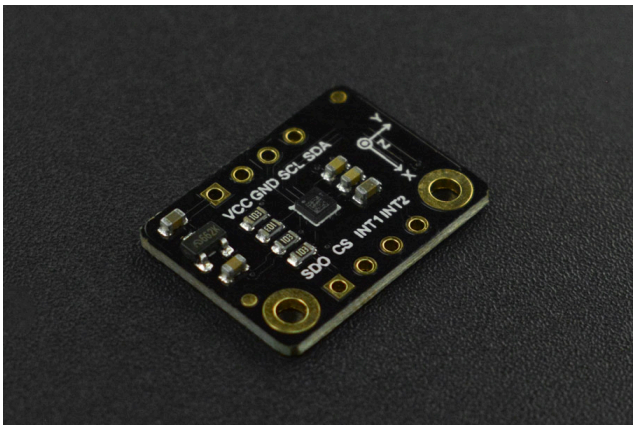
SKU:SEN0405 (https://www.dfrobot.com/product-2337.html)



(https://www.dfrobot.com/product-2337.html)

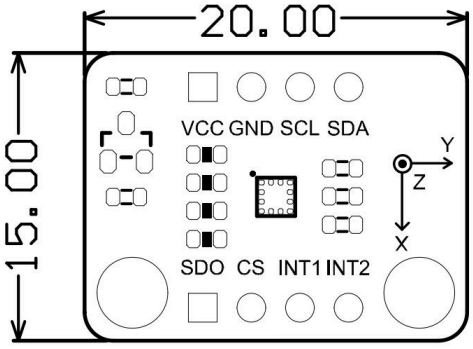
Introduction

The LIS2DW12 is an ultra-low power three-axis linear accelerometer with two independent programmable interrupts and a dedicated internal engine that can achieve various motion and acceleration detection including free-fall, portrait/landscape detection, 6D/4D orientation detection, configurable single/double-tap recognition, stationary/motion detection, motion wakeup for smart power saving, etc. And for your convenience, we provide you with sample programs for the above functions. The LIS2DW12 has user-selectable full scales of ±2g/±4g/±8g/±16g and is capable of measuring acceleration with output data rates from 1.6Hz to 1600Hz. Besides that, it offers multiple operating modes with multiple bandwidths, allowing you to choose freely based on your needs.

Features

- Selectable scale: ±2g /±4g /±8g /±16g
- 16-bit data output
- Two independent programmable interrupts
- Dedicated internal engine for achieving rich functions: free-fall, portrait/landscape detection, 6D/4D orientation detection, configurable single/double-tap recognition, stationary/motion detection, motion wakeup for smart power saving, etc.

Specification



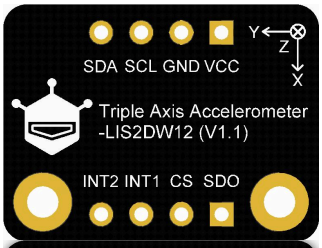
- Working Voltage: 3.3V
- Working Current: 50 nA (low power consumption mode)/0.17mA (high performance mode)
- Interface Mode: I2C/SPI

- I2C Address: 0x19(default address)/0x18(optional: pull down the SDO pin to select)
- Optional Scale: ±2g/±4g/±8g/±16g
- 16-bit data output
- Frequency: 1.6Hz~1600Hz
- Ultra-low Noise: 1.3 mg RMS (low power mode)
- 32-level FIFO (first-in first-out buffer zone)
- 10000 g high shock survivability
- ECOPACK, RoHS and "Green" compliant
- Working Temperature: -40℃~+85℃
- Module size: 15 x 20 (mm) / 0.59 x 0.79 (inch)

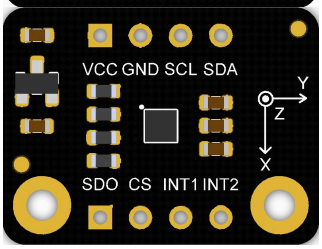
Application

- Free Fall Detection
- Activity Detection and Recording
- Single/Double Tap Detection
- Self-balancing Robot
- Aircraft
- Human Action Recognition
- Air Mouse
- Gamepad

Board Overview



(https://img.dfrobot.com.cn/wiki/none/081c5297ac78c380aa4b081ce3844eac.jpg)



(https://img.dfrobot.com.cn/wiki/none/ffbf52b0e43afa0b2ce1e73fa6c4f443.jpg)

No.	Silkscreen	Description
1	VCC	5V/3V3
2	GND	GND
3	SCL	I2C Clock Line/SPI Clock Line
4	SDA	I2C Data Line/SPI Data Line

5	INT2	Interrupt Pin 2
6	INT1	Interrupt Pin 1

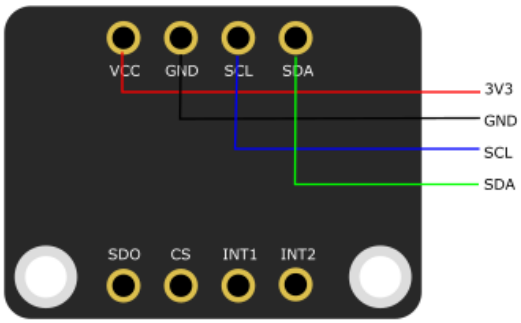
No.	Silkscreen	Description
7	CS	SPI chip-select line
8	SDO	I2C Address select pin/SPI data line MOSI

Note:

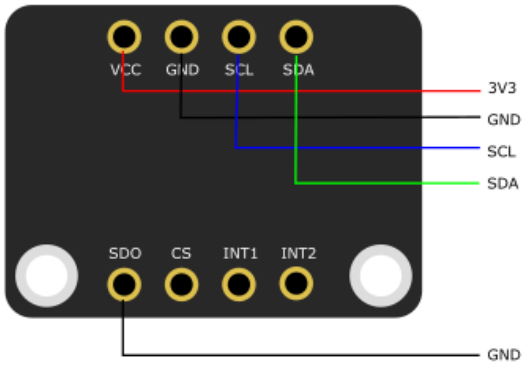
- All the data output voltage is 3.3V
- The I2C address of micro:bit (v1.5 version) conflicts with the sensor I2C address 0x19, so please select 0x18
- Pull down the SDO pin to switch the I2C address: 0x18

Connections for different communication methods:

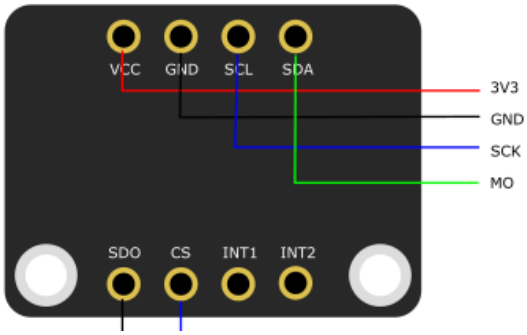
- I2C: 0x19(Default)

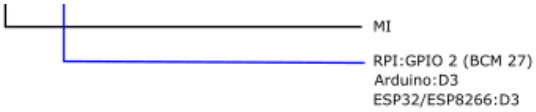


- I2C: 0x18



- SPI



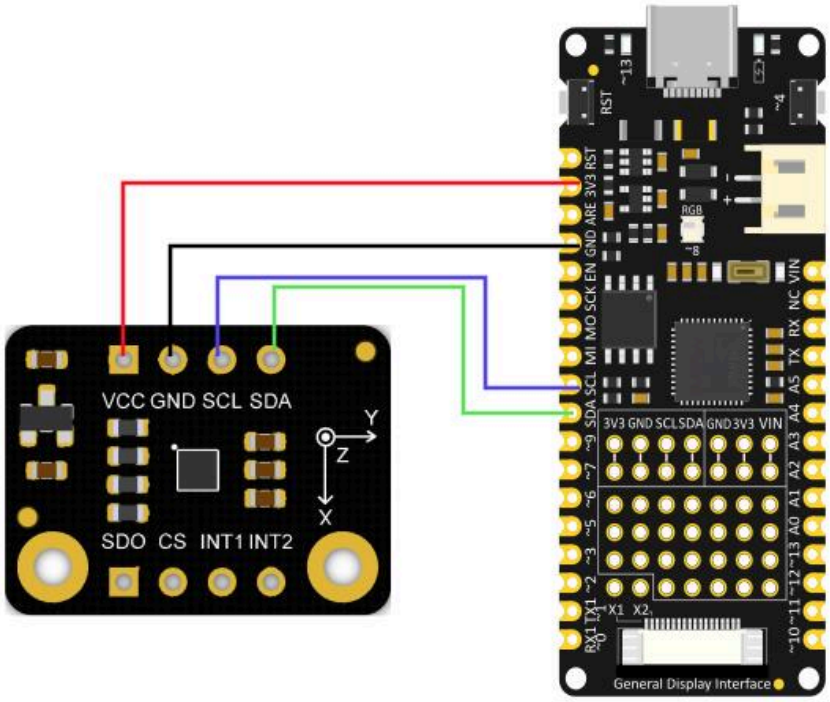


- Interrupt pin connection

Mainboard	Default connected pin
UNO/MEGA2560	D2
Leonardo	D3
Micro:bit	P0
ESP32/ESP8266/ARDUINO_SAM_ZERO	D6
Raspberry Pi	GPIO25

Tutorial for M0

Connect your sensor to M0 controller.



Requirements

- **Hardware**
  - Firebeetle Board-M0 x 1
  - LIS2DW12 Triple Axis Accelerometer x1
  - Jumper wires x1
- **Software**
  - Arduino IDE (https://www.arduino.cc/en/Main/Software)
  - Download and install the **LIS Series Library and Sample Code** (https://github.com/DFRobot/DFRobot_LIS) (About how to install the library? (https://www.arduino.cc/en/Guide/Libraries#.UxU8mdzF9H0))
  - About how to use Firebeetle Board-M0 (https://wiki.dfrobot.com/FireBeetle_Board_M0_V1.0_SKU_DFR0652)?

Connection

- **Sample Code**
  - Sample code 1-Read acceleration of x, y and z(getAcceleration.ino)
  - Sample code 2-Wakeup function(wakeUp.ino)
  - Sample code 3-Tap detection(tap.ino)
  - Sample code 4-Tap interrupt function(tapInterrupt.ino)
  - Sample code 5-Free fall detection function(freeFall.ino)
  - Sample code 6-Free fall interrupt function(freeFallInterrupt.ino)
  - Sample code 7-Motion detection(activityDetect.ino)
  - Sample code 8-Orientation detection(orientation.ino)
- API Function List

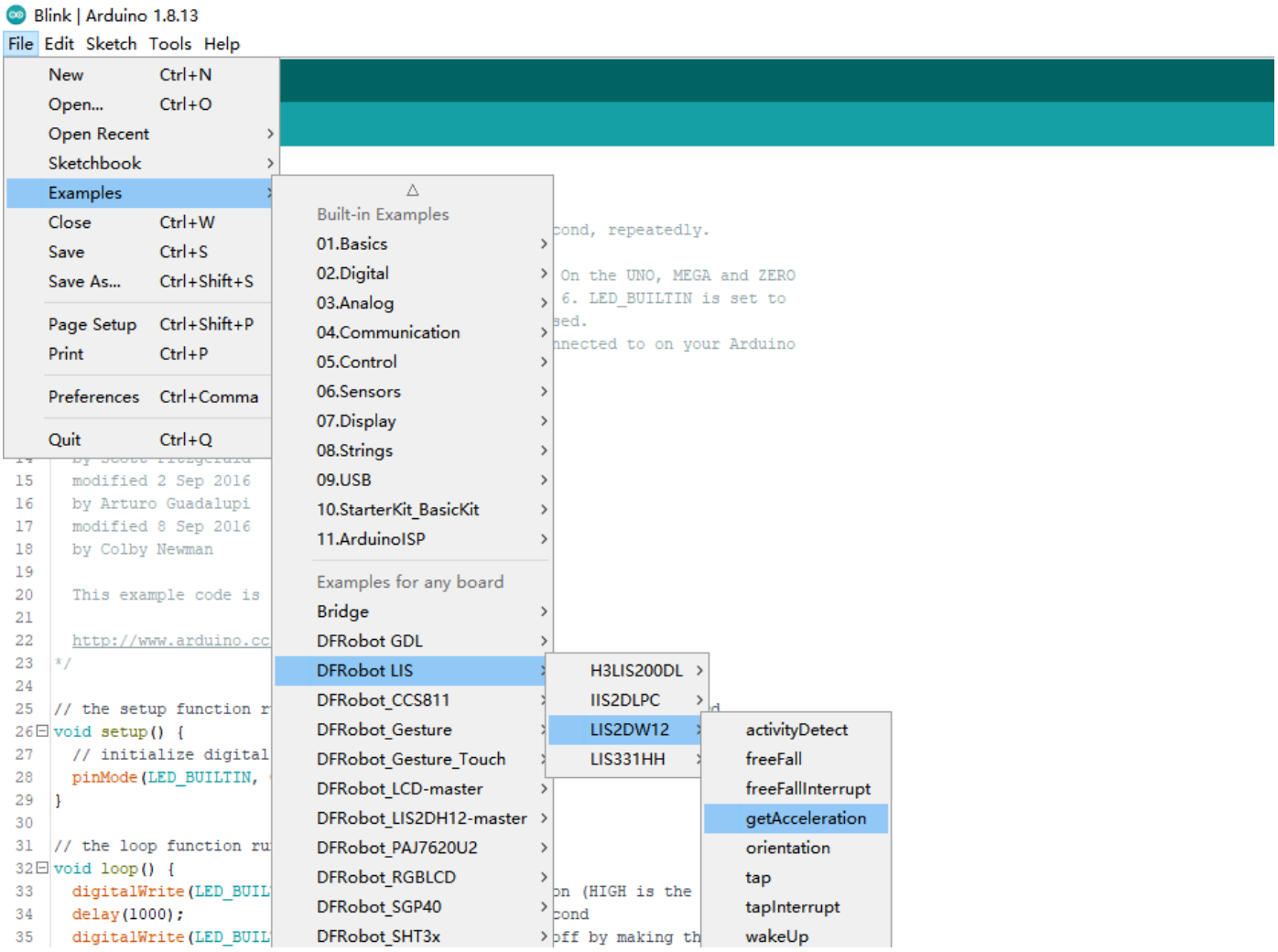
```
 DFRobot_LIS();
/**
 * @brief Initialize the function
 * @return true(Succeed)/false(Failed)
 */
bool begin(void);

/**
 * @brief Get chip id
 * @return 8 bit serial number
 */
uint8_t getID();

/**
 * @brief Enable interrupt
 * @param source Interrupt pin selection
            eINT1 = 0,/<int1 >/
            eINT2,/<int2>/
 * @param event Interrupt event selection
                 eXLowerThanTh ,/<The acceleration in the x direction is less than the threshold>/
                 eXHigherThanTh ,/<The acceleration in the x direction is greater than the threshold>/
                 eYLowerThanTh,/<The acceleration in the y direction is less than the threshold>/
                 eYHigherThanTh,/<The acceleration in the y direction is greater than the threshold>/
                 eZLowerThanTh,/<The acceleration in the z direction is less than the threshold>/
                 eZHigherThanTh,/<The acceleration in the z direction is greater than the threshold>/
 */
void enableInterruptEvent(eInterruptSource_t source, eInterruptEvent_t event);

/**
 * @brief Set measurement range
 * @param range Range(g)
                eH3lis200dl_100g, //±100g
                eH3lis200dl_200g, //±200g

                eLis331hh_6g = 6,//±6g
                eLis331hh_12g = 12 //±12g
                eLis331hh_24g = 24 //±24g
  @return true(Set successfully)/false(Set failed)
 */
bool setRange(eRange_t range);

/**
 * @brief Set data measurement rate
 * @param rate rate(HZ)
                ePowerDown_0HZ   //Measurement off
                eLowPower_halfHZ //0.5 hz
                eLowPower_1HZ
                eLowPower_2HZ
                eLowPower_5HZ
                eLowPower_10HZ
                eNormal_50HZ
                eNormal_100HZ
                eNormal_400HZ
                eNormal_1000HZ
 */
void setAcquireRate(ePowerMode_t rate);
```

```
/**
 * @brief Set data filtering mode
 * @param mode Four modes
               eCutOffMode1 = 0,
               eCutOffMode2,
               eCutOffMode3,
               eCutOffMode4,
               eShutDown, no filering
   eg: Select eCutOffMode1 in 50HZ, and the filtered frequency is 1HZ
 *|--------------------------High-pass filter cut-off frequency configuration-----------------------------|
 *|-------------------------------------------------------------------------------------------------------|
 *|                |    ft [Hz]      |        ft [Hz]       |       ft [Hz]        |        ft [Hz]        |
 *|   mode         |Data rate = 50 Hz|   Data rate = 100 Hz |  Data rate = 400 Hz  |   Data rate = 1000 Hz |
 *|-------------------------------------------------------------------------------------------------------|
 *|  eCutOffMode1  |     1           |         2            |            8         |             20        |
 *|-------------------------------------------------------------------------------------------------------|
 *|  eCutOffMode2  |    0.5          |         1            |            4         |             10        |
 *|-------------------------------------------------------------------------------------------------------|
 *|  eCutOffMode3  |    0.25         |         0.5          |            2         |             5         |
 *|-------------------------------------------------------------------------------------------------------|
 *|  eCutOffMode4  |    0.125        |         0.25         |            1         |             2.5       |
 *|-------------------------------------------------------------------------------------------------------|
 */
void setHFilterMode(eHighPassFilter_t mode);

/**
 * @brief Set the threshold of interrupt source 1 interrupt
 * @param threshold The threshold we set before is within measurement range(unit:g)
 */
void setInt1Th(uint8_t threshold);

/**
 * @brief Set interrupt source 2 interrupt generation threshold
 * @param threshold The threshold we set before is within measurement range(unit:g)
 */
void setInt2Th(uint8_t threshold);

/**
 * @brief Enable sleep wake function
 * @param enable true(enable)\false(disable)
 * @return false Indicate enable failed/true Indicate enable successful
 */
bool enableSleep(bool enable);

/**
 * @brief Check whether the interrupt event'event' is generated in interrupt 1
 * @param event Interrupt event
                eXLowerThanTh ,/<The acceleration in the x direction is less than the threshold>/
                eXHigherThanTh ,/<The acceleration in the x direction is greater than the threshold>/
                eYLowerThanTh,/<The acceleration in the y direction is less than the threshold>/
                eYHigherThanTh,/<The acceleration in the y direction is greater than the threshold>/
                eZLowerThanTh,/<The acceleration in the z direction is less than the threshold>/
                eZHigherThanTh,/<The acceleration in the z direction is greater than the threshold>/
 * @return true This event generated
           false This event not generated
 */
bool getInt1Event(eInterruptEvent_t event);

/**
 * @brief Check whether the interrupt event'event' is generated in interrupt 2
 * @param event Interrupt event
                eXLowerThanTh ,/<The acceleration in the x direction is less than the threshold>/
                eXHigherThanTh ,/<The acceleration in the x direction is greater than the threshold>/
```

```
                eYLowerThanTh,/<The acceleration in the y direction is less than the threshold>/
                eYHigherThanTh,/<The acceleration in the y direction is greater than the threshold>/
                eZLowerThanTh,/<The acceleration in the z direction is less than the threshold>/
                eZHigherThanTh,/<The acceleration in the z direction is greater than the threshold>/
 * @return true This event generated
           false This event not generated
 */
bool getInt2Event(eInterruptEvent_t event);

/**
 * @brief Get the acceleration in the x direction
 * @return acceleration from x
 */
int32_t readAccX();

/**
 * @brief Get the acceleration in the y direction
 * @return acceleration from y
 */
int32_t readAccY();

/**
 * @brief Get the acceleration in the z direction
 * @return acceleration from z
 */
int32_t readAccZ();

/**
 * @brief Get the acceleration in the three directions of xyz
 * @param accx Store the variable of acceleration in x direction
 * @param accy Store the variable of acceleration in y direction
 * @param accz Store the variable of acceleration in z direction
 * @return true(Get data successfully/false(Data not ready)
 */
bool getAcceFromXYZ(int32_t &accx,int32_t &accy,int32_t &accz);

/**
 * @brief Get whether the sensor is in sleep mode
 * @return true(In sleep mode)/false(In normal mode)
 */
bool getSleepState();

/**
 * @brief Set the sleep state flag
 * @param into true(Flag the current mode as sleep mode)
               false(Flag the current mode as normal mode)
 */
void setSleepFlag(bool into);
```

Sample code 1-Read acceleration of x, y and z(getAcceleration.ino)

- Select getAcceleration.ino



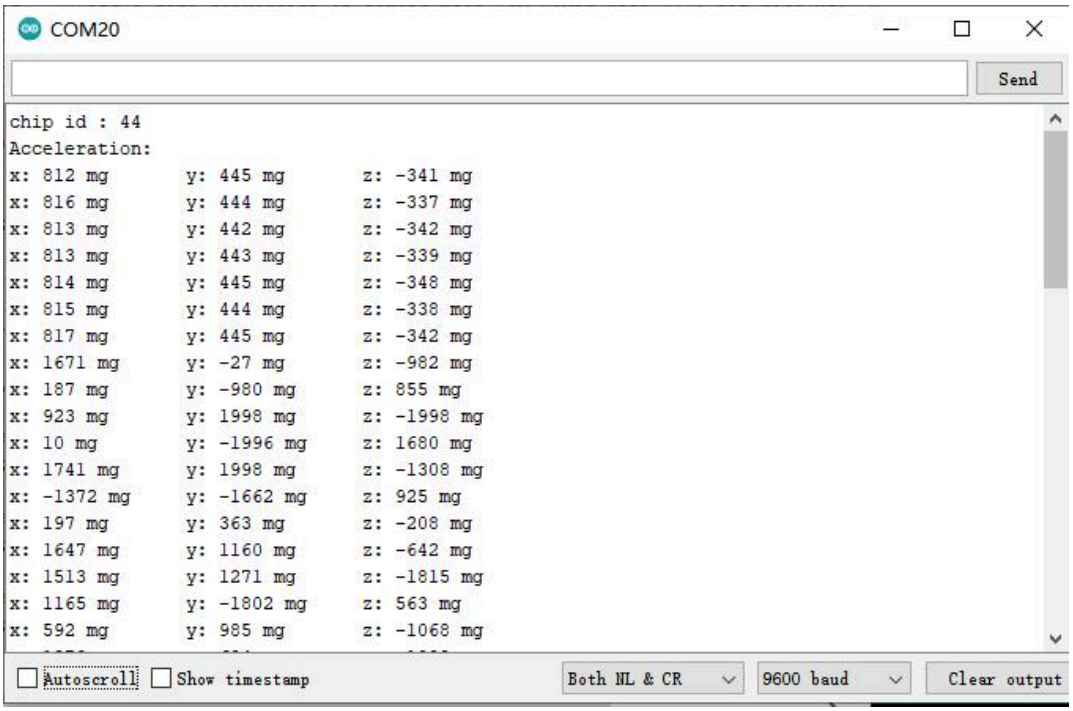
- Program Burning

```
/**!
 * @file getAcceleration.ino
 * @brief Get the acceleration in the three directions of xyz, the range can be ±2g, ±4g, ±8g or ±16g, set by the se
 * @n In this example, the continuous measurement mode is selected by default -- the acceleration data will be measu
 * @n You can also use the single data conversion on demand mode 1. You need to select a suitable conversion mode ir
 * @n                                                           2. Fill in the setDataRate() function with the eSet
 * @n                                                           3. Request a measurement by the demandData() functi
 * @n When using SPI, chip select pin can be modified by changing the value of LIS2DW12_CS
 * @copyright  Copyright (c) 2010 DFRobot Co.Ltd (http://www.dfrobot.com)
 * @licence     The MIT License (MIT)
 * @author [fengli](li.feng@dfrobot.com)
 * @version  V1.0
 * @date  2021-01-16
 * @get from https://www.dfrobot.com
 * @https://github.com/DFRobot/DFRobot_LIS
 */


#include <DFRobot_LIS2DW12.h>
//When using I2C communication, use the following program to construct an object by DFRobot_LIS2DW12_I2C
/*!
 * @brief Constructor
 * @param pWire I2c controller
 * @param addr  I2C address(0x18/0x19)
 */
//DFRobot_LIS2DW12_I2C acce(&Wire,0x18);
DFRobot_LIS2DW12_I2C acce;


//When using SPI communication, use the following program to construct an object by DFRobot_LIS2DW12_SPI
#if defined(ESP32) || defined(ESP8266)
#define LIS2DW12_CS  D3
#elif defined(__AVR__) || defined(ARDUINO_SAM_ZERO)
#define LIS2DW12_CS 3
#elif (defined NRF5)
#define LIS2DW12_CS 2  //The pin on the development board with the corresponding silkscreen printed as P2
#endif
/*!
 * @brief Constructor
 * @param cs Chip selection pinChip selection pin
 * @param spi SPI controller
 */
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS,&SPI);
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS);

void setup(void){

  Serial.begin(9600);
  while(!acce.begin()){
     Serial.println("Communication failed, check the connection and I2C address setting when using I2C communicatior
     delay(1000);
  }
  Serial.print("chip id : ");
  Serial.println(acce.getID(),HEX);
  //Chip soft reset
  acce.softReset();
  //Set whether to collect data continuously
```

```
acce.continRefresh(true);


/**!
  Set the sensor data collection rate:
             eRate_0hz           /<Measurement off>/
             eRate_1hz6          /<1.6hz, use only under low-power mode>/
             eRate_12hz5         /<12.5hz>/
             eRate_25hz
             eRate_50hz
             eRate_100hz
             eRate_200hz
             eRate_400hz       /<Use only under High-Performance mode>/
             eRate_800hz       /<Use only under High-Performance mode>/
             eRate_1k6hz       /<Use only under High-Performance mode>/
             eSetSwTrig        /<The software triggers a single measurement>/
*/
acce.setDataRate(DFRobot_LIS2DW12::eRate_50hz);

/**!
  Set the sensor measurement range:
                 e2_g   /<±2g>/
                 e4_g   /<±4g>/
                 e8_g   /<±8g>/
                 e16_g  /< ±16g>/
*/
acce.setRange(DFRobot_LIS2DW12::e2_g);


/**!
  Filter settings:
         eLPF (Low pass filter)
         eHPF (High pass filter)
*/
acce.setFilterPath(DFRobot_LIS2DW12::eLPF);

/**!
  Set bandwidth:
      eRateDiv_2  /<Rate/2 (up to Rate = 800 Hz, 400 Hz when Rate = 1600 Hz)>/
      eRateDiv_4  /<Rate/4 (High Power/Low power)>*
      eRateDiv_10 /<Rate/10 (HP/LP)>/
      eRateDiv_20 /< Rate/20 (HP/LP)>/
*/
acce.setFilterBandwidth(DFRobot_LIS2DW12::eRateDiv_4);

/**!
 Set power mode:
     eHighPerformance_14bit         /<High-Performance Mode,14-bit resolution>/
     eContLowPwr4_14bit             /<Continuous measurement,Low-Power Mode 4(14-bit resolution)>/
     eContLowPwr3_14bit             /<Continuous measurement,Low-Power Mode 3(14-bit resolution)>/
     eContLowPwr2_14bit             /<Continuous measurement,Low-Power Mode 2(14-bit resolution)/
     eContLowPwr1_12bit             /<Continuous measurement,Low-Power Mode 1(12-bit resolution)>/
     eSingleLowPwr4_14bit           /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution)>/
     eSingleLowPwr3_14bit           /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution)>/
     eSingleLowPwr2_14bit           /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution)>/
     eSingleLowPwr1_12bit           /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution)>/
     eHighPerformanceLowNoise_14bit /<High-Performance Mode,Low-noise enabled,14-bit resolution>/
     eContLowPwrLowNoise4_14bit     /<Continuous measurement,Low-Power Mode 4(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise3_14bit     /<Continuous measurement,Low-Power Mode 3(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise2_14bit     /<Continuous measurement,Low-Power Mode 2(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise1_12bit     /<Continuous measurement,Low-Power Mode 1(12-bit resolution,Low-noise enabled)
     eSingleLowPwrLowNoise4_14bit   /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution),Lo
     eSingleLowPwrLowNoise3_14bit   /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution),Lo
```

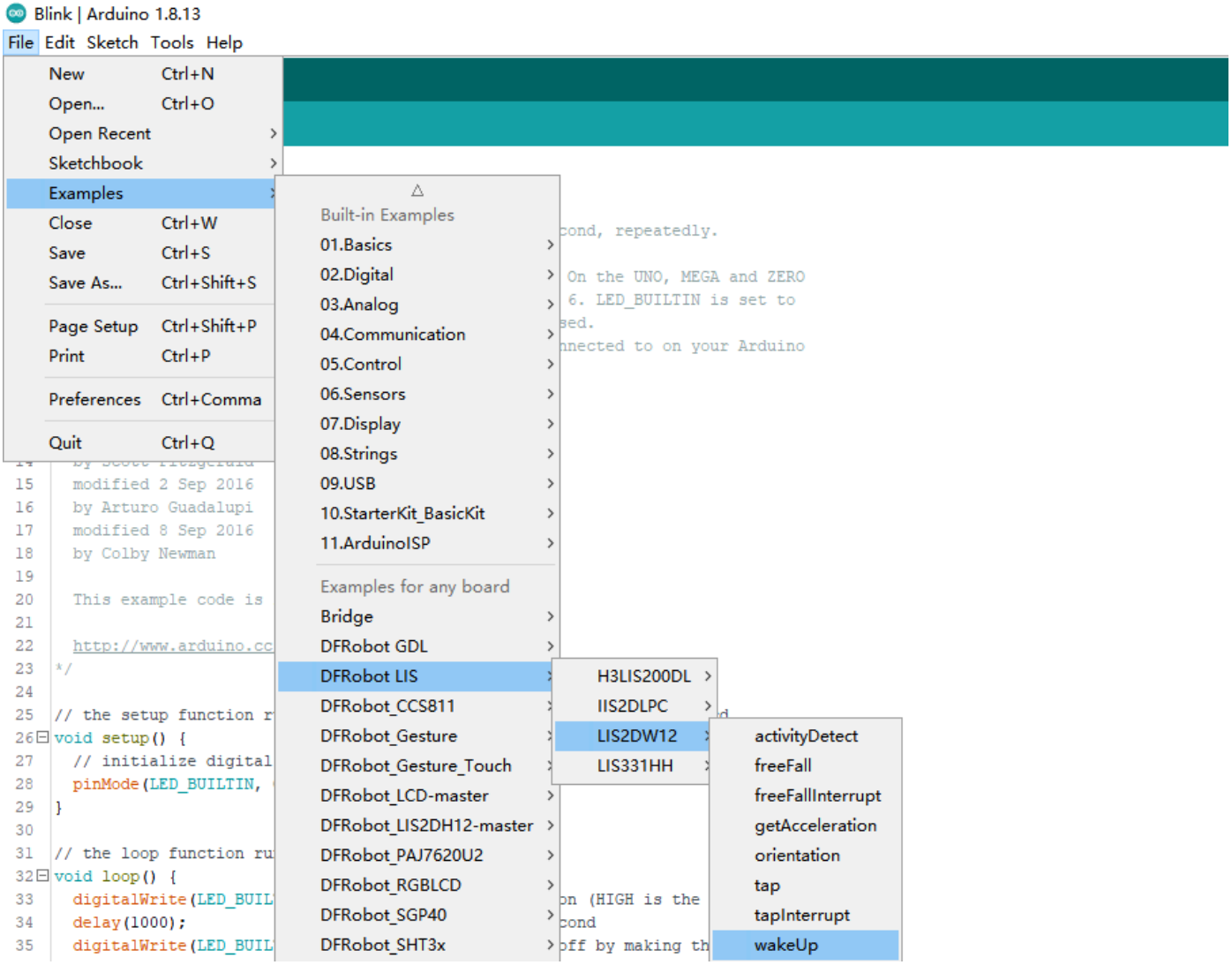
```
        eSingleLowPwrLowNoise2_14bit   /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution),Lo
        eSingleLowPwrLowNoise1_12bit   /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution),Lo
    */
    acce.setPowerMode(DFRobot_LIS2DW12::eContLowPwrLowNoise2_14bit);
    Serial.print("Acceleration:\n");
    delay(100);
}

void loop(void){
    //Request a measurement under single data conversion on demand mode
    //acce.demandData();
    //The mearsurement range is ±2g,±4g,±8g or ±16g, set by the setRange() function.
    Serial.print("x: ");
    //Read the acceleration in the x direction
    Serial.print(acce.readAccX());
    Serial.print(" mg \ty: ");
    //Read the acceleration in the y direction
    Serial.print(acce.readAccY());
    Serial.print(" mg \tz: ");
    //Read the acceleration in the z direction
    Serial.print(acce.readAccZ());
    Serial.println(" mg");
    delay(300);
}
```

Result



Sample code 2-Wakeup function(wakeUp.ino)

- Select wakeUp.ino



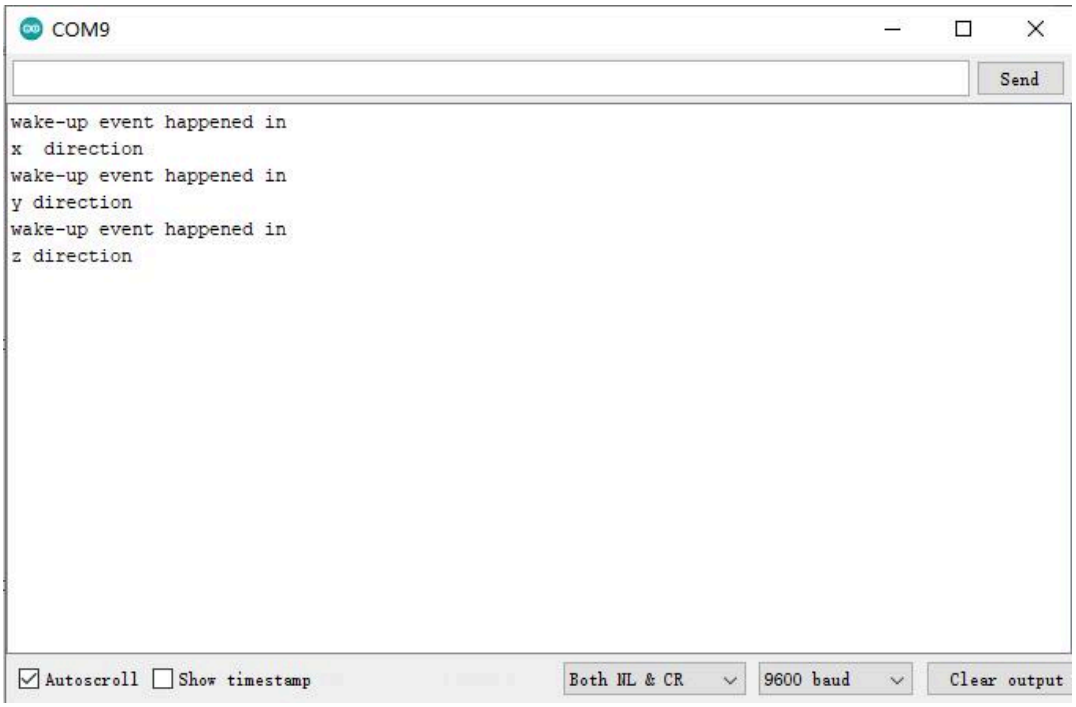
- Program Burning

```
/**!
 * @file wakeUp.ino
 * @brief When the acceleration change in x, y or z direction is detected to exceed the threshold we set before, the
 * @n By accessing the chip register, we can know which direction of movement wakes up the chip.
 * @n In this example, it is necessary to set the wake-up duration by setWakeUpDur().
 * @n When woken up, the chip will last for a while before it enters the sleep state.
 * @n And to set the threshold by setWakeUpThreshold(). When the acceleration change exceeds this value, the eWakeUp
 * @n When using SPI, chip select pin can be modified by changing the value of LIS2DW12_CS
 * @copyright  Copyright (c) 2010 DFRobot Co.Ltd (http://www.dfrobot.com)
 * @licence     The MIT License (MIT)
 * @author [fengli](li.feng@dfrobot.com)
 * @version  V1.0
 * @date  2021-01-16
 * @get from https://www.dfrobot.com
 * @https://github.com/DFRobot/DFRobot_LIS
 */

#include <DFRobot_LIS2DW12.h>

//When using I2C communication, use the following program to construct an object by DFRobot_LIS2DW12_I2C
/*!
 * @brief Constructor
 * @param pWire I2c controller
 * @param addr  I2C address(0x18/0x19)
 */
//DFRobot_LIS2DW12_I2C acce(&Wire,0x18);
DFRobot_LIS2DW12_I2C acce;

//When using SPI communication, use the following program to construct an object by DFRobot_LIS2DW12_SPI
#if defined(ESP32) || defined(ESP8266)
#define LIS2DW12_CS  D3
#elif defined(__AVR__) || defined(ARDUINO_SAM_ZERO)
#define LIS2DW12_CS  3
#elif (defined NRF5)
#define LIS2DW12_CS  2  //The pin on the development board with the corresponding silkscreen printed as P2
#endif
/*!
 * @brief Constructor
 * @param cs  Chip selection pinChip selection pin
 * @param spi SPI controller
 */
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS,&SPI);
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS);

void setup(void){
  Serial.begin(9600);
  while(!acce.begin()){
     Serial.println("Communication failed, check the connection and I2C address setting when using I2C communicatior
     delay(1000);
  }
  Serial.print("chip id : ");
  Serial.println(acce.getID(),HEX);
  //Chip soft reset
  acce.softReset();

  /**!
    Set the sensor measurement range:
```

```
                e2_g   /<±2g>/
                e4_g   /<±4g>/
                e8_g   /<±8g>/
                e16_g  /< ±16g>/
*/
acce.setRange(DFRobot_LIS2DW12::e2_g);

/**!
 Set power mode:
     eHighPerformance_14bit         /<High-Performance Mode,14-bit resolution>/
     eContLowPwr4_14bit             /<Continuous measurement,Low-Power Mode 4(14-bit resolution)>/
     eContLowPwr3_14bit             /<Continuous measurement,Low-Power Mode 3(14-bit resolution)>/
     eContLowPwr2_14bit             /<Continuous measurement,Low-Power Mode 2(14-bit resolution)/
     eContLowPwr1_12bit             /<Continuous measurement,Low-Power Mode 1(12-bit resolution)>/
     eSingleLowPwr4_14bit           /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution)>/
     eSingleLowPwr3_14bit           /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution)>/
     eSingleLowPwr2_14bit           /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution)>/
     eSingleLowPwr1_12bit           /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution)>/
     eHighPerformanceLowNoise_14bit /<High-Performance Mode,Low-noise enabled,14-bit resolution>/
     eContLowPwrLowNoise4_14bit     /<Continuous measurement,Low-Power Mode 4(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise3_14bit     /<Continuous measurement,Low-Power Mode 3(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise2_14bit     /<Continuous measurement,Low-Power Mode 2(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise1_12bit     /<Continuous measurement,Low-Power Mode 1(12-bit resolution,Low-noise enabled)
     eSingleLowPwrLowNoise4_14bit   /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution),Lo
     eSingleLowPwrLowNoise3_14bit   /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution),Lo
     eSingleLowPwrLowNoise2_14bit   /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution),Lo
     eSingleLowPwrLowNoise1_12bit   /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution),Lo
*/
acce.setPowerMode(DFRobot_LIS2DW12::eContLowPwrLowNoise1_12bit);

/**!
  Set the sensor data collection rate:
             eRate_0hz           /<Measurement off>/
             eRate_1hz6          /<1.6hz, use only under low-power mode>/
             eRate_12hz5         /<12.5hz>/
             eRate_25hz
             eRate_50hz
             eRate_100hz
             eRate_200hz
             eRate_400hz       /<Use only under High-Performance mode>/
             eRate_800hz       /<Use only under High-Performance mode>/
             eRate_1k6hz       /<Use only under High-Performance mode>/
             eSetSwTrig        /<The software triggers a single measurement>/
*/
acce.setDataRate(DFRobot_LIS2DW12::eRate_200hz);

/**!
  Filter settings:
         eLPF(Low pass filter)
         eHPF(High pass filter)
*/
acce.setFilterPath(DFRobot_LIS2DW12::eLPF);

/**
  The wake-up duration – when woken up, the chip will last for a while before it enters the sleep state.
  dur (0 ~ 3)
  time = dur * (1/Rate)(unit:s)
  |                      An example of a linear relationship between an argument and time
  |-----------------------------------------------------------------------------------------------------------
  |               |                     |                          |                          |
  |  Data rate    |       25 Hz         |         100 Hz           |          400 Hz          |         = 800 Hz
  |-----------------------------------------------------------------------------------------------------------
  |   time        |dur*(1s/25)= dur*40ms|  dur*(1s/100)= dur*10ms  |  dur*(1s/400)= dur*2.5ms |  dur*(1s/800)= du
```

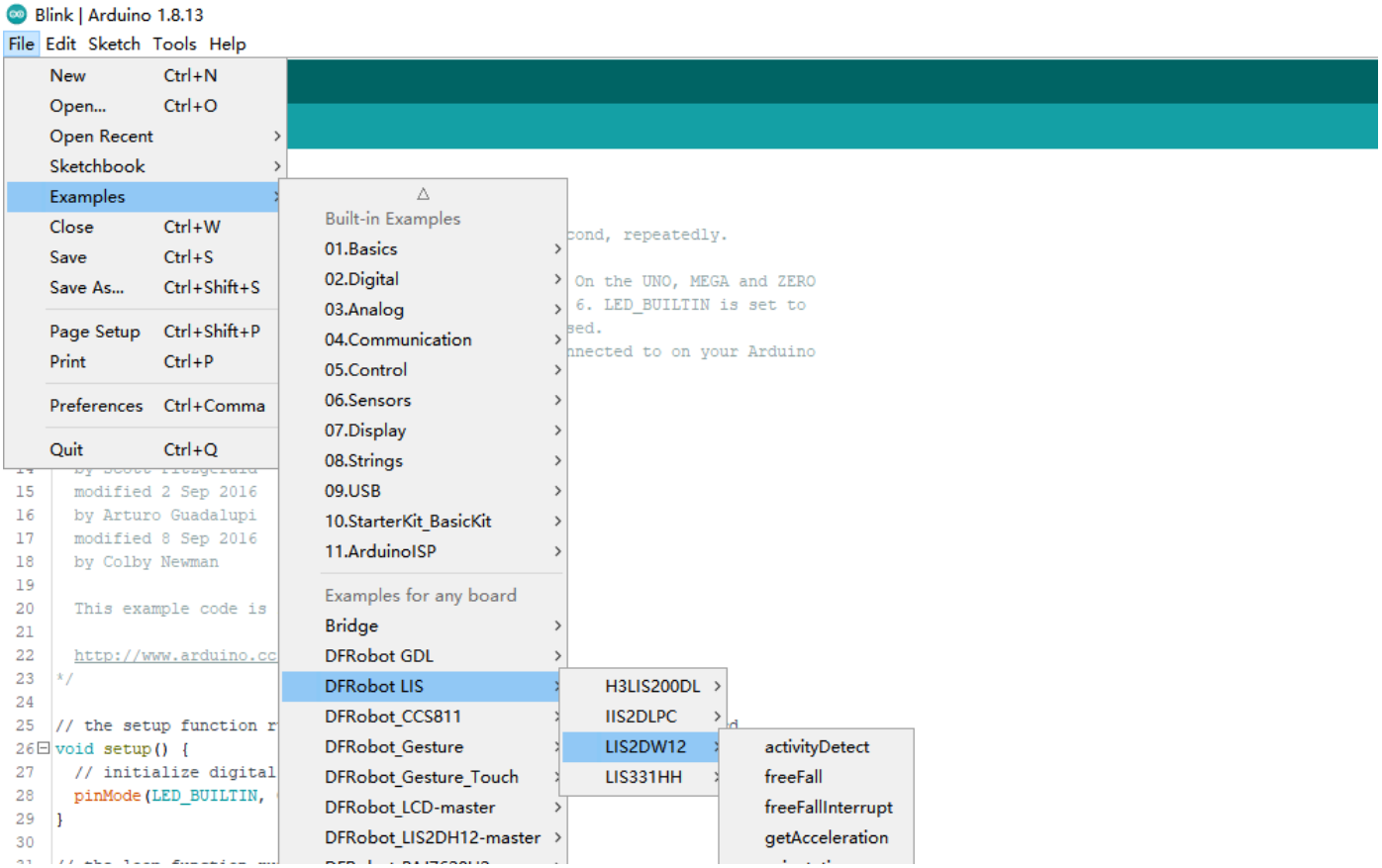
```
    |-------------------------------------------------------------------------------------------------------------------
   */
  acce.setWakeUpDur(/*dur =*/2);

  //Set wakeup threshold, when the acceleration change exceeds this value, the eWakeUp event will be triggered, unit
  //The value is within the range
  acce.setWakeUpThreshold(/*threshold = */0.5);

  /**!
    Set the interrupt event of the int1 pin:
    eDoubleTap(Double click)
    eFreeFall(Free fall)
    eWakeUp(wake)
    eSingleTap(single-Click)
    e6D(Orientation change check)
  */
  acce.setInt1Event(DFRobot_LIS2DW12::eWakeUp);

  /**!
    Set the interrupt event of the int1 pin:
       eSleepChange = 0x40,/<Sleep change status routed to INT2 pad>/
       eSleepState  = 0x80,/<Enable routing of SLEEP_STATE on INT2 pad>/
  */
  //acce.setInt2Event(DFRobot_LIS2DW12::eSleepChange);
  delay(100);
}

void loop(void){

   //Wake-up event detected
   if(acce.actDetected()){
     Serial.print("wake-up event happened in ");
     //Wake-up motion direction detection
     DFRobot_LIS2DW12::eWakeUpDir_t dir  = acce.getWakeUpDir();
     if(dir == DFRobot_LIS2DW12::eDirX){
       Serial.println("x direction");
     }
     if(dir == DFRobot_LIS2DW12::eDirY){
       Serial.println("y direction");
     }
     if(dir == DFRobot_LIS2DW12::eDirZ){
       Serial.println("z direction");
     }
     delay(100);
   }
}
```

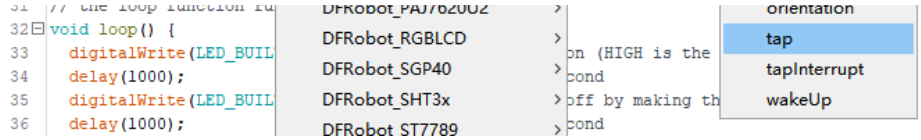
Result



Sample code 3-Tap detection(tap.ino)

- Select tap.ino





- Program Burning

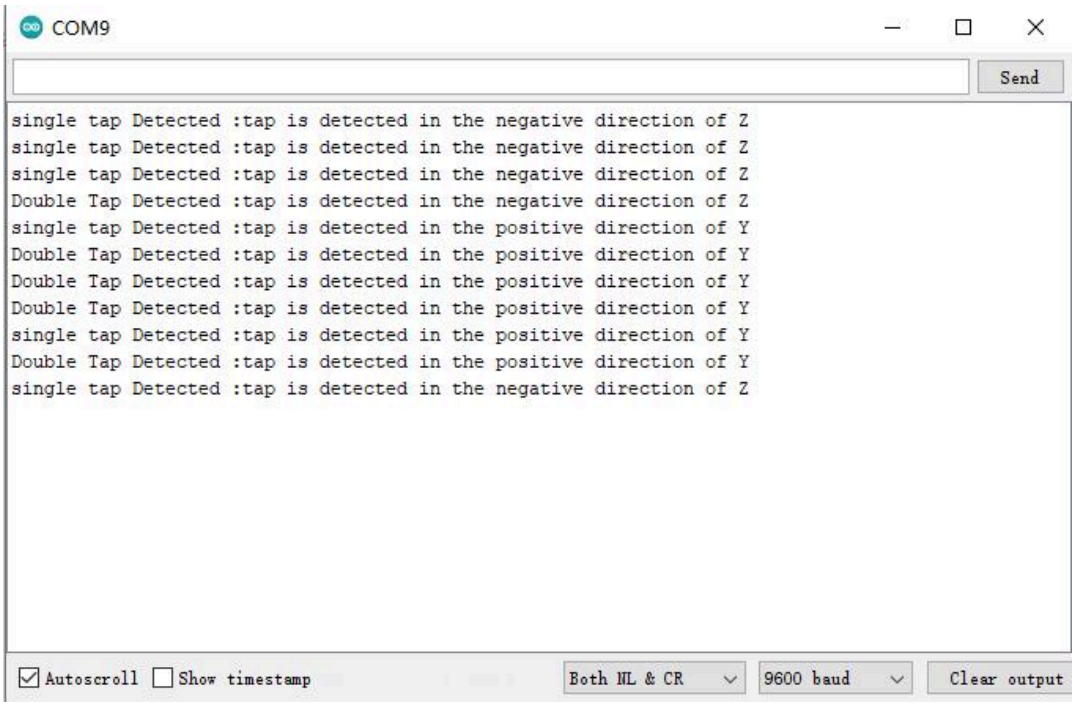
```
/**!
 * @file tap.ino
 * @brief Single tap and double tap detection, tapping the module or the desktop near the module both can trigger th
 * @n You can select to detect single tap or to detect both single tap and double tap by the setTapMode() function
 * @n When using SPI, chip select pin can be modified by changing the value of LIS2DW12_CS
 * @copyright  Copyright (c) 2010 DFRobot Co.Ltd (http://www.dfrobot.com)
 * @licence     The MIT License (MIT)
 * @author [fengli](li.feng@dfrobot.com)
 * @version  V1.0
 * @date  2021-01-16
 * @get from https://www.dfrobot.com
 * @https://github.com/DFRobot/DFRobot_LIS
 */


#include <DFRobot_LIS2DW12.h>


//When using I2C communication, use the following program to construct an object by DFRobot_LIS2DW12_I2C
/*!
 * @brief Constructor
 * @param pWire I2c controller
 * @param addr  I2C address(0x18/0x19)
 */
//DFRobot_LIS2DW12_I2C acce(&Wire,0x18);
DFRobot_LIS2DW12_I2C acce;


//When using SPI communication, use the following program to construct an object by DFRobot_LIS2DW12_SPI
#if defined(ESP32) || defined(ESP8266)
#define LIS2DW12_CS  D3
#elif defined(__AVR__) || defined(ARDUINO_SAM_ZERO)
#define LIS2DW12_CS 3
#elif (defined NRF5)
#define LIS2DW12_CS 2  //The pin on the development board with the corresponding silkscreen printed as P2
#endif
/*!
 * @brief Constructor
 * @param cs  Chip selection pinChip selection pin
 * @param spi SPI controller
 */
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS,&SPI);
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS);

void setup(void){
  Serial.begin(9600);
  while(!acce.begin()){
     Serial.println("Communication failed, check the connection and I2C address setting when using I2C communicatior
     delay(1000);
  }
  Serial.print("chip id : ");
  Serial.println(acce.getID(),HEX);
  //Chip soft reset
  acce.softReset();

  /**!
    Set the sensor measurement range:
```

```
                e2_g   /<±2g>/
                e4_g   /<±4g>/
                e8_g   /<±8g>/
                e16_g  /< ±16g>/
*/
acce.setRange(DFRobot_LIS2DW12::e2_g);

/**!
 Set power mode:
     eHighPerformance_14bit         /<High-Performance Mode,14-bit resolution>/
     eContLowPwr4_14bit             /<Continuous measurement,Low-Power Mode 4(14-bit resolution)>/
     eContLowPwr3_14bit             /<Continuous measurement,Low-Power Mode 3(14-bit resolution)>/
     eContLowPwr2_14bit             /<Continuous measurement,Low-Power Mode 2(14-bit resolution)/
     eContLowPwr1_12bit             /<Continuous measurement,Low-Power Mode 1(12-bit resolution)>/
     eSingleLowPwr4_14bit           /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution)>/
     eSingleLowPwr3_14bit           /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution)>/
     eSingleLowPwr2_14bit           /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution)>/
     eSingleLowPwr1_12bit           /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution)>/
     eHighPerformanceLowNoise_14bit /<High-Performance Mode,Low-noise enabled,14-bit resolution>/
     eContLowPwrLowNoise4_14bit     /<Continuous measurement,Low-Power Mode 4(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise3_14bit     /<Continuous measurement,Low-Power Mode 3(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise2_14bit     /<Continuous measurement,Low-Power Mode 2(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise1_12bit     /<Continuous measurement,Low-Power Mode 1(12-bit resolution,Low-noise enabled)
     eSingleLowPwrLowNoise4_14bit   /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution),Lo
     eSingleLowPwrLowNoise3_14bit   /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution),Lo
     eSingleLowPwrLowNoise2_14bit   /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution),Lo
     eSingleLowPwrLowNoise1_12bit   /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution),Lo
*/
acce.setPowerMode(DFRobot_LIS2DW12::eContLowPwrLowNoise1_12bit);

/**!
  Set the sensor data collection rate:
             eRate_0hz           /<Measurement off>/
             eRate_1hz6          /<1.6hz, use only under low-power mode>/
             eRate_12hz5         /<12.5hz>/
             eRate_25hz
             eRate_50hz
             eRate_100hz
             eRate_200hz
             eRate_400hz       /<Use only under High-Performance mode>/
             eRate_800hz       /<Use only under High-Performance mode>/
             eRate_1k6hz       /<Use only under High-Performance mode>/
             eSetSwTrig        /<The software triggers a single measurement>/
*/
acce.setDataRate(DFRobot_LIS2DW12::eRate_800hz);

//Enable tap detection in the Z direction
acce.enableTapDetectionOnZ(true);
//Enable tap detection in Y direction
acce.enableTapDetectionOnY(true);
//Enable tap detection in the X direction
acce.enableTapDetectionOnX(true);
//The threshold setting in the X direction
//Threshold(mg),Can only be used in the range of ±2g
acce.setTapThresholdOnX(/*Threshold = */0.5);
//The threshold setting in the Y direction   //Threshold(mg),Can only be used in the range of ±2g
acce.setTapThresholdOnY(/*Threshold = */0.5);
//The threshold setting in the Z direction   //Threshold(mg),Can only be used in the range of ±2g)
acce.setTapThresholdOnZ(/*Threshold = */0.5);


/*
  Set the interval time between two taps when detecting double tap
```

```
    dur duration(0 ~ 15)
    time = dur * (1/ODR)(unit:s)
    |                                An example of a linear relationship between an argument and time                                                  |
    |-----------------------------------------------------------------------------------------------------------------------------------------------------|
    |               |                     |                           |                           |                                                 |
    |  Data rate    |       25 Hz         |         100 Hz            |          400 Hz           |         = 800 Hz                                |
    |-----------------------------------------------------------------------------------------------------------------------------------------------------|
    |   time        |dur*(1s/25)= dur*40ms|  dur*(1s/100)= dur*10ms   |  dur*(1s/400)= dur*2.5ms  |  dur*(1s/800)= dur*1.25ms                       |
    |-----------------------------------------------------------------------------------------------------------------------------------------------------|
  */
  acce.setTapDur(/*dur=*/6);

  /**!
    Set tap detection mode:
       eOnlySingle(Single tap)
       eBothSingleDouble(Single tap and double tap)
  */
  acce.setTapMode(DFRobot_LIS2DW12::eBothSingleDouble);

  /**!
    Set the interrupt source of the int1 pin:
      eDoubleTap(Double tap)
      eFreeFall(Free fall)
      eWakeUp(wake)
      eSingleTap(single-tap)
      e6D(Orientation change check)
  */
  acce.setInt1Event(DFRobot_LIS2DW12::eDoubleTap);

  delay(1000);
}

void loop(void){
  //tap detected
  DFRobot_LIS2DW12:: eTap_t tapEvent = acce.tapDetect();
  //Tap source detection
  DFRobot_LIS2DW12::eTapDir_t dir = acce.getTapDirection();
  uint8_t tap = 0;
  if(tapEvent  == DFRobot_LIS2DW12::eSTap){
      Serial.print("Single Tap Detected :");
      tap = 1;
  }
  if(tapEvent  == DFRobot_LIS2DW12::eDTap){
      Serial.print("Double Tap Detected :");
      tap = 1;
  }
  if(tap == 1){
      if(dir == DFRobot_LIS2DW12::eDirXUp){
        Serial.println("tap is detected in the positive direction of X");
      }else if(dir == DFRobot_LIS2DW12::eDirXDown){
        Serial.println("tap is detected in the negative direction of X");
      }else if(dir == DFRobot_LIS2DW12::eDirYUp){
        Serial.println("tap is detected in the positive direction of Y");
      }else if(dir == DFRobot_LIS2DW12::eDirYDown){
        Serial.println("tap is detected in the negative direction of Y");
      }else if(dir == DFRobot_LIS2DW12::eDirZUp){
        Serial.println("tap is detected in the positive direction of Z");
      }else if(dir == DFRobot_LIS2DW12::eDirZDown){
        Serial.println("tap is detected in the negative direction of Z");
      }
      delay(500);
      tap = 0;
  }
```

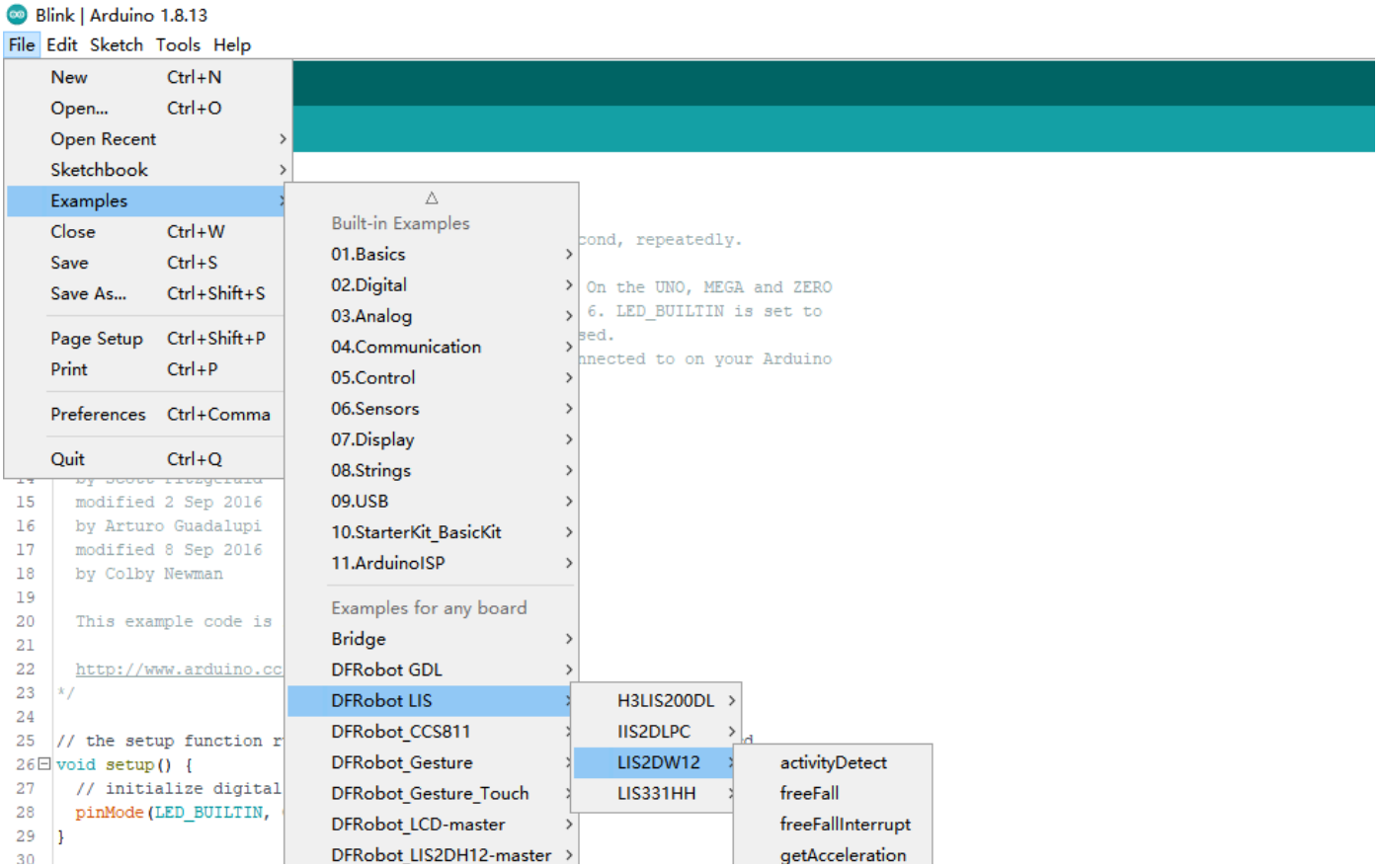
```
}
```

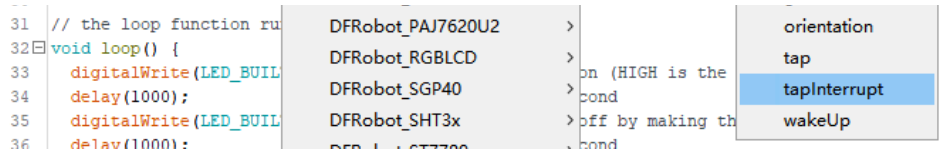
Result



Sample code 4-Tap interrupt function(tapInterrupt.ino)

- Select tapInterrupt.ino





- Program Burning

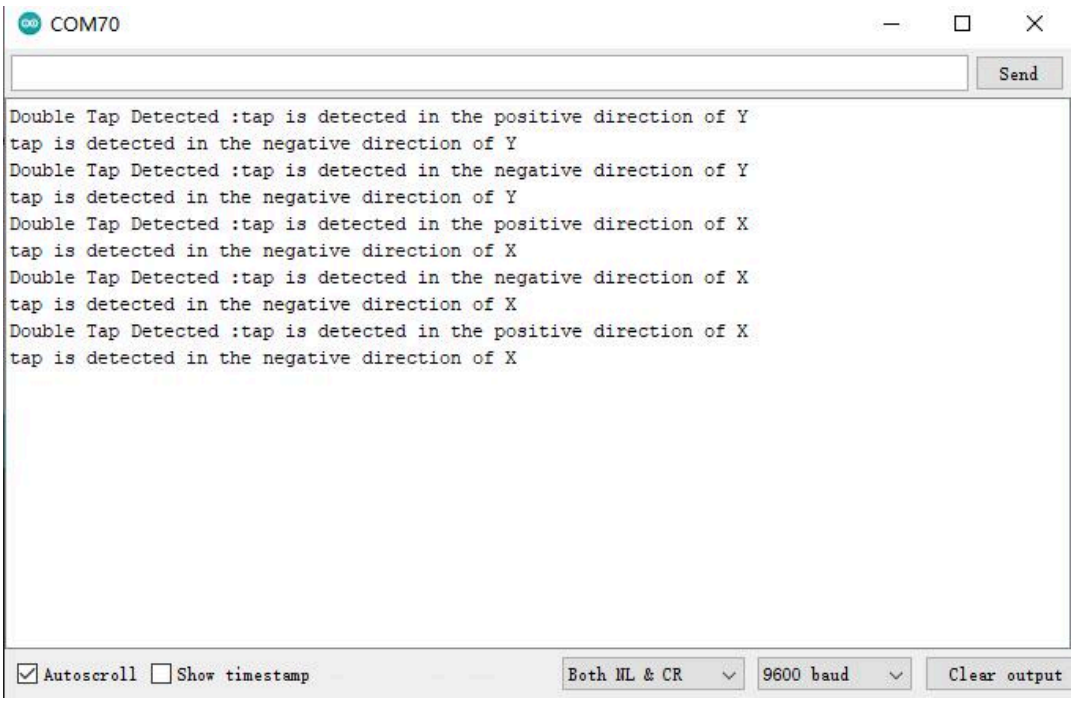
```
/**!
 * @file tapInterrupt.ino
 * @brief tap interrupt detection, tapping the module and the desktop near the module can both trigger the interrupt
 * @n When using SPI, chip select pin can be modified by changing the value of macro LIS2DW12_CS
 * @n In this example, the int2/int1 pin on the module needs to be connected to the interrupt pin on the motherboard
 * @n                   Mega2560(2), Leonardo(3), microbit(P0),FireBeetle-ESP8266(D6),FireBeetle-ESP32((D6),FireBeet
 * @copyright  Copyright (c) 2010 DFRobot Co.Ltd (http://www.dfrobot.com)
 * @licence     The MIT License (MIT)
 * @author [fengli](li.feng@dfrobot.com)
 * @version  V1.0
 * @date  2021-01-16
 * @get from https://www.dfrobot.com
 * @https://github.com/DFRobot/DFRobot_LIS
 */


#include <DFRobot_LIS2DW12.h>

//When using I2C communication, use the following program to construct an object by DFRobot_LIS2DW12_I2C
/*!
 * @brief Constructor
 * @param pWire I2c controller
 * @param addr  I2C address(0x18/0x19)
 */
//DFRobot_LIS2DW12_I2C acce(&Wire,0x18);
DFRobot_LIS2DW12_I2C acce;


//When using SPI communication, use the following program to construct an object by DFRobot_LIS2DW12_SPI
#if defined(ESP32) || defined(ESP8266)
#define LIS2DW12_CS  D3
#elif defined(__AVR__) || defined(ARDUINO_SAM_ZERO)
#define LIS2DW12_CS 3
#elif (defined NRF5)
#define LIS2DW12_CS 2  //The pin on the development board with the corresponding silkscreen printed as P2
#endif
/*!
 * @brief Constructor
 * @param cs  Chip selection pinChip selection pin
 * @param spi SPI controller
 */
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS,&SPI);
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS);

volatile uint8_t intFlag = 0;
void interEvent(){
  intFlag = 1;
}

void setup(void){

  Serial.begin(9600);
  while(!acce.begin()){
     Serial.println("Communication failed, check the connection and I2C address setting when using I2C communicatior
     delay(1000);
  }
  Serial.print("chip id : ");
```

```
Serial.println(acce.getID(),HEX);
//Chip soft reset
acce.softReset();
#if defined(ESP32) || defined(ESP8266)
//The D6 pin is used as the interrupt pin by default, and other non-conflicting pins can also be selected as the e
attachInterrupt(digitalPinToInterrupt(D6)/*Query the interrupt number of the D6 pin*/,interEvent,CHANGE);
#elif defined(ARDUINO_SAM_ZERO)
//The 5 pin is used as the interrupt pin by default, and other non-conflicting pins can also be selected as the ex
attachInterrupt(digitalPinToInterrupt(5)/*Query the interrupt number of the 5 pin*/,interEvent,CHANGE);
#else
/*    The Correspondence Table of AVR Series Arduino Interrupt Pins And Terminal Numbers
 * ---------------------------------------------------------------------------------------
 * |                                      |  DigitalPin  | 2  | 3  |                   |
 * |    Uno, Nano, Mini, other 328-based  |---------------------------------------------|
 * |                                      | Interrupt No | 0  | 1  |                   |
 * |--------------------------------------------------------------------------------------|
 * |                                      |    Pin       | 2  | 3  | 21 | 20 | 19 | 18 |
 * |              Mega2560                |---------------------------------------------|
 * |                                      | Interrupt No | 0  | 1  | 2  | 3  | 4  | 5  |
 * |--------------------------------------------------------------------------------------|
 * |                                      |    Pin       | 3  | 2  | 0  | 1  | 7  |    |
 * |    Leonardo, other 32u4-based        |---------------------------------------------|
 * |                                      | Interrupt No | 0  | 1  | 2  | 3  | 4  |    |
 * |--------------------------------------------------------------------------------------
 */
/*                     The Correspondence Table of micro:bit Interrupt Pins And Terminal Numbers
 * ------------------------------------------------------------------------------------------------------------------
 * |             micro:bit                      | DigitalPin |P0-P20 can be used as an external interrupt
 * |  (When using as an external interrupt,     |-------------------------------------------------------------------
 * |no need to set it to input mode with pinMode)|Interrupt No|Interrupt number is a pin digital value, such as P0
 * |-------------------------------------------------------------------------------------------------------------------
 */
attachInterrupt(/*Interrupt No*/0,interEvent,CHANGE);//Open the external interrupt 0, connect INT1/2 to the digita
   //UNO(2), Mega2560(2), Leonardo(3), microbit(P0).
#endif

/**!
  Set the sensor measurement range:
                e2_g   /<±2g>/
                e4_g   /<±4g>/
                e8_g   /<±8g>/
                e16_g  /< ±16g>/
*/
acce.setRange(DFRobot_LIS2DW12::e2_g);

/**!
 Set power mode:
     eHighPerformance_14bit         /<High-Performance Mode,14-bit resolution>/
     eContLowPwr4_14bit             /<Continuous measurement,Low-Power Mode 4(14-bit resolution)>/
     eContLowPwr3_14bit             /<Continuous measurement,Low-Power Mode 3(14-bit resolution)>/
     eContLowPwr2_14bit             /<Continuous measurement,Low-Power Mode 2(14-bit resolution)/
     eContLowPwr1_12bit             /<Continuous measurement,Low-Power Mode 1(12-bit resolution)>/
     eSingleLowPwr4_14bit           /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution)>/
     eSingleLowPwr3_14bit           /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution)>/
     eSingleLowPwr2_14bit           /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution)>/
     eSingleLowPwr1_12bit           /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution)>/
     eHighPerformanceLowNoise_14bit /<High-Performance Mode,Low-noise enabled,14-bit resolution>/
     eContLowPwrLowNoise4_14bit     /<Continuous measurement,Low-Power Mode 4(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise3_14bit     /<Continuous measurement,Low-Power Mode 3(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise2_14bit     /<Continuous measurement,Low-Power Mode 2(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise1_12bit     /<Continuous measurement,Low-Power Mode 1(12-bit resolution,Low-noise enabled)
     eSingleLowPwrLowNoise4_14bit   /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution),Lo
     eSingleLowPwrLowNoise3_14bit   /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution),Lo
```

```
     eSingleLowPwrLowNoise2_14bit   /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution),Lo
     eSingleLowPwrLowNoise1_12bit   /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution),Lo
*/
acce.setPowerMode(DFRobot_LIS2DW12::eContLowPwrLowNoise1_12bit);

/**!
  Set the sensor data collection rate:
             eRate_0hz           /<Measurement off>/
             eRate_1hz6          /<1.6hz, Measurement off>/
             eRate_12hz5         /<12.5hz>/
             eRate_25hz
             eRate_50hz
             eRate_100hz
             eRate_200hz
             eRate_400hz       /<Use only under High-Performance mode>/
             eRate_800hz       /<Use only under High-Performance mode>/
             eRate_1k6hz       /<Use only under High-Performance mode>/
             eSetSwTrig        /<The software triggers a single measurement>/
*/
acce.setDataRate(DFRobot_LIS2DW12::eRate_800hz);

//Enable tap detection in the Z direction
acce.enableTapDetectionOnZ(true);
//Enable tap detection in Y direction
acce.enableTapDetectionOnY(true);
//Enable tap detection in the X direction
acce.enableTapDetectionOnX(true);
//The threshold setting in the X direction
//Threshold(mg),Can only be used in the range of ±2g
acce.setTapThresholdOnX(/*Threshold = */0.5);
//The threshold setting in the Y direction   //Threshold(mg),Can only be used in the range of ±2g
acce.setTapThresholdOnY(/*Threshold = */0.5);
//The threshold setting in the Z direction   //Threshold(mg),Can only be used in the range of ±2g)
acce.setTapThresholdOnZ(/*Threshold = */0.5);

/*
  Set the interval time between two taps when detecting double tap
  dur duration(0 ~ 15)
  time = dur * (1/ODR)(unit:s)
  |                      An example of a linear relationship between an argument and time
  |---------------------------------------------------------------------------------------------------------------
  |               |                     |                          |                          |
  |  Data rate    |       25 Hz         |         100 Hz           |          400 Hz          |         = 800 Hz
  |---------------------------------------------------------------------------------------------------------------
  |   time        |dur*(1s/25)= dur*40ms|  dur*(1s/100)= dur*10ms  |  dur*(1s/400)= dur*2.5ms |  dur*(1s/800)= du
  |---------------------------------------------------------------------------------------------------------------
*/
acce.setTapDur(/*dur=*/6);

/**!
  Set tap detection mode:
    eOnlySingle(single tap)
    eBothSingleDouble(Single tap and double tap)
*/
acce.setTapMode(DFRobot_LIS2DW12::eBothSingleDouble);

/**!
  Set the interrupt source of the int1 pin:
    eDoubleTap(Double tap)
    eFreeFall(Free fall)
    eWakeUp(wake)
    eSingleTap(single-tap)
    e6D(Orientation change check)
```

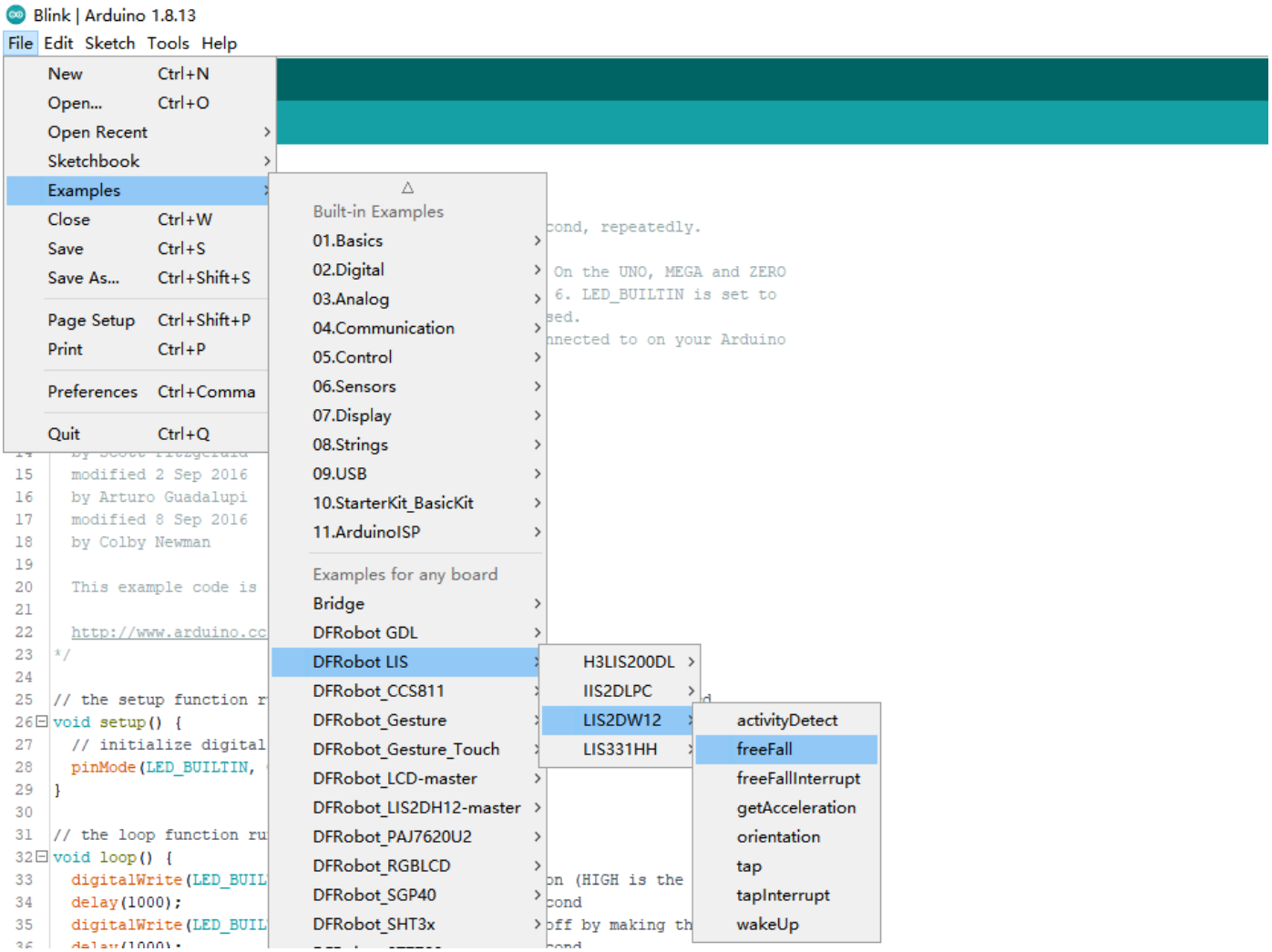
```
  */
  acce.setInt1Event(DFRobot_LIS2DW12::eDoubleTap);
  delay(1000);
}

void loop(void){
  if(intFlag == 1){
   //Tap detected
     DFRobot_LIS2DW12:: eTap_t tapEvent = acce.tapDetect();
    //Tap direction source detection
     DFRobot_LIS2DW12::eTapDir_t dir = acce.getTapDirection();
     if(tapEvent  == DFRobot_LIS2DW12::eSTap){
         Serial.print("Single Tap Detected :");
     }
     if(tapEvent  == DFRobot_LIS2DW12::eDTap){
         Serial.print("Double Tap Detected :");
     }
     if(dir == DFRobot_LIS2DW12::eDirXUp){
       Serial.println("tap is detected in the positive direction of X");
     }else if(dir == DFRobot_LIS2DW12::eDirXDown){
       Serial.println("tap is detected in the negative direction of X");
     }else if(dir == DFRobot_LIS2DW12::eDirYUp){
       Serial.println("tap is detected in the positive direction of Y");
     }else if(dir == DFRobot_LIS2DW12::eDirYDown){
       Serial.println("tap is detected in the negative direction of Y");
     }else if(dir == DFRobot_LIS2DW12::eDirZUp){
       Serial.println("tap is detected in the positive direction of Z");
     }else if(dir == DFRobot_LIS2DW12::eDirZDown){
       Serial.println("tap is detected in the negative direction of Z");
     }
     delay(500)
     intFlag = 0;

  }
}
```

Result



Sample Code 5-Free fall detection function(freeFall.ino)

- Select freeFall.ino



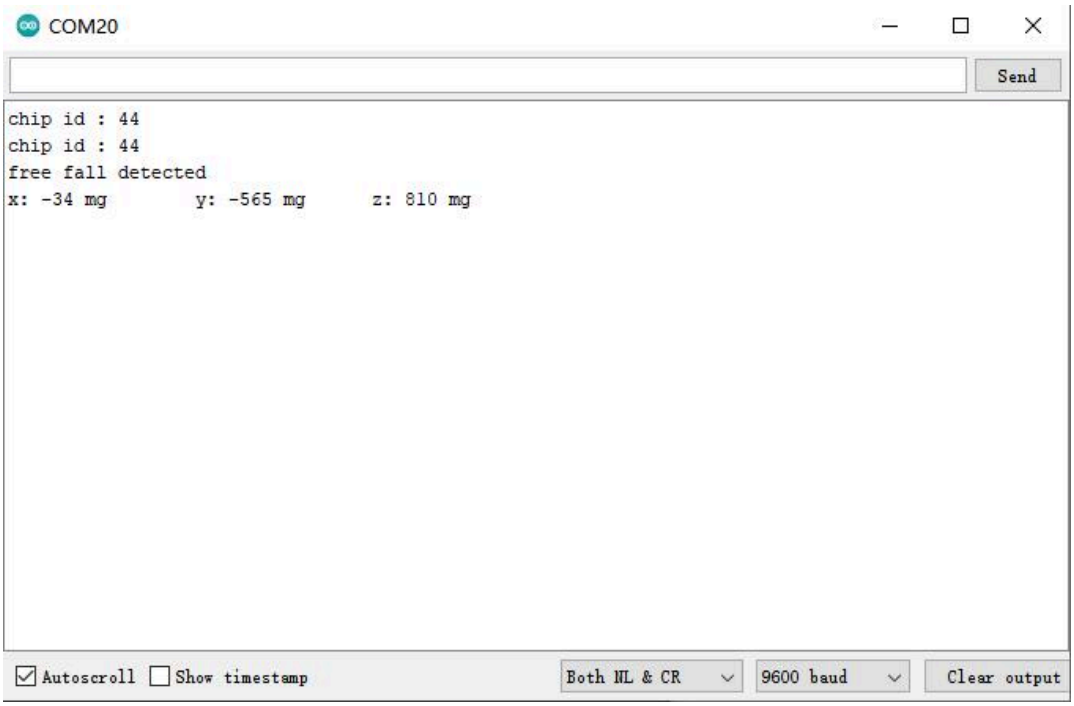
- Program Burning

```
/**!
 * @file freeFall.ino
 * @brief Sensor module free fall detection, set the free fall time with the setFrDur() function to adjust the sensi
 * @n The shorter the free fall time we set, the easier for the module to detect the free fall event
 * @n When using SPI, chip select pin can be modified by changing the value of LIS2DW12_CS
 * @copyright  Copyright (c) 2010 DFRobot Co.Ltd (http://www.dfrobot.com)
 * @licence     The MIT License (MIT)
 * @author [fengli](li.feng@dfrobot.com)
 * @version  V1.0
 * @date  2021-01-16
 * @get from https://www.dfrobot.com
 * @https://github.com/DFRobot/DFRobot_LIS
 */

#include <DFRobot_LIS2DW12.h>

//When using I2C communication, use the following program to construct an object by DFRobot_LIS2DW12_I2C
/*!
 * @brief Constructor
 * @param pWire I2c controller
 * @param addr  I2C address(0x18/0x19)
 */
//DFRobot_LIS2DW12_I2C acce(&Wire,0x18);
DFRobot_LIS2DW12_I2C acce;

//When using SPI communication, use the following program to construct an object by DFRobot_LIS2DW12_SPI
#if defined(ESP32) || defined(ESP8266)
#define LIS2DW12_CS  D3
#elif defined(__AVR__) || defined(ARDUINO_SAM_ZERO)
#define LIS2DW12_CS 3
#elif (defined NRF5)
#define LIS2DW12_CS 2  //The pin on the development board with the corresponding silkscreen printed as P2
#endif
/*!
 * @brief Constructor
 * @param cs  Chip selection pinChip selection pin
 * @param spi SPI controller
 */
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS);
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS,&SPI);

void setup(void){
  Serial.begin(9600);
  while(!acce.begin()){
     Serial.println("Communication failed, check the connection and I2C address setting when using I2C communicatior
     delay(1000);
  }
  Serial.print("chip id : ");
  Serial.println(acce.getID(),HEX);
  //Chip soft reset
  acce.softReset();
  //Set whether to collect data continuously
  acce.contInRefresh(true);

  /**!
   Set power mode:
       eHighPerformance_14bit         /<High-Performance Mode,14-bit resolution>/
```

```
    eContLowPwr4_14bit             /<Continuous measurement,Low-Power Mode 4(14-bit resolution)>/
    eContLowPwr3_14bit             /<Continuous measurement,Low-Power Mode 3(14-bit resolution)>/
    eContLowPwr2_14bit             /<Continuous measurement,Low-Power Mode 2(14-bit resolution)/
    eContLowPwr1_12bit             /<Continuous measurement,Low-Power Mode 1(12-bit resolution)>/
    eSingleLowPwr4_14bit           /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution)>/
    eSingleLowPwr3_14bit           /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution)>/
    eSingleLowPwr2_14bit           /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution)>/
    eSingleLowPwr1_12bit           /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution)>/
    eHighPerformanceLowNoise_14bit /<High-Performance Mode,Low-noise enabled,14-bit resolution>/
    eContLowPwrLowNoise4_14bit     /<Continuous measurement,Low-Power Mode 4(14-bit resolution,Low-noise enabled)
    eContLowPwrLowNoise3_14bit     /<Continuous measurement,Low-Power Mode 3(14-bit resolution,Low-noise enabled)
    eContLowPwrLowNoise2_14bit     /<Continuous measurement,Low-Power Mode 2(14-bit resolution,Low-noise enabled)
    eContLowPwrLowNoise1_12bit     /<Continuous measurement,Low-Power Mode 1(12-bit resolution,Low-noise enabled)
    eSingleLowPwrLowNoise4_14bit   /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution),Lo
    eSingleLowPwrLowNoise3_14bit   /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution),Lo
    eSingleLowPwrLowNoise2_14bit   /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution),Lo
    eSingleLowPwrLowNoise1_12bit   /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution),Lo
*/
acce.setPowerMode(DFRobot_LIS2DW12::eContLowPwr4_14bit);

/**!
  Set the sensor data collection rate:
             eRate_0hz           /<Measurement off>/
             eRate_1hz6          /<1.6hz, use only under low-power mode>/
             eRate_12hz5         /<12.5hz>/
             eRate_25hz
             eRate_50hz
             eRate_100hz
             eRate_200hz
             eRate_400hz       /<Use only under High-Performance mode>/
             eRate_800hz       /<Use only under High-Performance mode>/
             eRate_1k6hz       /<Use only under High-Performance mode>/
             eSetSwTrig        /<The software triggers a single measurement>/
*/
acce.setDataRate(DFRobot_LIS2DW12::eRate_100hz);

/**!
  Set the sensor measurement range:
                e2_g   /<±2g>/
                e4_g   /<±4g>/
                e8_g   /<±8g>/
                e16_g  /< ±16g>/
*/
acce.setRange(DFRobot_LIS2DW12::e2_g);

/**
 * Set the free fall time (Or the number of free-fall samples. In a measurement, it will not be determined as a fr
  dur (0 ~ 31)
  time = dur * (1/Rate)(unit:s)
  |                    An example of a linear relationship between an argument and time
  |-------------------------------------------------------------------------------------------------------------
  |               |                    |                          |                          |
  |  Data rate    |       25 Hz        |         100 Hz           |          400 Hz          |         = 800 Hz
  |-------------------------------------------------------------------------------------------------------------
  |   time        |dur*(1s/25)= dur*40ms|  dur*(1s/100)= dur*10ms  |  dur*(1s/400)= dur*2.5ms |  dur*(1s/800)= du
  |-------------------------------------------------------------------------------------------------------------
*/
acce.setFreeFallDur(/*dur = */3);

/**!
  Set the interrupt source of the int1 pin:
  eDoubleTap(Double click)
  eFreeFall(Free fall)
```

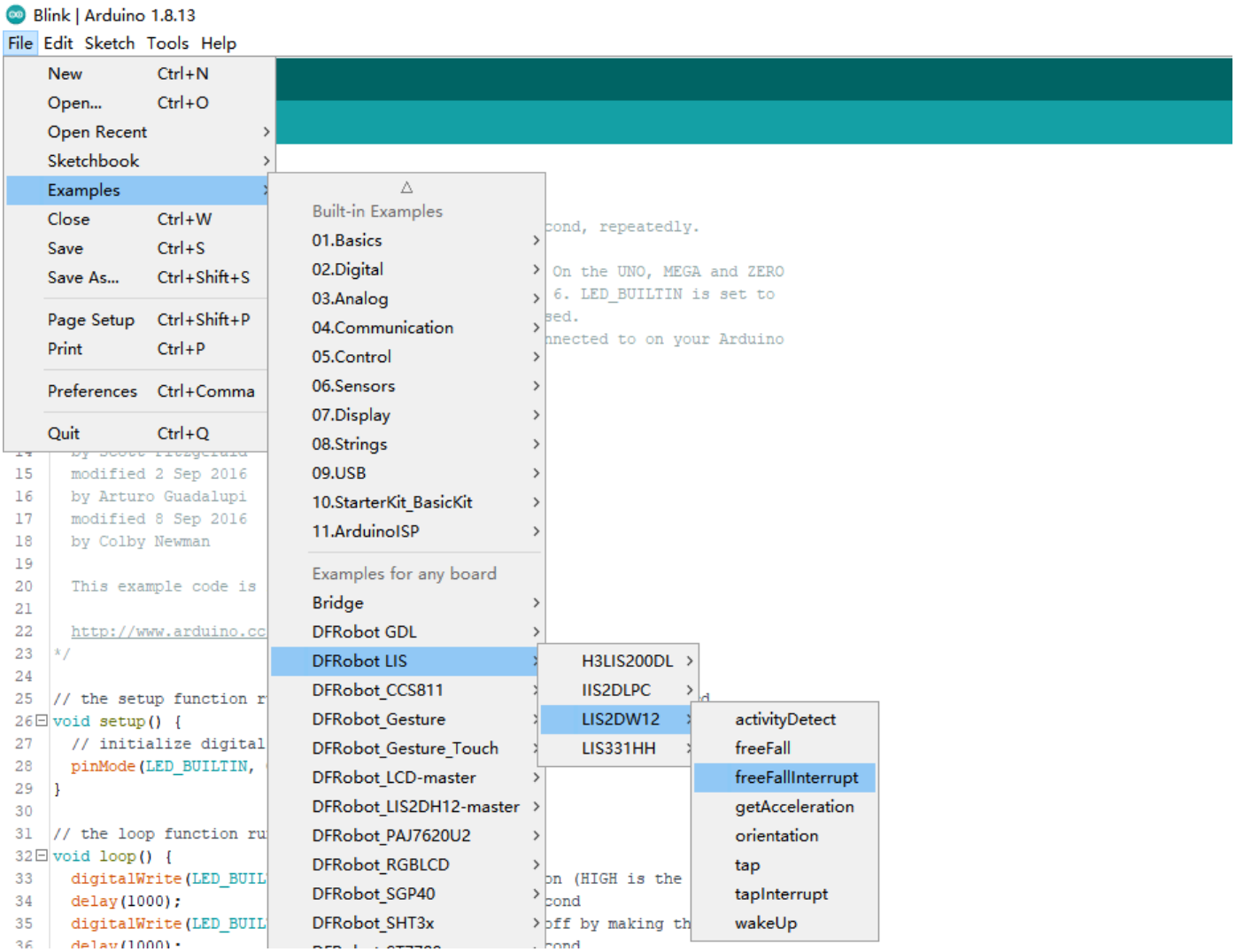
```
    eWakeUp(wake)
    eSingleTap(single-Click)
    e6D(Orientation change check)
  */
  acce.setInt1Event(DFRobot_LIS2DW12::eFreeFall);
  delay(100);
}

void loop(void){
   //Free fall event detected
   if(acce.freeFallDetected()){
      Serial.println("free fall detected");
      delay(300);
   }
}
```

Result



Sample code 6-Free fall interrupt function(freeFallInterrupt.ino)

- Select freeFallInterrupt.ino



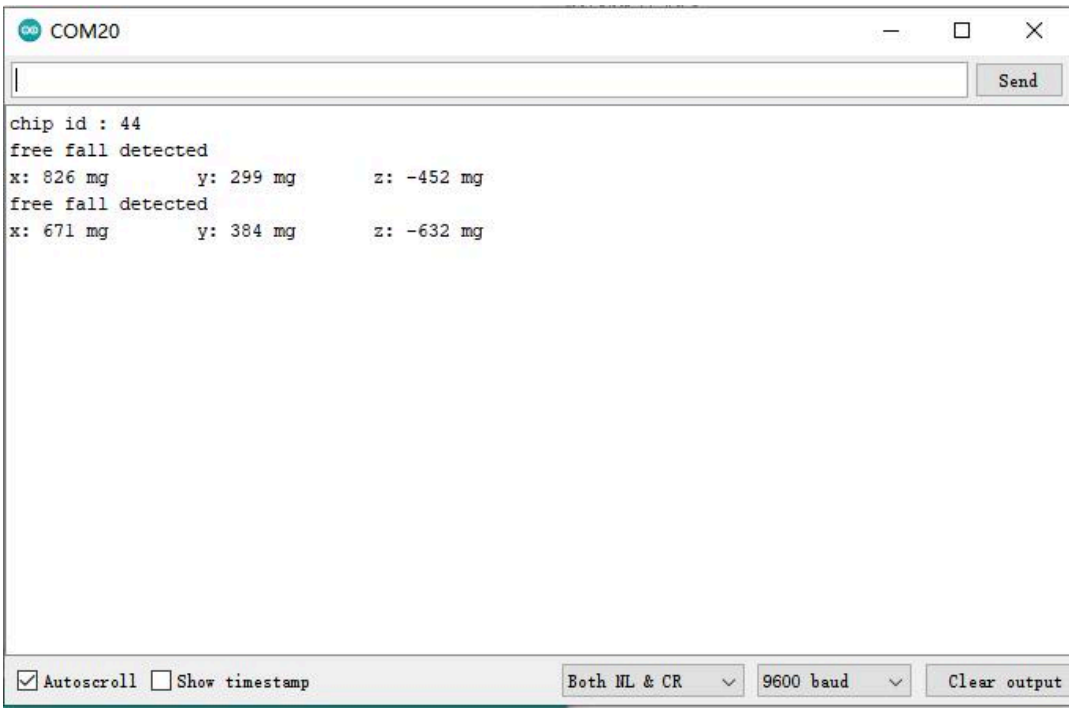
- Program Burning

```
/**!
 * @file freeFallInterrupt.ino
 * @brief Interrupt detection of free fall, an interrupt signal will be generated in int1 once a free fall event occ
 * @n When a free-fall motion is detected, it will be printed on the serial port.
 * @n When using SPI, chip select pin can be modified by changing the value of LIS2DW12_CS
 * @n In this example, the int2/int1 pin on the module needs to be connected to the interrupt pin on the motherboard
 * @n                                Mega2560(2), Leonardo(3), microbit(P0),FireBeetle-ESP8266(D6),FireBeetle-ESP32
 * @copyright  Copyright (c) 2010 DFRobot Co.Ltd (http://www.dfrobot.com)
 * @licence     The MIT License (MIT)
 * @author [fengli](li.feng@dfrobot.com)
 * @version  V1.0
 * @date  2021-01-16
 * @get from https://www.dfrobot.com
 * @https://github.com/DFRobot/DFRobot_LIS
 */
#include <DFRobot_LIS2DW12.h>

//When using I2C communication, use the following program to construct an object by DFRobot_LIS2DW12_I2C
/*!
 * @brief Constructor
 * @param pWire I2c controller
 * @param addr  I2C address(0x18/0x19)
 */
//DFRobot_LIS2DW12_I2C acce(&Wire,0x18);
DFRobot_LIS2DW12_I2C acce;

//When using SPI communication, use the following program to construct an object by DFRobot_LIS2DW12_SPI
#if defined(ESP32) || defined(ESP8266)
#define LIS2DW12_CS  D3
#elif defined(__AVR__) || defined(ARDUINO_SAM_ZERO)
#define LIS2DW12_CS 3
#elif (defined NRF5)
#define LIS2DW12_CS P3
#endif
/*!
 * @brief Constructor
 * @param cs Chip selection pinChip selection pin
 * @param spi SPI controller
 */
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS,&SPI);
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS);

volatile uint8_t intFlag = 0;
void interEvent(){
  intFlag = 1;
}

void setup(void){

  Serial.begin(9600);
  while(!acce.begin()){
     Serial.println("Communication failed, check the connection and I2C address setting when using I2C communicatior
     delay(1000);
  }
  Serial.print("chip id : ");
  Serial.println(acce.getID(),HEX);
```

```
#if defined(ESP32) || defined(ESP8266)
//By default, the D6 pin is used as the interrupt pin, and other non-conflicting pins can also be selected as the
attachInterrupt(digitalPinToInterrupt(D6)/*Query the interrupt number of the D6 pin*/,interEvent,CHANGE);
#elif defined(ARDUINO_SAM_ZERO)
//By default, the 5 pin is used as the interrupt pin, and other non-conflicting pins can also be selected as the e
attachInterrupt(digitalPinToInterrupt(5)/*Query the interrupt number of the pin 5*/,interEvent,CHANGE);
#else
/*    The Correspondence Table of AVR Series Arduino Interrupt Pins And Terminal Numbers
 * ---------------------------------------------------------------------------------
 * |                                      |  DigitalPin  | 2  | 3  |                 |
 * |    Uno, Nano, Mini, other 328-based  |---------------------------------------|
 * |                                      | Interrupt No | 0  | 1  |                 |
 * |---------------------------------------------------------------------------------|
 * |                                      |    Pin       | 2  | 3  | 21 | 20 | 19 | 18 |
 * |               Mega2560               |---------------------------------------|
 * |                                      | Interrupt No | 0  | 1  | 2  | 3  | 4  | 5  |
 * |---------------------------------------------------------------------------------|
 * |                                      |    Pin       | 3  | 2  | 0  | 1  | 7  |    |
 * |    Leonardo, other 32u4-based        |---------------------------------------|
 * |                                      | Interrupt No | 0  | 1  | 2  | 3  | 4  |    |
 * |---------------------------------------------------------------------------------
 */
/*                     The Correspondence Table of micro:bit Interrupt Pins And Terminal Numbers
 * ------------------------------------------------------------------------------------------------------------
 * |             micro:bit                      | DigitalPin |P0-P20 can be used as an external interrupt
 * |  (When using as an external interrupt,     |-------------------------------------------------------------
 * |no need to set it to input mode with pinMode)|Interrupt No|Interrupt number is a pin digital value, such as P0
 * |-------------------------------------------------------------------------------------------------------------
 */
attachInterrupt(/*Interrupt No*/0,interEvent,CHANGE);//Enable the external interrupt 0, connect INT1/2 to the digi
   //UNO(2), Mega2560(2), Leonardo(3), microbit(P0).
#endif

//Chip soft reset
acce.softReset();
//Set whether to collect data continuously
acce.continRefresh(true);

/**!
 Set power mode:
     eHighPerformance_14bit         /<High-Performance Mode,14-bit resolution>/
     eContLowPwr4_14bit             /<Continuous measurement,Low-Power Mode 4(14-bit resolution)>/
     eContLowPwr3_14bit             /<Continuous measurement,Low-Power Mode 3(14-bit resolution)>/
     eContLowPwr2_14bit             /<Continuous measurement,Low-Power Mode 2(14-bit resolution)/
     eContLowPwr1_12bit             /<Continuous measurement,Low-Power Mode 1(12-bit resolution)>/
     eSingleLowPwr4_14bit           /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution)>/
     eSingleLowPwr3_14bit           /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution)>/
     eSingleLowPwr2_14bit           /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution)>/
     eSingleLowPwr1_12bit           /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution)>/
     eHighPerformanceLowNoise_14bit /<High-Performance Mode,Low-noise enabled,14-bit resolution>/
     eContLowPwrLowNoise4_14bit     /<Continuous measurement,Low-Power Mode 4(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise3_14bit     /<Continuous measurement,Low-Power Mode 3(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise2_14bit     /<Continuous measurement,Low-Power Mode 2(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise1_12bit     /<Continuous measurement,Low-Power Mode 1(12-bit resolution,Low-noise enabled)
     eSingleLowPwrLowNoise4_14bit   /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution),Lo
     eSingleLowPwrLowNoise3_14bit   /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution),Lo
     eSingleLowPwrLowNoise2_14bit   /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution),Lo
     eSingleLowPwrLowNoise1_12bit   /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution),Lo
*/
acce.setPowerMode(DFRobot_LIS2DW12::eContLowPwr4_14bit);

/**!
  Set the sensor data collection rate:
```

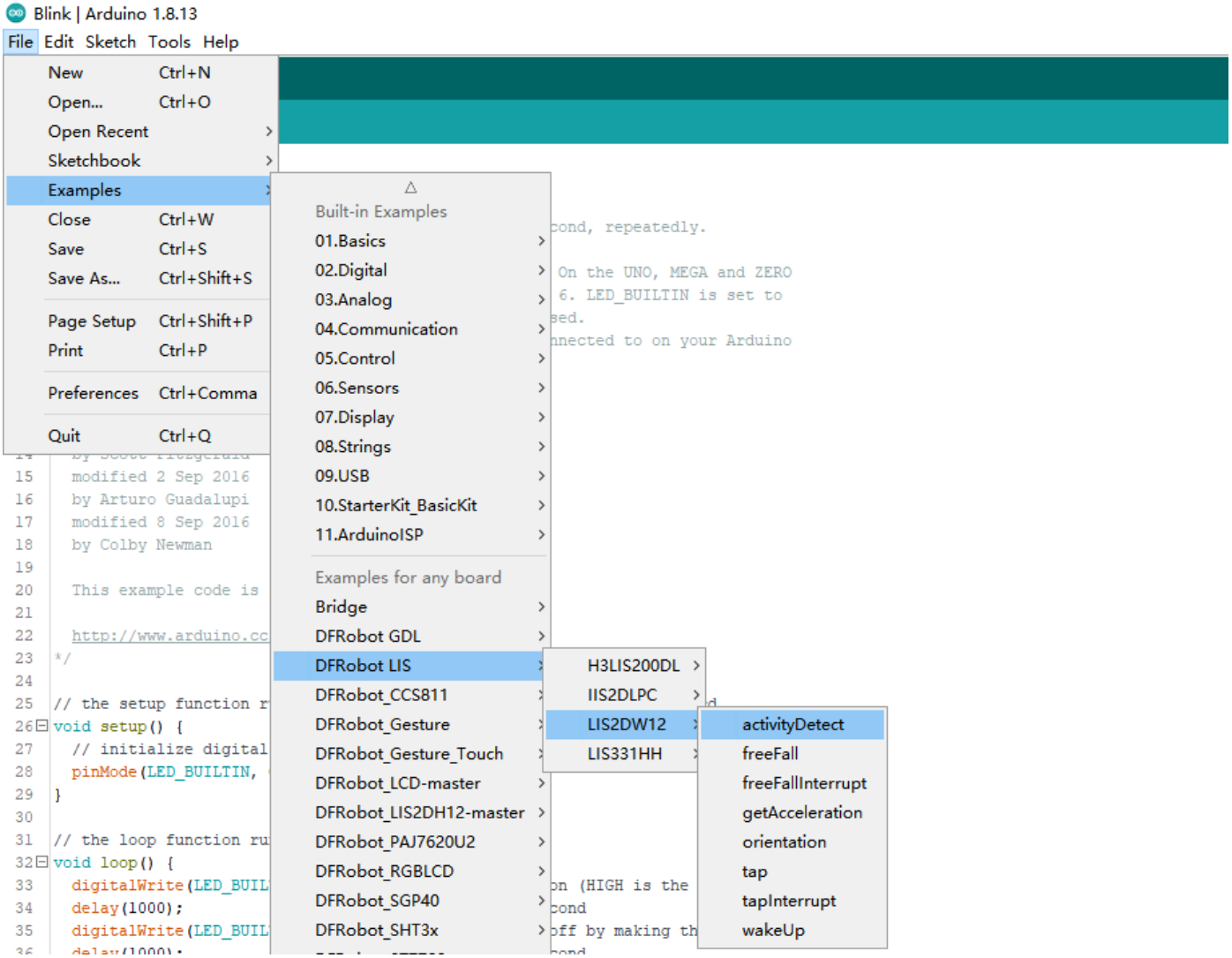
```
                eRate_0hz           /<Measurement off>/
                eRate_1hz6          /<1.6hz, use only under low-power mode>/
                eRate_12hz5         /<12.5hz>/
                eRate_25hz
                eRate_50hz
                eRate_100hz
                eRate_200hz
                eRate_400hz       /<Use only under High-Performance mode>/
                eRate_800hz       /<Use only under High-Performance mode>/
                eRate_1k6hz       /<Use only under High-Performance mode>/
                eSetSwTrig        /<The software triggers a single measurement.>/
  */
  acce.setDataRate(DFRobot_LIS2DW12::eRate_100hz);

  /**!
    Set the sensor measurement range:
                  e2_g   /<±2g>/
                  e4_g   /<±4g>/
                  e8_g   /<±8g>/
                  e16_g  /< ±16g>/
  */
  acce.setRange(DFRobot_LIS2DW12::e2_g);

  //The duration of free fall (0~31), the larger the value, the longer it takes to detect a free fall event
  /**
   * Set the free fall time (Or the number of free-fall samples. In a measurement, it will not be determined as a fr
    dur range(0 ~ 31)
    time = dur * (1/Rate)(unit:s)
    |                                 An example of a linear relationship between an argument and time
    |---------------------------------------------------------------------------------------------------------
    |               |                     |                           |                          |
    |  Data rate    |       25 Hz         |         100 Hz            |          400 Hz          |         = 800 Hz
    |---------------------------------------------------------------------------------------------------------
    |   time        |dur*(1s/25)= dur*40ms|  dur*(1s/100)= dur*10ms  |  dur*(1s/400)= dur*2.5ms |  dur*(1s/800)= du
    |---------------------------------------------------------------------------------------------------------
   */
  acce.setFreeFallDur(/*dur = */3);

  /**!
    Set the interrupt source of the int1 pin:
    eDoubleTap(Double click)
    eFreeFall(Free fall)
    eWakeUp(wake)
    eSingleTap(single-Click)
    e6D(Orientation change check)
  */
  acce.setInt1Event(DFRobot_LIS2DW12::eFreeFall);
  delay(100);
}

void loop(void){

   if(intFlag == 1){
   //Free fall event detected
   delay(100);
   if(acce.freeFallDetected()){
      Serial.println("free fall detected");
      delay(200);
   }
    intFlag = 0;
   }
}
```

Result



Sample code 7-Motion detection(activityDetect.ino)

- Select activityDetect.ino



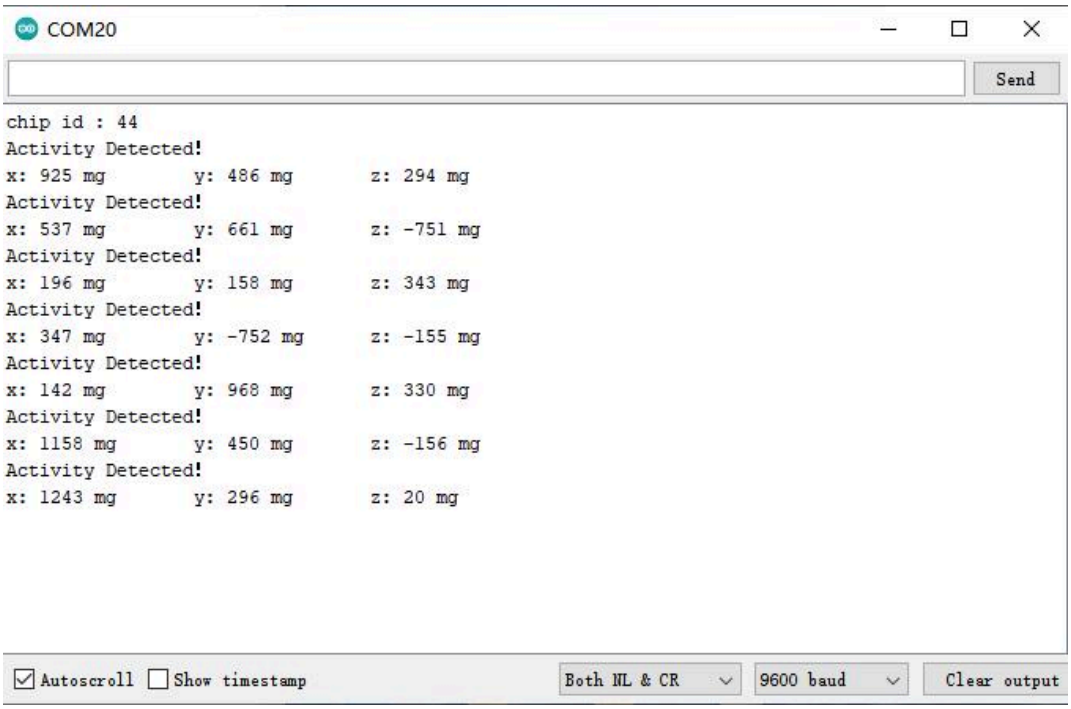
- Program Burning

```
/**!
 * @file activityDetect.ino
 * @brief Motion detection, can detect whether the module is moving
 * @n It’s necessary to go into low power mode before using this function. Then call setActMode() to make the chip i
 * @n In this state, the measurement rate is 12.5hz.
 * @n When the acceleration change in a certain direction is detected to exceed the threshold, the measurement rate
 * @n to the normal rate we set before. The threshold can be set by the setWakeUpThreshold() function.
 * @n But if the move stops moving, also, the acceleration change in the three directions is less than the threshold
 * @n mode after a period of time. This duration time can be set by the setWakeUpDur() function.
 * @n When using SPI, chip select pin can be modified by changing the value of LIS2DW12_CS.
 * @copyright  Copyright (c) 2010 DFRobot Co.Ltd (http://www.dfrobot.com)
 * @licence     The MIT License (MIT)
 * @author [fengli](li.feng@dfrobot.com)
 * @version  V1.0
 * @date  2021-01-16
 * @get from https://www.dfrobot.com
 * @https://github.com/DFRobot/DFRobot_LIS
 */

#include <DFRobot_LIS2DW12.h>

//When using I2C communication, use the following program to construct an object by DFRobot_LIS2DW12_I2C
/*!
 * @brief Constructor
 * @param pWire I2c controller
 * @param addr  I2C address(0x18/0x19)
 */
//DFRobot_LIS2DW12_I2C acce(&Wire,0x18);
DFRobot_LIS2DW12_I2C acce;

//When using SPI communication, use the following program to construct an object by DFRobot_LIS2DW12_SPI
#if defined(ESP32) || defined(ESP8266)
#define LIS2DW12_CS  D3
#elif defined(__AVR__) || defined(ARDUINO_SAM_ZERO)
#define LIS2DW12_CS 3
#elif (defined NRF5)
#define LIS2DW12_CS 2  //The pin on the development board with the corresponding silkscreen printed as P2
#endif
/*!
 * @brief Constructor
 * @param cs  Chip selection pinChip selection pin
 * @param spi SPI controller
 */
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS);
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS,&SPI);

void setup(void){
  Serial.begin(9600);
  while(!acce.begin()){
     Serial.println("Communication failed, check the connection and I2C address setting when using I2C communicatior
     delay(1000);
  }
  Serial.print("chip id : ");
  Serial.println(acce.getID(),HEX);
  //Software reset
  acce.softReset();
```

```
/**!
  Set the sensor measurement range:
                e2_g   /<±2g>/
                e4_g   /<±4g>/
                e8_g   /<±8g>/
                e16_g  /<±16g>/
*/
acce.setRange(DFRobot_LIS2DW12::e2_g);

/**!
  Filter settings:
         eLPF(Low pass filter)
         eHPF(High pass filter)
*/
acce.setFilterPath(DFRobot_LIS2DW12::eLPF);

/**!
  Set bandwidth:
      eRateDiv_2  ,/<Rate/2 (up to Rate = 800 Hz, 400 Hz when Rate = 1600 Hz)>/
      eRateDiv_4  ,/<Rate/4 (High Power/Low power)>*
      eRateDiv_10 ,/<Rate/10 (HP/LP)>/
      eRateDiv_20 ,/< Rate/20 (HP/LP)>/
*/
acce.setFilterBandwidth(DFRobot_LIS2DW12::eRateDiv_4);

/**
   Wake-up duration: when using the detection mode of eDetectAct in the setActMode() function, it will collect dat
 at a normal rate after the chip is awakened. Then after a period of time, the chip will continue to hibernate, co
  dur (0 ~ 3)
  time = dur * (1/Rate)(unit:s)
  |                    An example of a linear relationship between an argument and time
  |-----------------------------------------------------------------------------------------------------------------
  |               |                     |                          |                          |
  |  Data rate    |       25 Hz         |         100 Hz           |          400 Hz          |         = 800 Hz
  |-----------------------------------------------------------------------------------------------------------------
  |   time        |dur*(1s/25)= dur*40ms|  dur*(1s/100)= dur*10ms  |  dur*(1s/400)= dur*2.5ms |  dur*(1s/800)= du
  |-----------------------------------------------------------------------------------------------------------------
 */
acce.setWakeUpDur(/*dur = */2);

//Set wakeup threshold, when the acceleration change exceeds this value, the eWakeUp event will be triggered, unit
//The value is within the range.
acce.setWakeUpThreshold(/*threshold = */0.2);

/**!
 Set power mode:
     eHighPerformance_14bit         /<High-Performance Mode,14-bit resolution>/
     eContLowPwr4_14bit             /<Continuous measurement,Low-Power Mode 4(14-bit resolution)>/
     eContLowPwr3_14bit             /<Continuous measurement,Low-Power Mode 3(14-bit resolution)>/
     eContLowPwr2_14bit             /<Continuous measurement,Low-Power Mode 2(14-bit resolution)/
     eContLowPwr1_12bit             /<Continuous measurement,Low-Power Mode 1(12-bit resolution)>/
     eSingleLowPwr4_14bit           /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution)>/
     eSingleLowPwr3_14bit           /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution)>/
     eSingleLowPwr2_14bit           /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution)>/
     eSingleLowPwr1_12bit           /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution)>/
     eHighPerformanceLowNoise_14bit /<High-Performance Mode,Low-noise enabled,14-bit resolution>/
     eContLowPwrLowNoise4_14bit     /<Continuous measurement,Low-Power Mode 4(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise3_14bit     /<Continuous measurement,Low-Power Mode 3(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise2_14bit     /<Continuous measurement,Low-Power Mode 2(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise1_12bit     /<Continuous measurement,Low-Power Mode 1(12-bit resolution,Low-noise enabled)
     eSingleLowPwrLowNoise4_14bit   /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution),Lo
     eSingleLowPwrLowNoise3_14bit   /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution),Lo
     eSingleLowPwrLowNoise2_14bit   /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution),Lo
```

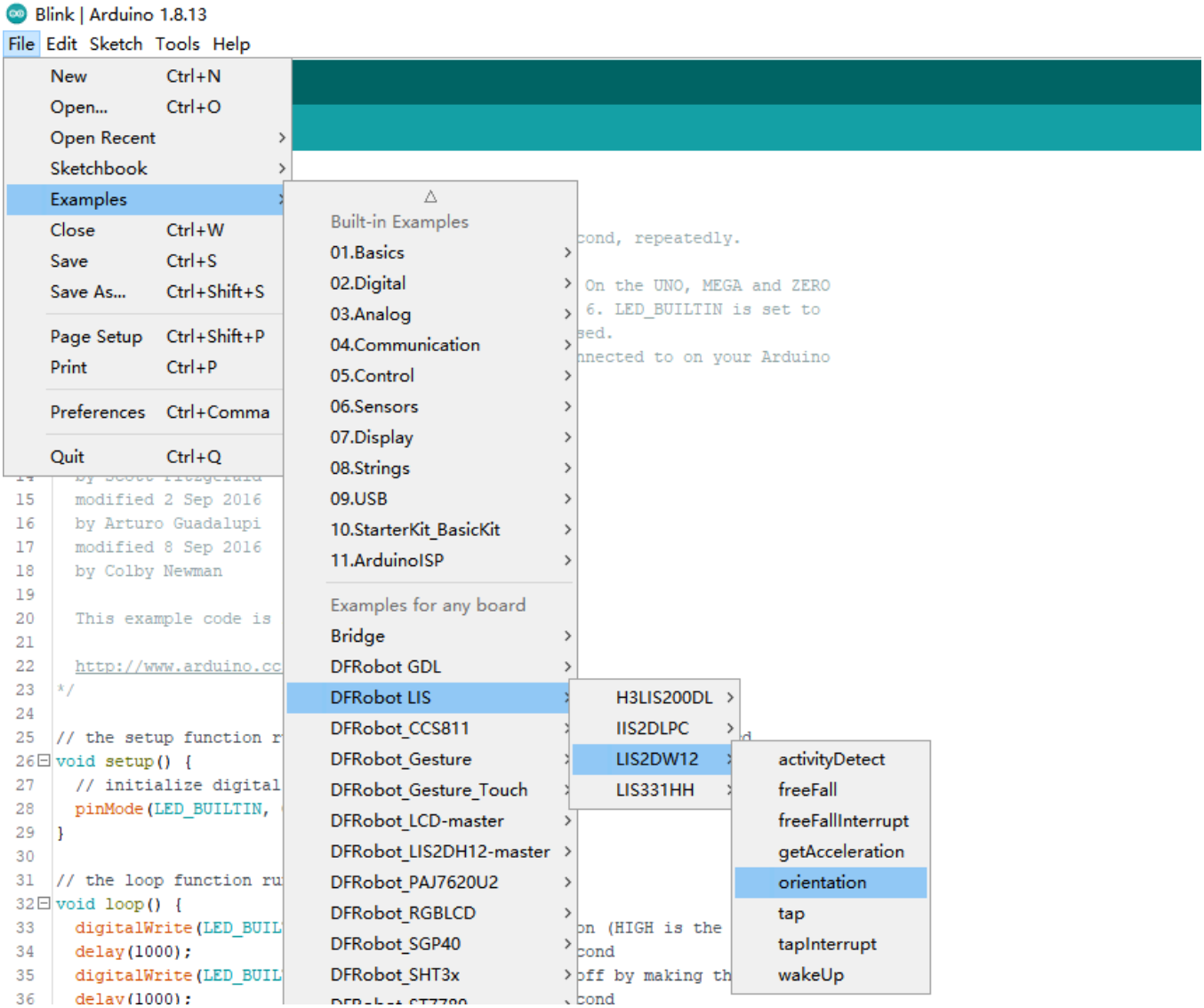
```
      eSingleLowPwrLowNoise1_12bit   /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution),Lo
  */
  acce.setPowerMode(DFRobot_LIS2DW12::eContLowPwrLowNoise1_12bit);

  /**!
    Set the mode of motion detection:
    eNoDetection       /<No detection>/
    eDetectAct         /<If set this mode, the rate of the chip will drop to 12.5hz and turn into normal measurement
                        after the eWakeUp event is generated.>/
    eDetectStatMotion  /<In this mode, it can only detect if the chip is in sleep mode without changing the measurem
                          and power mode, continuously measuring the data at normal frequency.>/
  */
  acce.setActMode(DFRobot_LIS2DW12::eDetectAct);

  /**!
    Set the interrupt source of the int1 pin:
    eDoubleTap(Double click)
    eFreeFall(Free fall)
    eWakeUp(wake up)
    eSingleTap(single-Click)
    e6D(Orientation change check)
  */
  acce.setInt1Event(DFRobot_LIS2DW12::eWakeUp);

  /**!
    Set the sensor data collection rate:
                eRate_0hz           /<Measurement off>/
                eRate_1hz6          /<1.6hz, use only under low-power mode>/
                eRate_12hz5         /<12.5hz>/
                eRate_25hz
                eRate_50hz
                eRate_100hz
                eRate_200hz
                eRate_400hz       /<Use only under High-Performance mode>/
                eRate_800hz       /<Use only under High-Performance mode>/
                eRate_1k6hz       /<Use only under High-Performance mode>/
                eSetSwTrig        /<The software triggers a single measurement>/
  */
  acce.setDataRate(DFRobot_LIS2DW12::eRate_200hz);
  delay(100);
}

void loop(void){
    //Motion detected
    if(acce.actDetected()){
        Serial.println("Activity Detected!");
        Serial.print("x: ");
        Serial.print(acce.readAccX());
        Serial.print(" mg \t y: ");
        Serial.print(acce.readAccY());
        Serial.print(" mg \t z: ");
        Serial.print(acce.readAccZ());
        Serial.println(" mg");
        delay(100);
    }
}
```

Result



Sample code 8-Orientation detection(orientation.ino)

- Select orientation.ino



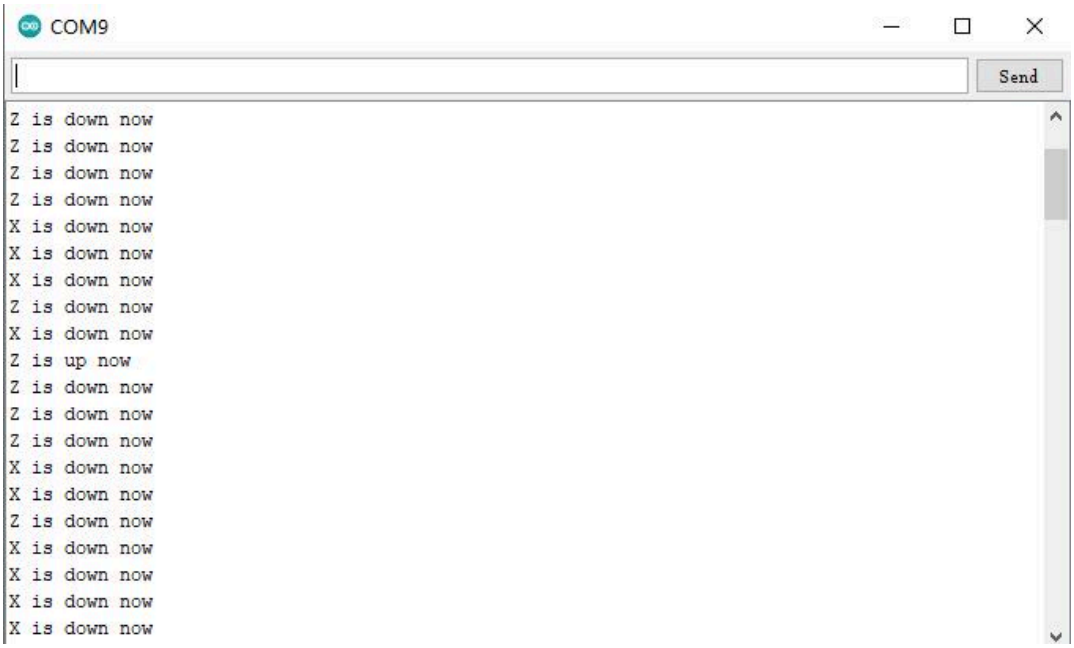
- Program Burning

```
/**!
 * @file orientation.ino
 * @brief When detecting the orientation of the module, the sensor can detect the following six events:
 * @n Positive z-axis is facing up
 * @n Positive z-axis is facing down
 * @n Positive y-axis is facing up
 * @n Positive y-axis is facing down
 * @n Positive x-axis is facing up
 * @n Positive x-axis is facing down
 * @n When using SPI, chip select pin can be modified by changing the value of macro LIS2DW12_CS
 * @copyright  Copyright (c) 2010 DFRobot Co.Ltd (http://www.dfrobot.com)
 * @licence     The MIT License (MIT)
 * @author [fengli](li.feng@dfrobot.com)
 * @version  V1.0
 * @date  2021-01-16
 * @get from https://www.dfrobot.com
 * @https://github.com/DFRobot/DFRobot_LIS
 */
#include <DFRobot_LIS2DW12.h>

//When using I2C communication, use the following program to construct an object by DFRobot_LIS2DW12_I2C
/*!
 * @brief Constructor
 * @param pWire I2c controller
 * @param addr  I2C address(0x18/0x19)
 */
//DFRobot_LIS2DW12_I2C acce(&Wire,0x18);
DFRobot_LIS2DW12_I2C acce;


//When using SPI communication, use the following program to construct an object by DFRobot_LIS2DW12_SPI
#if defined(ESP32) || defined(ESP8266)
#define LIS2DW12_CS  D3
#elif defined(__AVR__) || defined(ARDUINO_SAM_ZERO)
#define LIS2DW12_CS 3
#elif (defined NRF5)
#define LIS2DW12_CS 2  //The pin on the development board with the corresponding silkscreen printed as P2
#endif
/*!
 * @brief Constructor
 * @param cs Chip selection pinChip selection pin
 * @param spi SPI controller
 */
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS,&SPI);
//DFRobot_LIS2DW12_SPI acce(/*cs = */LIS2DW12_CS);

int lastOrientation = 0; //No event happened

void setup(void){

  Serial.begin(9600);
  while(!acce.begin()){
     Serial.println("Communication failed, check the connection and I2C address setting when using I2C communicatior
     delay(1000);
  }
  Serial.print("chip id : ");
  Serial.println(acce.getID(),HEX);
```

```
//Chip soft reset
acce.softReset();

/**!
  Set the sensor measurement range:
                e2_g   /<±2g>/
                e4_g   /<±4g>/
                e8_g   /<±8g>/
                e16_g  /< ±16g>/
*/
acce.setRange(DFRobot_LIS2DW12::e2_g);

/**!
 Set power mode:
     eHighPerformance_14bit         /<High-Performance Mode,14-bit resolution>/
     eContLowPwr4_14bit             /<Continuous measurement,Low-Power Mode 4(14-bit resolution)>/
     eContLowPwr3_14bit             /<Continuous measurement,Low-Power Mode 3(14-bit resolution)>/
     eContLowPwr2_14bit             /<Continuous measurement,Low-Power Mode 2(14-bit resolution)/
     eContLowPwr1_12bit             /<Continuous measurement,Low-Power Mode 1(12-bit resolution)>/
     eSingleLowPwr4_14bit           /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution)>/
     eSingleLowPwr3_14bit           /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution)>/
     eSingleLowPwr2_14bit           /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution)>/
     eSingleLowPwr1_12bit           /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution)>/
     eHighPerformanceLowNoise_14bit /<High-Performance Mode,Low-noise enabled,14-bit resolution>/
     eContLowPwrLowNoise4_14bit     /<Continuous measurement,Low-Power Mode 4(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise3_14bit     /<Continuous measurement,Low-Power Mode 3(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise2_14bit     /<Continuous measurement,Low-Power Mode 2(14-bit resolution,Low-noise enabled)
     eContLowPwrLowNoise1_12bit     /<Continuous measurement,Low-Power Mode 1(12-bit resolution,Low-noise enabled)
     eSingleLowPwrLowNoise4_14bit   /<Single data conversion on demand mode,Low-Power Mode 4(14-bit resolution),Lo
     eSingleLowPwrLowNoise3_14bit   /<Single data conversion on demand mode,Low-Power Mode 3(14-bit resolution),Lo
     eSingleLowPwrLowNoise2_14bit   /<Single data conversion on demand mode,Low-Power Mode 2(14-bit resolution),Lo
     eSingleLowPwrLowNoise1_12bit   /<Single data conversion on demand mode,Low-Power Mode 1(12-bit resolution),Lo
*/
acce.setPowerMode(DFRobot_LIS2DW12::eContLowPwrLowNoise1_12bit);

/**!
  Set the sensor data collection rate:
             eRate_0hz           /<Measurement off>/
             eRate_1hz6          /<1.6hz, use only under low-power mode>/
             eRate_12hz5         /<12.5hz>/
             eRate_25hz
             eRate_50hz
             eRate_100hz
             eRate_200hz
             eRate_400hz       /<Use only under High-Performance mode>/
             eRate_800hz       /<Use only under High-Performance mode>/
             eRate_1k6hz       /<Use only under High-Performance mode>/
             eSetSwTrig        /<The software triggers a single measurement>/
*/
acce.setDataRate(DFRobot_LIS2DW12::eRate_200hz);

/**!
  Set the threshold of the angle when turning:
                  eDegrees80   (80°)
                  eDegrees70   (70°)
                  eDegrees60   (60°)
                  eDegrees50   (50°)
*/
acce.set6DThreshold(DFRobot_LIS2DW12::eDegrees60);

/**!
  Set the interrupt source of the int1 pin:
  eDoubleTap(Double click)
```

```
    eFreeFall(Free fall)
    eWakeUp(wake)
    eSingleTap(single-Click)
    e6D(Orientation change check)
  */
  acce.setInt1Event(DFRobot_LIS2DW12::e6D);

  delay(1000);
}

void loop(void){
    //check Changes detected in six directions
    if(acce.oriChangeDetected()){
        DFRobot_LIS2DW12::eOrient_t orientation = acce.getOrientation();
        if(lastOrientation != orientation){
            if(orientation == DFRobot_LIS2DW12::eXDown){
             Serial.println("X is down now");
            }
            if(orientation == DFRobot_LIS2DW12::eXUp){
             Serial.println("X is up now");
            }
            if(orientation == DFRobot_LIS2DW12::eYDown){
             Serial.println("Y is down now");
            }
            if(orientation == DFRobot_LIS2DW12::eYUp){
             Serial.println("Y is up now");
            }
            if(orientation == DFRobot_LIS2DW12::eZDown){
             Serial.println("Z is down now");
            }
            if(orientation == DFRobot_LIS2DW12::eZUp){
             Serial.println("Z is up now");
            }
            lastOrientation = orientation;
        }
    }
}
```

Result



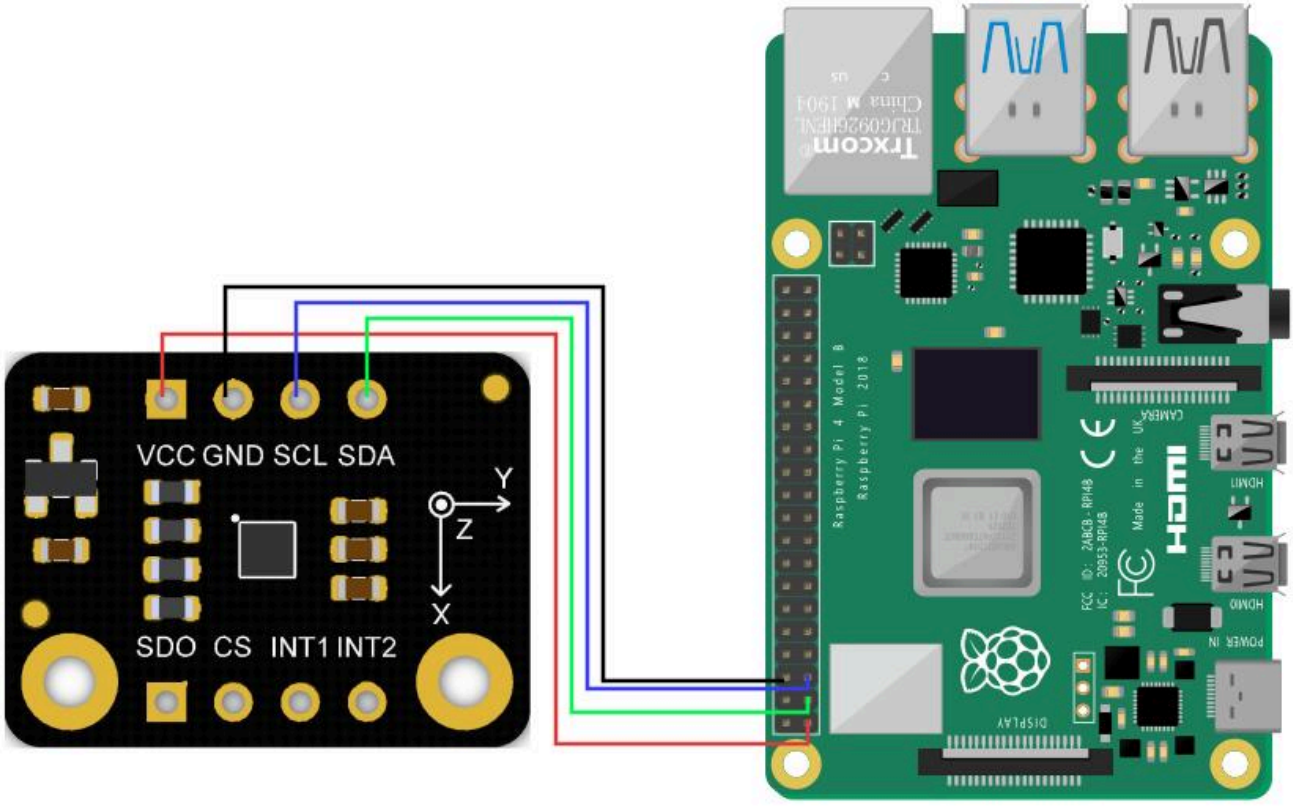
Tutorial for Raspberry Pi

Requirements

- **Hardware**
  - Raspberry Pi 4B(or similar) x 1
  - LIS2DW12 Triple Axis Accelerometer x1
  - Jumper wires x1
- **Software**
  - Download and install the **LIS Series Python Library** (https://github.com/DFRobot/DFRobot_LIS/tree/master/python/raspberrypi).
    - Raspberry Pi Official OS (https://www.raspberrypi.org/downloads/raspbian)

Connection

- Connect the module to the Raspberry Pi according to the connection diagram. The default I2C address is 0x19.



Driver Installtion

1. Enable the I2C interface of the Raspberry Pi. If it is already enabled, you can skip this step. Open Terminal, type the following command, and press Enter:

```
sudo raspi-config
```

Then use the up and down keys to select "5 Interfacing Options", press Enter, select "P5 I2C", and press Enter to confirm "YES". Restart the Raspberry Pi main control board.

2. To install Python dependent libraries and git, the Raspberry Pi needs to be connected to the Internet. If it is already installed, you can skip this step. In the terminal, type the following commands in sequence, and press Enter:

```
sudo apt-get update
```

```
sudo apt-get install build-essential python-dev python-smbus git
```

3. Download the LIS series driver library. In the terminal, type the following commands in sequence and press Enter:

```
cd Desktop
```

```
git clone https://github.com/DFRobot/DFRobot_LIS
```

Note: If you choose to use I2C (0X18) and SPI communication methods, you need to modify the demo to the corresponding communication. You may encounter situations where you do not have the authority to modify the sample program. The following is the solution:

1. Query permissions under the file directory which needs to be modified, the command is:

```
ls -al
```

2. Modify the file permissions, the command is:

```
sudo chmod a+w XXX.py
```

At this point, the file write permission is available for everyone.

Sample Code

- Sample code 1-Read acceleration of x, y and z(get_acceleration.py)
- Sample code 2-Wakeup function(wake_up.py)
- Sample code 3-Tap detection(tap.py)
- Sample code 4-Free fall detection function(free_fall.py)
- Sample code 5-Free fall interrupt function(interrupt.py)
- Sample code 6-Motion detection(activity_detect.py)
- Sample code 7-Orientation detection(orientation.py)

Sample code 1-Read acceleration of x, y and z(get_acceleration.py)

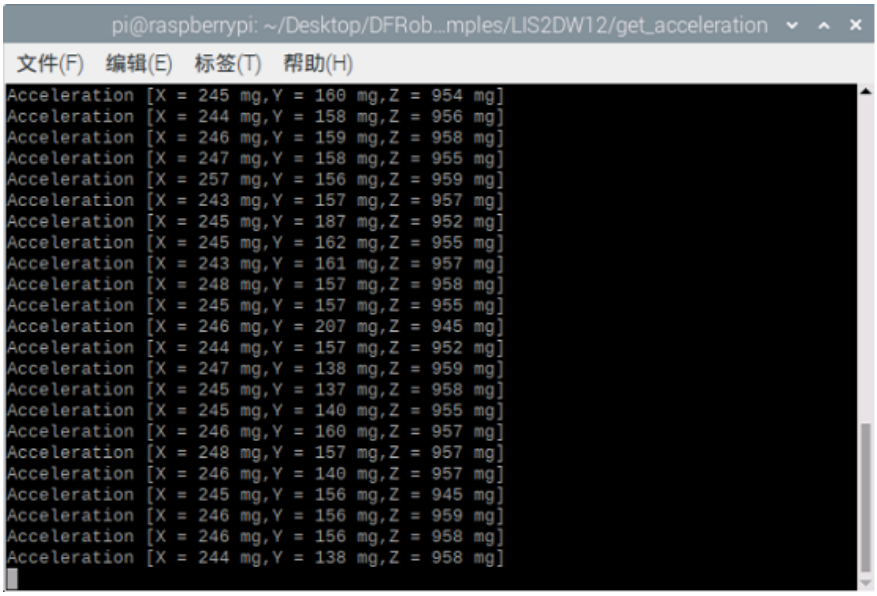
- In the terminal, type the following command and press Enter, run the sample code:

```
cd DFRobot_LIS/python/raspberrypi/examples/LIS2DW12
```

```
cd get_acceleration/
```

```
python get_acceleration.py
```

- Result



Sample code 2-Wakeup function(wake_up.py)

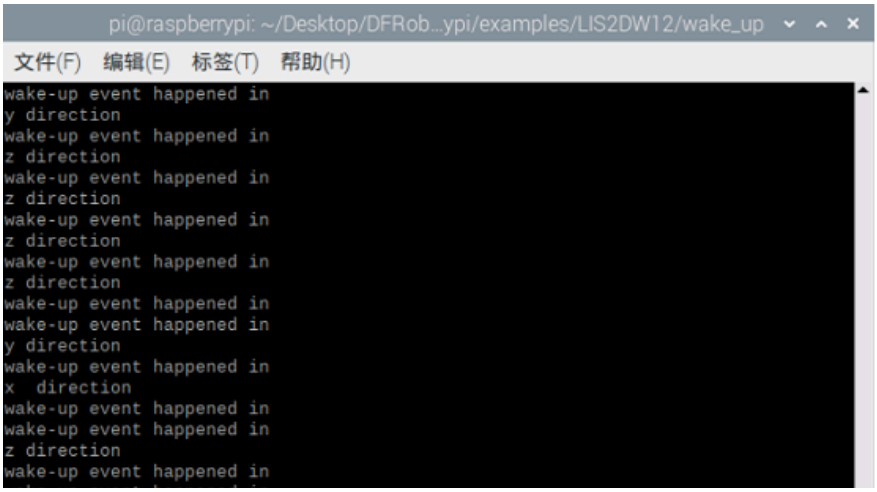
- In the terminal, type the following command and press Enter, run the sample code:

```
cd DFRobot_LIS/Python/raspberrypi/examples/LIS2DW12
```

```
cd wake_up
```

```
python wake_up.py
```

- Result



Sample code 3-Tap detection(tap.py)

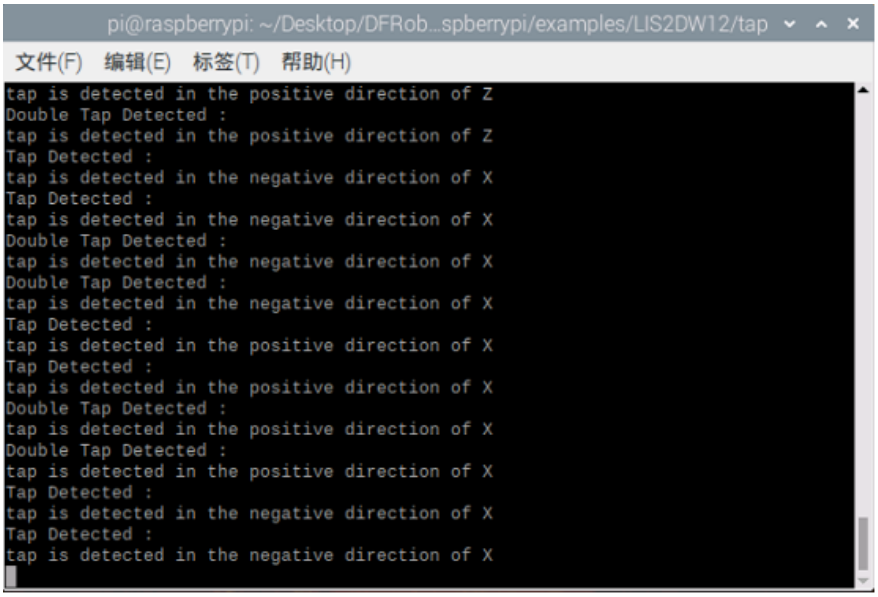
- In the terminal, type the following command and press Enter, run the sample code:

```
cd DFRobot_LIS/Python/raspberrypi/examples/LIS2DW12
```

```
cd tap
```

```
python tap.py
```

- Result



Sample code 4-Free fall detection function(free_fall.py)

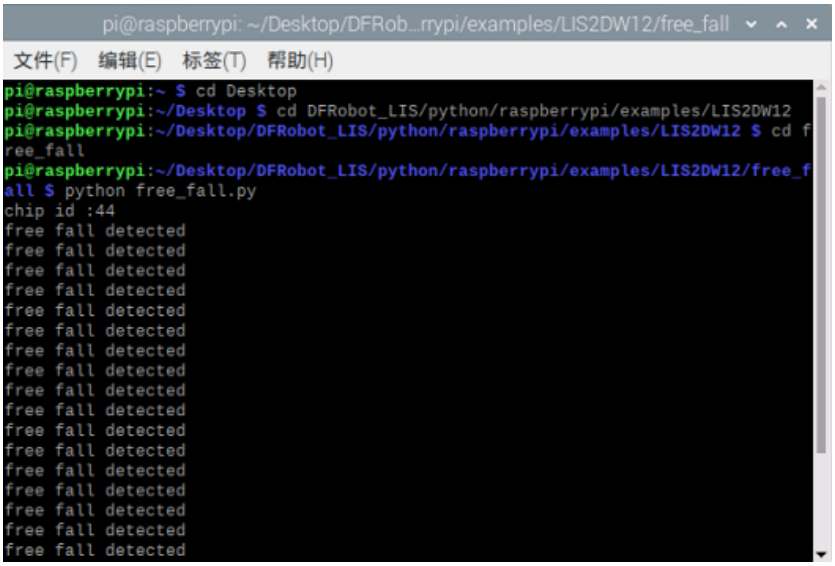
- In the terminal, type the following command and press Enter, run the sample code:

```
cd DFRobot_LIS/Python/raspberrypi/examples/LIS2DW12
```

```
cd free_fall
```

```
python free_fall.py
```

- Result



Sample code 5-Free fall interrupt function(interrupt.py)

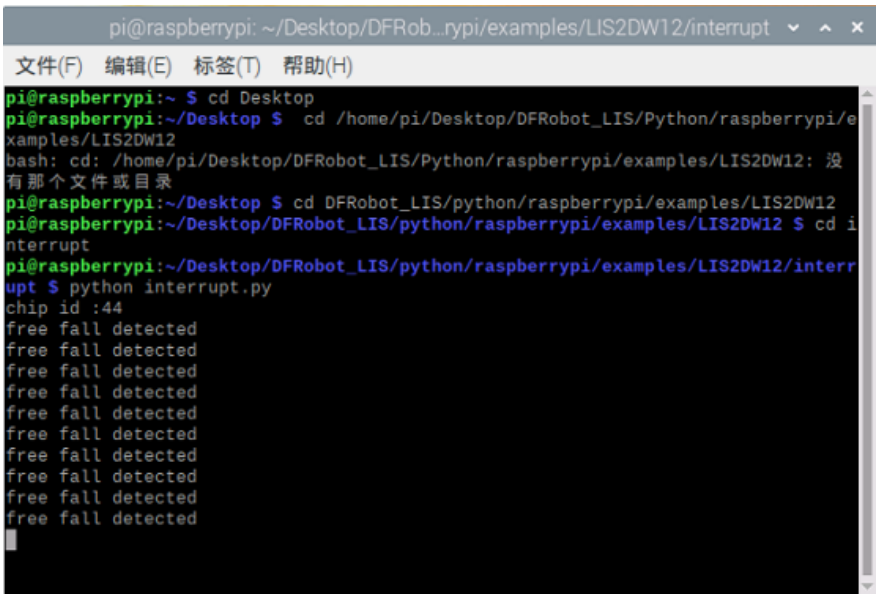
- In the terminal, type the following command and press Enter, run the sample code:

```
cd DFRobot_LIS/Python/raspberrypi/examples/LIS2DW12
```

```
cd interrupt
```

```
python interrupt.py
```

- Result



Sample code 6-Motion detection(activity_detect.py)

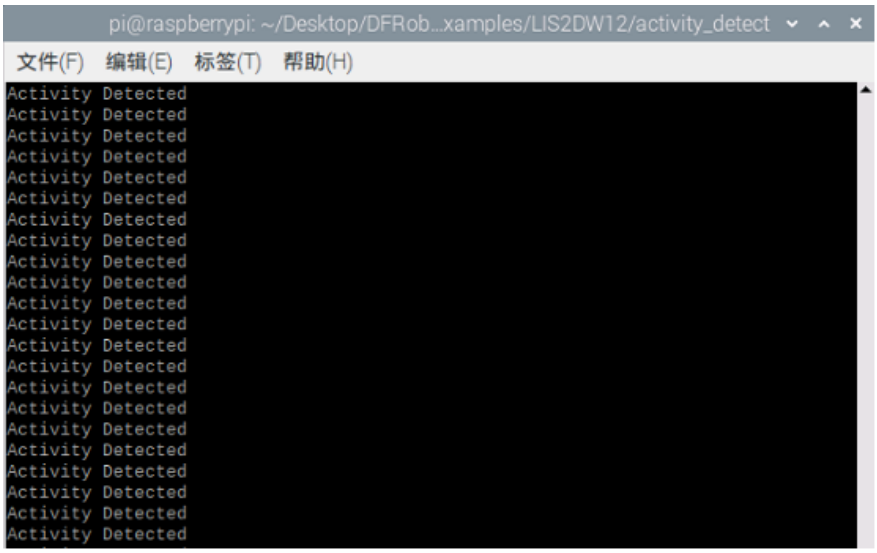
- In the terminal, type the following command and press Enter, run the sample code:

```
cd DFRobot_LIS/Python/raspberrypi/examples/LIS2DW12
```

```
cd activity_detect
```

```
python activity_detect.py
```

- Result



Sample code 7-Orientation detection(orientation.py)

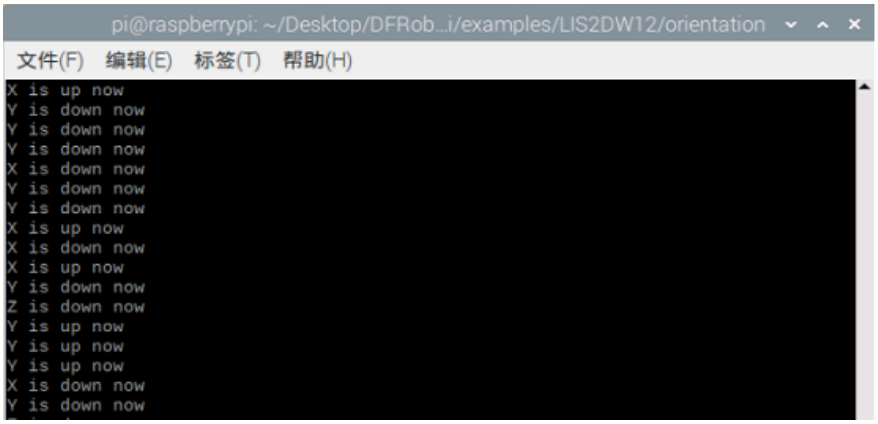
- In the terminal, type the following command and press Enter, run the sample code:

```
cd DFRobot_LIS/Python/raspberrypi/examples/LIS2DW12
```

```
cd orientation
```

```
python orientation.py
```

- Result



FAQ

For any questions, advice or cool ideas to share, please visit the **DFRobot Forum** (https://www.dfrobot.com/forum/).

More Documents

- Schematics Diagram (https://dfimg.dfrobot.com/nobody/wiki/c4fc2deee49a17b742266b36cd22f7bc.pdf)
- SEN0405-Dimension.jpg (https://dfimg.dfrobot.com/nobody/wiki/b5c31ac803b0afef28cdcafd3a39d81e.jpg)
- SEN0405-Datasheet.pdf (https://dfimg.dfrobot.com/nobody/wiki/aafcb9ba2d347a4828188ba8f5616758.pdf)