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REF: E12-PCA9685

16 Channel 12-bit PWMServo Driver-I2C Interface PCA9685 Module

Description

You want to make a cool Arduino robot, maybe a hexapod walker, or maybe just a piece of art with a lot of moving parts. Or maybe you want to drive a lot of LEDs with precise PWM output. Then you realize that the Arduino has only a few PWM outputs, and maybe those outputs are conflicting with another shield! What now? You could give up OR you could just get our handy PWM and Servo driver shield. It's just like our popular PWM/Servo Breakout but now Arduino-ready and works with any Arduino that uses shields: Uno, Leo, Mega, ADK, it’s all good. When we saw this chip, we quickly realized what an excellent add-on this would be. Using only two I2C pins, control 16 free-running PWM outputs! You can even stack up 62 shields to control up to 992 PWM outputs (which we would really like to see since it would be glorious and like 4 feet tall) Because I2C is a shared bus you can also connect other I2C devices and sensors to the SCL/SDA pins as long as their addresses don't conflict (this shield has address 0x40)

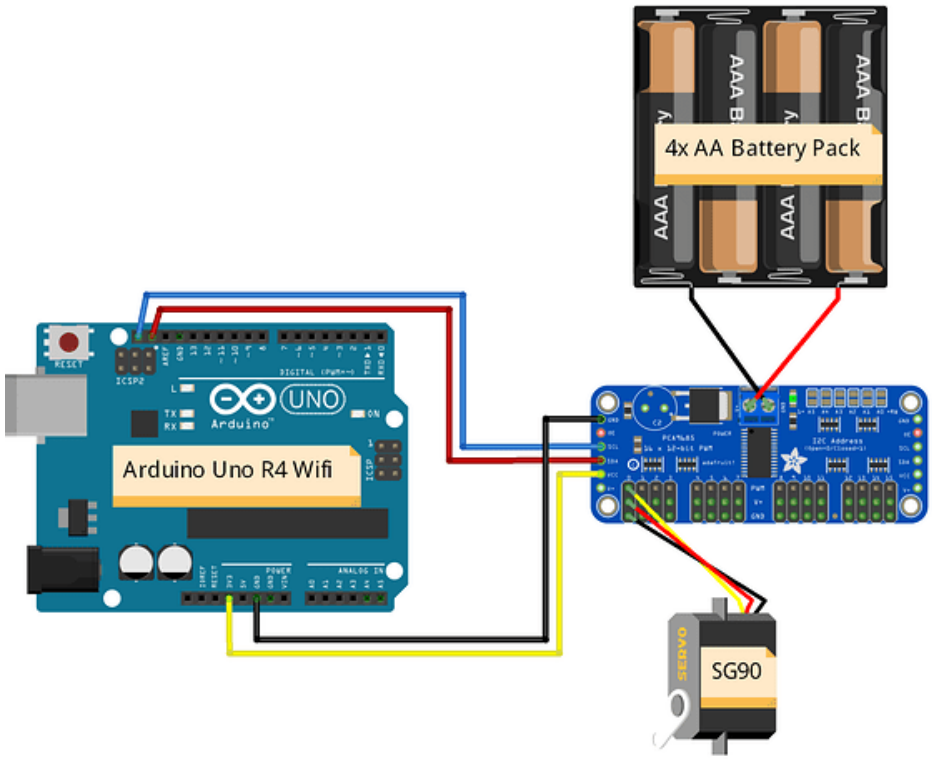
Specifications

- Protocol: I2C
- Interface: I2C
- PWM Channels: 16
- PWM Resolution: 12-bit (4096 steps)
- PWM Frequency: 24 Hz to 1526 Hz
- Voltage (Logic Circuit): 2.3V to 5.5V
- Voltage (External Power): Up to 6V (typically 5V for servos)
- Output Current: Sink: 25 mA, Source: 10 mA per channel
- Addressable Modules: Up to 62 on a single I2C bus
- External Clock: Supports external clock input for synchronization
- Operating Temperature: -40°C to 85°C

Circuit diagram

The module is equipped with an I2C bus and a power input. The I2C bus is connected as follows:

- Pin A5 or SCL to the SCL pin of the module
- Pin A4 or SDA to the SDA pin of the module
- Pin 5V to the VCC pin of the module
- Pin GND to the GND pin of the module in this tutorial we use the Arduino UNO board, but it can be adapted to other microcontrollers. To do so, just adapt the I2C pins available on the microcontroller in question and possibly the code.



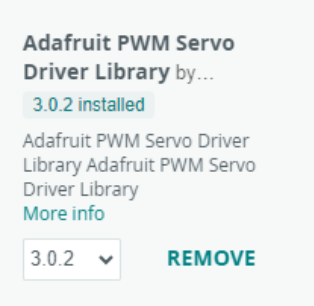
Arduino UNO	PCA9685 Module	SG90S Servo	Battery / Power
VCC	VCC	-	-
GND	GND	-	-
SCA / A4	SCA	-	-
SCL / A5	SCL	-	-
-	(External) V+	-	POSITIVE (+)
-	(External) GND	-	NEGATIVE (-)
-	PWM 0	SIGNAL	-
-	(PWM) V+	VCC	-
-	(PWM) GND	GND	-

Libraries

To use the PCA9685 module, we use the library “Adafruit_PWMServoDriver.h”. PWM widths are usually given in microseconds over a period of 20ms (50Hz) but these values can change from one actuator to another and between vendors. You will have to modify the values in the code to adapt them to your actuator.

In our case, we use the MG90S actuator whose ranges are 400-2400µs over 20ms.

To set the PWM command, the library provides two functions: setPWM() and writeMicroseconds(). The writeMicroseconds() function allows us to use the constructor values directly. For the setPWM function, we need to find the corresponding pulse width on 4096 (2^12, 12bits).



Coding

The code is the example code that comes with the Adafruit servo package. I have commented out the part where it goes through servo 0-7, because I only have 1 connected, but otherwise this is just what comes "out of the box":