

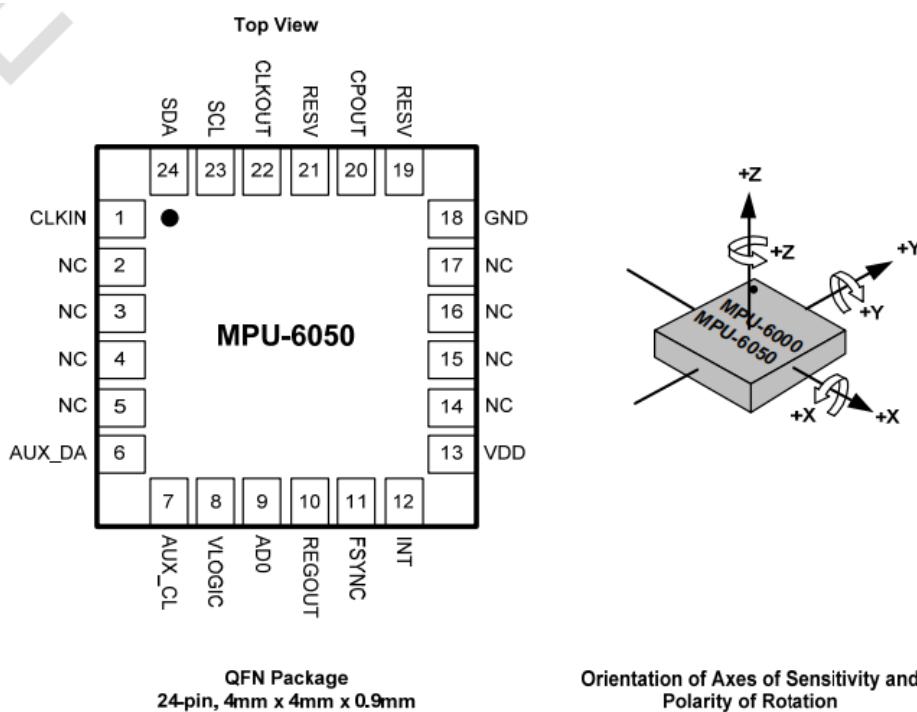
6.1 About MPU6050

1. What is the MPU6050?

A: The MPU6050 is a 6-axis attitude sensor that integrates a 3-axis gyroscope, a 3-axis accelerometer and a digital motion processor. The external expansion pins AUX_DA and AUX_CL can be connected to third-party digital sensors, such as an external magnetometer, which can be seen as a sensor that outputs 9-axis signals for I2C communication.

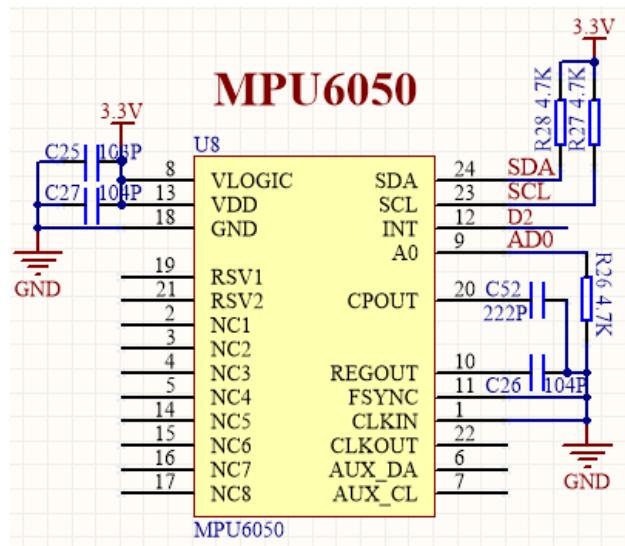
The MPU6050's gyroscopes and accelerometer adopt three 16-bit ADCs to convert the measured analog quantities into outputable digital values. The gyroscope can measure ± 250 , ± 500 , ± 1000 , $\pm 2000^\circ/\text{sec}$ (dps), and the accelerometer can measure ± 2 , ± 4 , ± 8 , $\pm 16\text{g}$. The MPU6050 come with 1024 bytes of FIFO memory to help reduce system power consumption. The supply voltage is $3.3\text{V} \pm 5\%$. It uses I2C communication and speeds up to 400kHz. Built-in DMP (Digital Motion Processor) can directly output information such as Euler angles, eliminating the need for a large number of filtering and calculation steps of the processor, saving the resources of the main control chip.

2. Pin function description



Pin Number	MPU-6000	MPU-6050	Pin Name	Pin Description
1	Y	Y	CLKIN	Optional external reference clock input. Connect to GND if unused.
6	Y	Y	AUX_DA	I ² C master serial data, for connecting to external sensors
7	Y	Y	AUX_CL	I ² C Master serial clock, for connecting to external sensors
8	Y		/CS	SPI chip select (0=SPI mode)
8		Y	VLOGIC	Digital I/O supply voltage
9	Y		AD0 / SDO	I ² C Slave Address LSB (AD0); SPI serial data output (SDO)
9		Y	AD0	I ² C Slave Address LSB (AD0)
10	Y	Y	REGOUT	Regulator filter capacitor connection
11	Y	Y	FSYNC	Frame synchronization digital input. Connect to GND if unused.
12	Y	Y	INT	Interrupt digital output (totem pole or open-drain)
13	Y	Y	VDD	Power supply voltage and Digital I/O supply voltage
18	Y	Y	GND	Power supply ground
19, 21	Y	Y	RESV	Reserved. Do not connect.
20	Y	Y	CPOUT	Charge pump capacitor connection
22	Y	Y	CLKOUT	System clock output
23	Y		SCL / SCLK	I ² C serial clock (SCL); SPI serial clock (SCLK)
23		Y	SCL	I ² C serial clock (SCL)
24	Y		SDA / SDI	I ² C serial data (SDA); SPI serial data input (SDI)
24		Y	SDA	I ² C serial data (SDA)
2, 3, 4, 5, 14, 15, 16, 17	Y	Y	NC	Not internally connected. May be used for PCB trace routing.

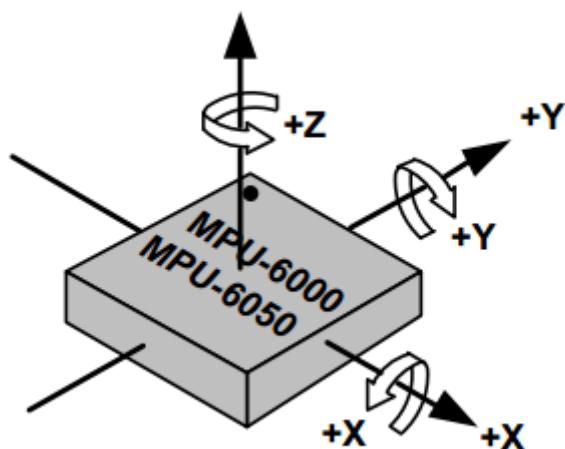
MPU6050 wiring diagram of omniduino robot car:



3. MPU6050 function:

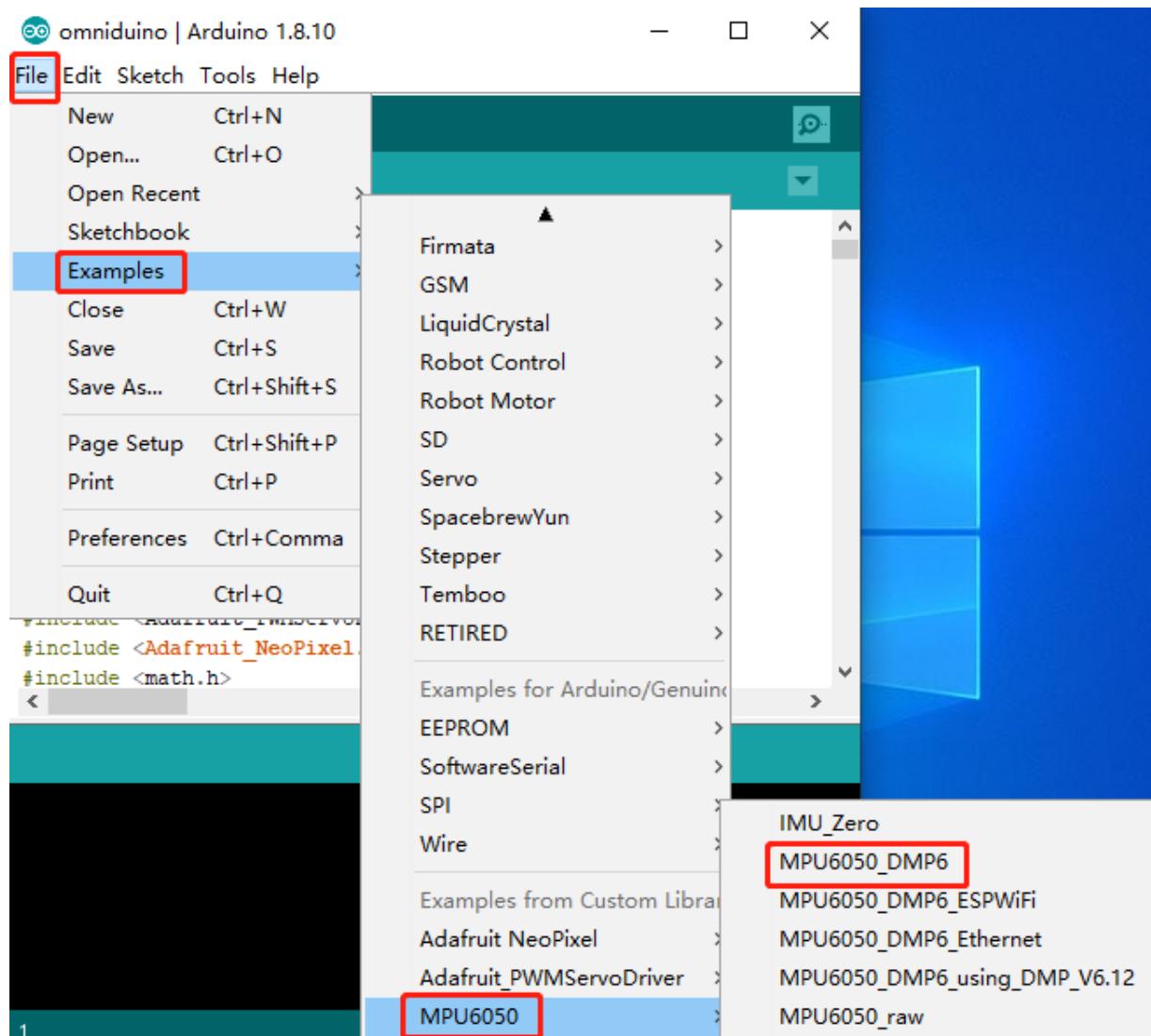
MPU6050 can output the original X/Y/Z axis data, or use the DMP module that comes with the chip, and then use arduino IDE MPU6050 library function to directly output information such as yaw angle, roll angle and pitch angle.

MPU6050 axis model, as shown below:



4. How to use MPU6050

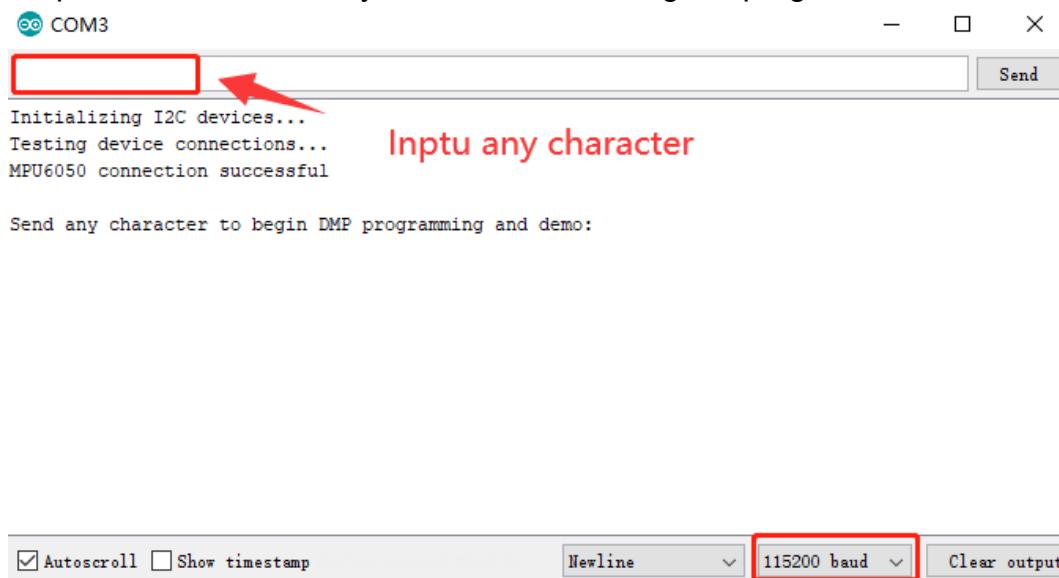
4.1 Open arduinolDE interface 【File】->【Examples】->【MPU6050】->【MPU6050_DMP6】



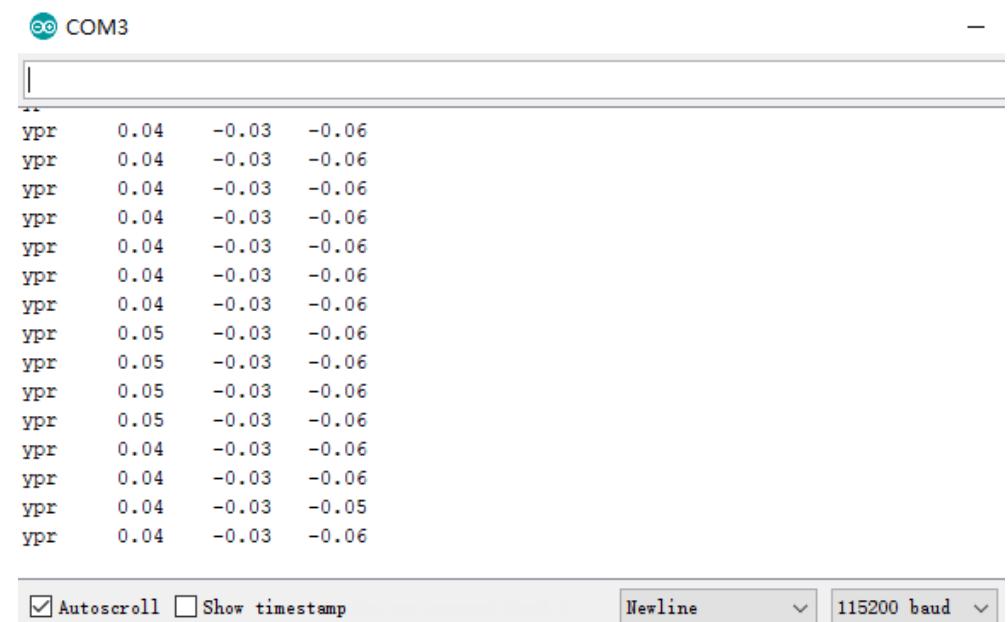
4.2 Choose port and upload this program. Then, open the Serial monitor.



4.3 Set the serial port baud rate to 115200, enter any character in the data sending box above, and press the Enter on keyboard to start running the program.



4.4 Next, we can see come come MPU6050 data be printed.



The first data is the yaw angle, the second data is the pitch angle, and the third data is the roll angle. The value of the boot initialization is 0, and the actual detected data with some errors.