), the faster the flow rate speed is; when the value is closer to 90°, the slower the motor speed. Therefore, according to the requirement, you can set the appropriate angle value to adjust the motor speed, to achieve the purpose of controlling the flow rate.

Requirements

- Hardware
  DFRduino UNO R3 (or similar) x 1
  Motor of Peristaltic Pump x 1
  Pump Head of Peristaltic Pump x1
  External Power(5~7V) x1
  Digital 3Pin Gravity Cable x1

- Software
  Arduino IDE (Version requirements: V1.0.x or V1.8.x), Click to Download Arduino IDE from Arduino®

Connection Diagram

Arduino Sample Code

```
/*****************************************************

 DFRobot Gravity: Peristaltic Pump

 <https://www.dfrobot.com/wiki/index.php/Gravitry: Peristaltic Pump SKU:DF
R0523>
```

```
 ***************************************************
 This sample code shows 3 states: clockwise maximum speed rotation; stop;
counterclockwise maximum speed rotation


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 /***********Notice and Trouble shooting***************
0   -> clockwise maximum speed rotation
90  -> stop
180 -> counterclockwise maximum speed rotation
 ***************************************************/


#include <Servo.h>


Servo myservo;


#define PUMPPIN 9    //peristaltic pump control pin, connect to arduino di
gital pin 9
#define waitTime 2000 //interval time(ms) between every state


void setup()
{
  myservo.attach(PUMPPIN);
}


void loop()
{
    myservo.write(0);   //Clockwise maximum speed rotation
    delay(waitTime);
```
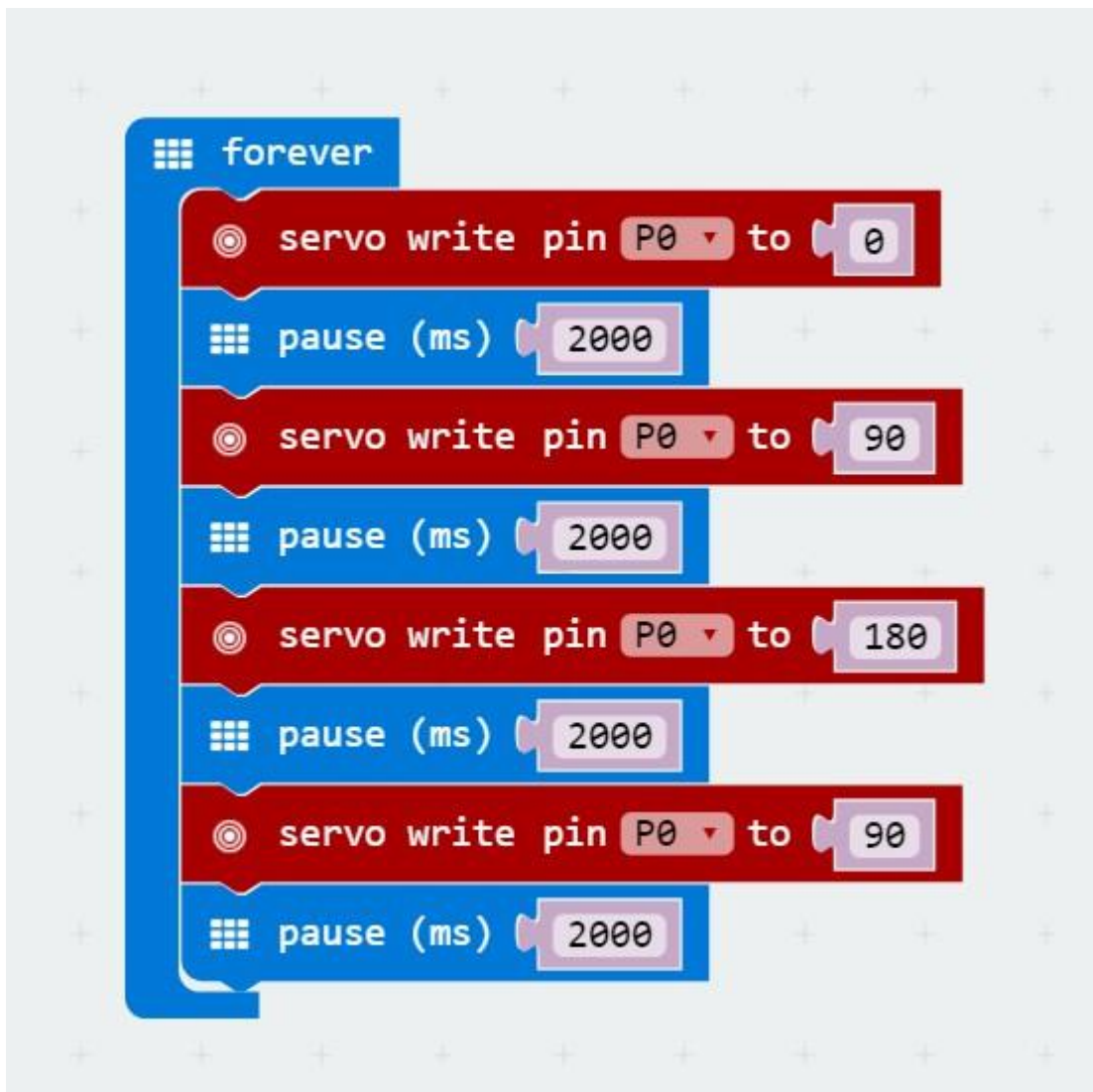
```
    myservo.write(90);   //Stop

    delay(waitTime);

    myservo.write(180); //Counterclockwise maximum speed rotation

    delay(waitTime);

    myservo.write(90);   //Stop

    delay(waitTime);

}
```

micro:bit Sample Code

Expected Results

After uploading the sample code, you can see that the peristaltic pump starts to work and continuously switches between the three states of clockwise maximum speed rotation, stop and maximum counterclockwise rotation speed every 2 seconds.

For any questions, advice or cool ideas to share, please visit the DFRobot Forum.

More Documents

- Motor Driver Board Dimension
- Peristaltic Pump Dimension