PIR Digital Sensor

BM22S402x-1
Arduino Library V1.0.1 Description

Revision: V1.01 Date: September 11, 2023

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Contents

Introduction

The BM22S402x-1 (x=1, 2, 3, 4) are four PIR digital sensors from Best Modules, which use the UART communication method. This document provides the description of the BM22S402x-1 Arduino Lib functions and how to install the Arduino Lib. The example uses the BMA26M221 to demonstrate the functions of module parameter configuration and PIR motion detection.

Applicable types:

Part No.	Description
BM22S4021-1 BM22S4022-1 BM22S4023-1 BM22S4024-1	PIR Digital Sensor
BMA26M221	On-board BM22S4021-1 Sensor

Arduino Lib Functions

Arduino Lib Name: BM22S402x-1		Lib Version: V1.0.1
Constructors & Initialisation		
1	BM22S402x_1(HardwareSerial *theSerial=&Serial)	
	Description	Constructor, uses the Hardware Serial interface
	Parameter	*theSerial: Select Hardware Serial interface (default Serial interface)
	Return Value	—
	Note	—
2	BM22S402x_1(uint8_t rxPin, uint8_t txPin)	
	Description	Constructor, uses the Software Serial interface
	Parameter	rxPin: RX pin, connects to the TX pin of the BM22S402x-1 or the BMA26M221 txPin: TX pin, connects to the RX pin of the BM22S402x-1or the BMA26M221
	Return Value	—
	Note	—
3	void begin()	
	Description	Module initialisation
	Parameter	—
	Return Value	void
	Note	—
Performance Functions		
4	uint8_t getDevID(uint8_t devID[])	
	Description	Get the module ID
	Parameter	devID[]: Store the module ID (ASCII code), length: 10 bytes
	Return Value	Execution result: 0: Execution succeeded 1: Response verification error 2: Communication timeout
	Note	The module ID is fixed to BM22S402x1 (converted to characters based on ASCII code table)

5	uint16_t readCommand(uint8_t cmd)	
	Description	Read the module parameters
	Parameter	cmd: “Read” type command code
	Return Value	Module parameter
	Note	This function can read the STATUS register value, PIR register value, real-time PIR value, etc. Refer to the BM22S402x-1 datasheet for details.
6	bool isStable()	
	Description	Query if the module is stable
	Parameter	—
	Return Value	Module stable status: true: Stable, warm-up is completed false: Unstable, warm-up is not completed
	Note	A warm-up time of 30s is required after the module is powered on
7	bool isTrigger()	
	Description	Query if the module has detected the object
	Parameter	—
	Return Value	Object detection status: true: Object detected false: No object detected
	Note	—
8	bool isInfoAvailable()	
	Description	Query if the module automatic output information has been received
	Parameter	—
	Return Value	Information receiving status: true: Received false: Not received
	Note	—
9	void readInfopacket(uint8_t dataBuf[])	
	Description	Read the module automatic output information (7 bytes)
	Parameter	dataBuf[0], dataBuf[1]: Original PIR value low byte, original PIR value high byte dataBuf[2], dataBuf[3]: Filtered PIR value low byte, filtered PIR value high byte dataBuf[4]: STATUS register value dataBuf[5], dataBuf[6]: Temperature value low byte, temperature value high byte (unit: 0.1°C)
	Return Value	void
	Note	This function should be used after “isInfoAvailable()==true”
10	uint16_t readPIR()	
	Description	Read the filtered PIR value
	Parameter	—
	Return Value	12-bit A/D value
	Note	—
11	uint16_t readRawPIR()	
	Description	Read the original PIR value
	Parameter	—
	Return Value	12-bit A/D value
	Note	—
12	float readTemperature(bool isFahrenheit=false)	
	Description	Read the temperature value
	Parameter	isFahrenheit: Unit selection true: Fahrenheit degree false: Centigrade
	Return Value	Temperature value
	Note	—

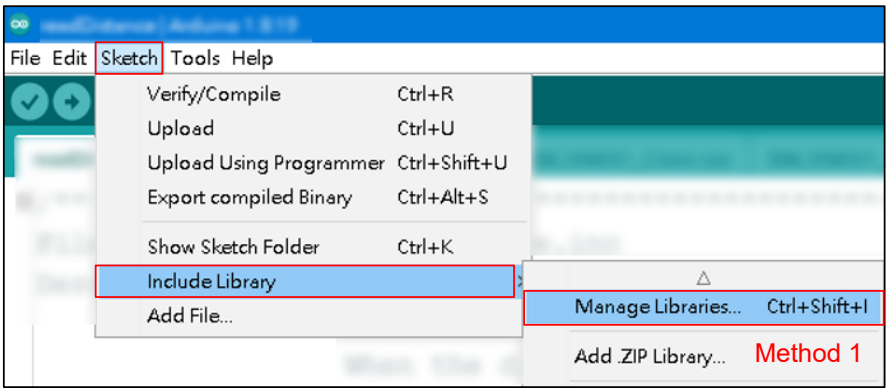
Module Configuration		
13	uint8_t writeCommand(uint8_t cmd, uint16_t param)	
	Description	Configure the module according to command
	Parameter	cmd: “Write” type command code param: Parameters to be written
	Return Value	Execution result: 0: Execution succeeded 1: Response verification error 2: Communication timeout 3: Command code error 4: Write failed
	Note	This function allows users to write parameters to the PIR configuration register as well as set trigger sensitivity and other parameters. Refer to the BM22S402x-1 datasheet for details
14	uint8_t enablePIR(bool isEnable=true)	
	Description	Enable or disable PIR detection
	Parameter	isEnable: Enabling status true: Enable PIR detection false: Disable PIR detection
	Return Value	Execution result: 0: Execution succeeded 1: Response verification error 2: Communication timeout 3: Command code error 4: Write failed
	Note	—
15	uint8_t reset()	
	Description	Software reset
	Parameter	—
	Return Value	Execution result: 0: Execution succeeded 1: Response verification error 2: Communication timeout 3: Command code error
	Note	Refer to the BM22S402x-1 datasheet for the changes in some register values after reset
16	uint8_t restoreDefault()	
	Description	Restore the PIR register and sensitivity register to the default values in the datasheet
	Parameter	—
	Return Value	Execution result: 0: Execution succeeded 1: Response verification error 2: Communication timeout 3: Command code error 4: Write failed
	Note	—
17	uint8_t sleep()	
	Description	Enter the sleep mode
	Parameter	—
	Return Value	Execution result: 0: Execution succeeded 1: Response verification error 2: Communication timeout 3: Command code error
	Note	Sending any command will wake up the module in the sleep mode

Arduino Lib Download and Installation

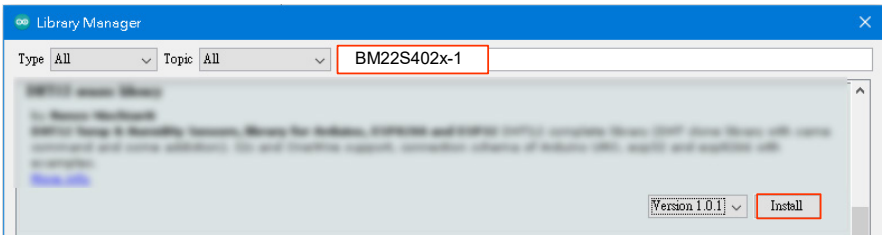
BM22S402x-1 Library: Refer to the following two methods to install the BM22S402x-1 Arduino Library.

Method 1: Search for installation

Search for installation: Arduino IDE→Sketch→Include Library→Manage Libraries...→Search BM22S402x-1→Install



Search for Installation Step 1

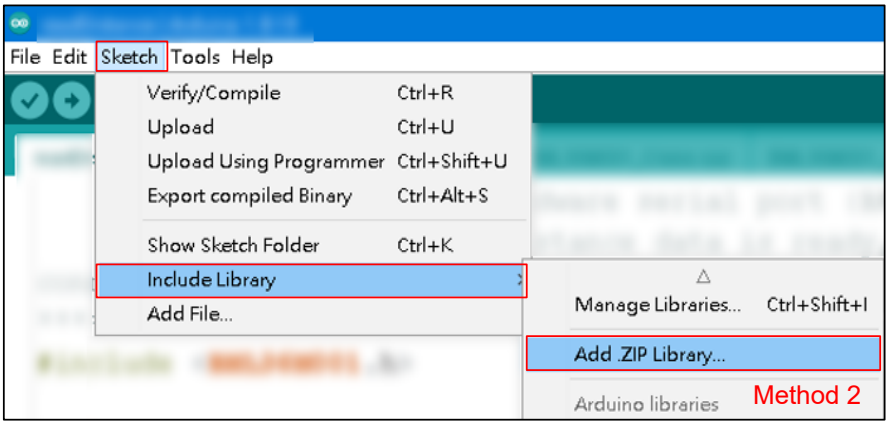


Search for Installation Step 2

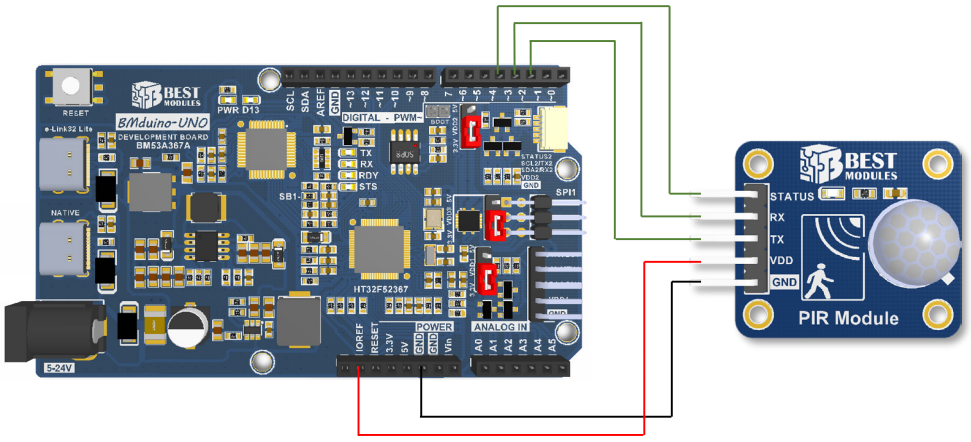
Method 2: Download before adding a ZIP library

Download method: Open the Best Modules official website (https://www.bestmodulescorp.com/bm22s402x-1.html) and download the BM22S402x-1 Library from "Arduino example program" under the "DOCUMENTS" menu.

Add .ZIP library: Arduino IDE → Sketch → Include Library → Add .ZIP Library....



Arduino Example



Physical Connection Diagram

Example: LEDIndicatesTriggerState

Example function: Use LED to indicate the triggering status of the module. When the module detects an object, the module LED on, otherwise off.

1. Open the example: Arduino IDE→File→Examples→Select Lib (BM22S402x-1)→Select example (LEDIndicatesTriggerState)

2. Example description:

a. Create object & initialise object

```
#include <BM22S402x-1.h> // Call the BM22S402x-1 library
#define RX_PIN 2          // PIR_TX
#define TX_PIN 3          // PIR_RX
#define STATUS 13         // PIR_STATUS
/* Create object & Set Software serial pin */
BM22S402x_1 pir(RX_PIN, TX_PIN);
uint8_t error = 0;
void setup()
{
  /* Module initialisation */
  pir.begin();// Softeware serial initialisation(baud rate: 38400bps),
              // set Pin 4 to input mode
  pinMode(STATUS, OUTPUT);
  digitalWrite(STATUS, LOW);
  /* Configure serial monitor */
  Serial.begin(9600); // Serial initialisation, baud rate: 9600bps
  /* Configure the module parameter */
  error += pir.writeCommand(0x07, L1);  // Sensitivity: Level 1 (most
                                        // sensitive)
  error += pir.writeCommand(0x05, 0x6B);// PIR register configuration
  if (error == 0)
  {
    Serial.println("Setting succeeded!");
  }
```

```
  else
  {
    Serial.println("Setting failed.");
  }
  while (pir.isStable() == false);
  Serial.println("Module stabilized.");
}
```

b. When the module is triggered, the development board LED (D13) will be turned on. After a set delay time, the module will be released from the triggered status, the LED will be turned off.

```
void loop()
{
  if (pir.isTrigger())
  {
    digitalWrite(STATUS, HIGH); // Module is triggered
  }
  else
  {
    digitalWrite(STATUS, LOW);  // Module is not triggered
  }
}
```

3. Open the serial monitor, after "Module stabilized" is displayed, observe the development board LED (D13). When a hand swings over the module, the LED will be turned on, after a delay time, the LED will be turned off.