# Bus Bridge Server

commit-4d0fe6f

Generated by Doxygen 1.9.8

# Chapter 1

# Bus Bridge Server

# Chapter 2

# Test List

**File test_math.cpp**

MathTest.Add

- Verifies that the `add` function correctly computes the sum of two integers.
- Example: `add(2, 3)` should return `5`.

MathTest.Subtract

- Verifies that the `subtract` function correctly computes the difference between two integers.
- Examples:
  - `subtract(10, 3)` should return `7`.
  - `subtract(9, 3)` should return `6`.

MathTest.SubtractNegative

- Verifies that the `subtract` function handles subtraction with negative integers correctly.
- Example: `subtract(10, -3)` should return `13`.

# Chapter 3

# Hierarchical Index

## 3.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

# Chapter 4

# Class Index

## 4.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

# Chapter 5

# File Index

## 5.1 File List

Here is a list of all files with brief descriptions:

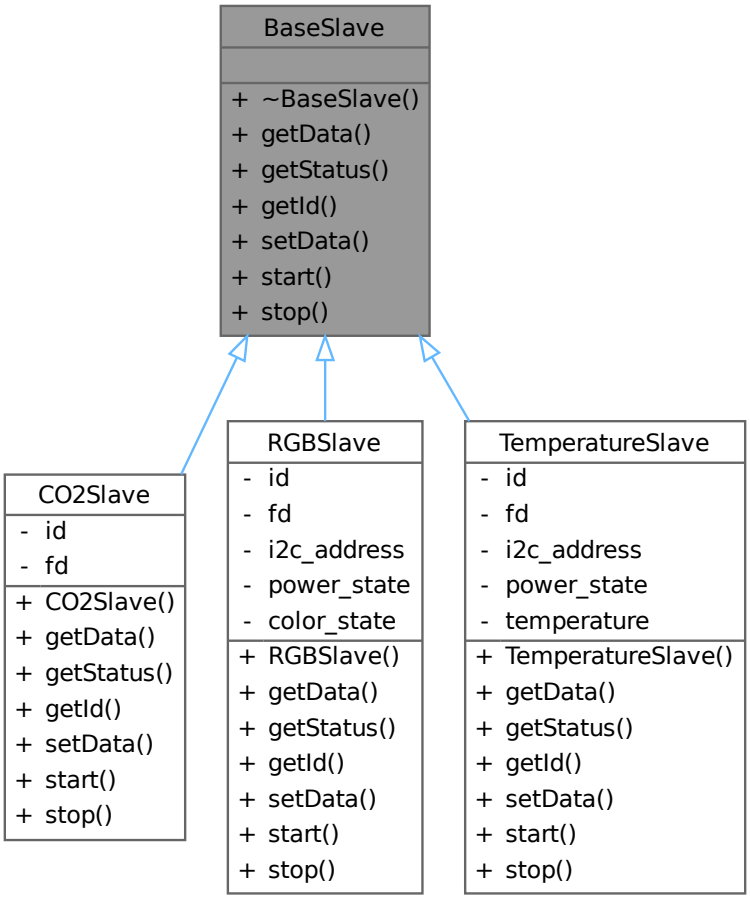
# Chapter 6

# Class Documentation

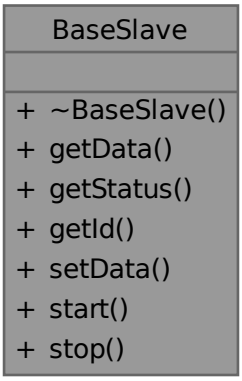
## 6.1 BaseSlave Class Reference

`#include <BaseSlave.h>`

Inheritance diagram for BaseSlave:



Collaboration diagram for BaseSlave:




**Public Member Functions**

- virtual ~BaseSlave ()=default
- virtual void * getData ()=0
- virtual bool getStatus ()=0
- virtual int getId ()=0
- virtual void setData (void *data)=0
- virtual void start (int i2c_fd)=0
- virtual void stop ()=0

### 6.1.1 Detailed Description

Definition at line 6 of file BaseSlave.h.

### 6.1.2 Constructor & Destructor Documentation

#### 6.1.2.1 ~BaseSlave()

```
virtual BaseSlave::~BaseSlave ( )  [virtual], [default]
```

### 6.1.3 Member Function Documentation

#### 6.1.3.1 getData()

```
virtual void * BaseSlave::getData ( )  [pure virtual]
```

Implemented in RGBSlave, TemperatureSlave, and CO2Slave.

#### 6.1.3.2 getId()

```
virtual int BaseSlave::getId ( )  [pure virtual]
```

Implemented in RGBSlave, TemperatureSlave, and CO2Slave.

#### 6.1.3.3 getStatus()

```
virtual bool BaseSlave::getStatus ( )  [pure virtual]
```

Implemented in RGBSlave, TemperatureSlave, and CO2Slave.

#### 6.1.3.4 setData()

```
virtual void BaseSlave::setData (
            void * data )  [pure virtual]
```

Implemented in RGBSlave, TemperatureSlave, and CO2Slave.

#### 6.1.3.5 start()

```
virtual void BaseSlave::start (
            int i2c_fd )  [pure virtual]
```

Implemented in RGBSlave, TemperatureSlave, and CO2Slave.

#### 6.1.3.6 stop()

```
virtual void BaseSlave::stop ( )  [pure virtual]
```

Implemented in RGBSlave, TemperatureSlave, and CO2Slave.

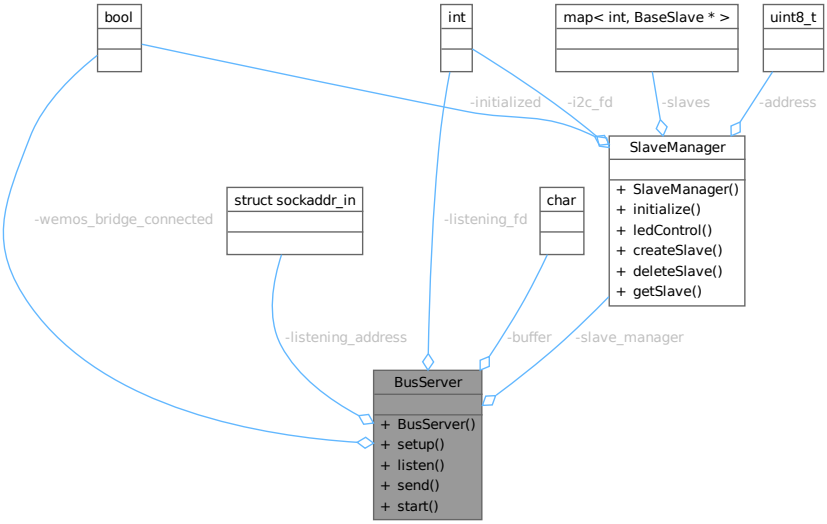
The documentation for this class was generated from the following file:

- include/BaseSlave.h

## 6.2 BusServer Class Reference

`#include <BusServer.h>`

Collaboration diagram for BusServer:




### Public Member Functions

- BusServer ()
- void setup (std::string ip, int port)

  *Setup for the IP socket and the I2C slaves connection.*
- void listen ()

  *Open the underlying socket for incoming connections.*
- void send (struct sensor_packet *pkt, int fd)

  *Send a sensor packet to a connected network client.*
- void start ()

  *Start the main loop of the BusServer.*

### Private Attributes

- int listening_fd
- struct sockaddr_in listening_address
- bool wemos_bridge_connected = false
- char buffer [BUFFER_SIZE]
- SlaveManager slave_manager

### 6.2.1 Detailed Description

Definition at line 12 of file BusServer.h.

## 6.2.2 Constructor & Destructor Documentation

### 6.2.2.1 BusServer()

```
BusServer::BusServer ( )  [inline]
```

Definition at line 14 of file BusServer.h.

## 6.2.3 Member Function Documentation

### 6.2.3.1 listen()

```
void BusServer::listen ( )
```

Open the underlying socket for incoming connections.

**Exceptions**

| | |
|---|---|
| *std::runtime_error* | if the listening fails |

Definition at line 57 of file BusServer.cpp.

### 6.2.3.2 send()

```
void BusServer::send (
            struct sensor_packet * pkt,
            int fd )
```

Send a sensor packet to a connected network client.

Depending on the data set in the packet header, send a certain amount of data to the client.

**Parameters**

| | |
|---|---|
| *pkt* | A pointer to the sensor_packet struct to send over |
| *fd* | The file descriptor to send the packet over |

**Exceptions**

| | |
|---|---|
| *std::runtime_error* | if the sending fails for any reason |

Definition at line 64 of file BusServer.cpp.

### 6.2.3.3 setup()

```
void BusServer::setup (
            std::string ip,
            int port )
```

Setup for the IP socket and the I2C slaves connection.

This method will set up a socket for listening on the network and will also tell the underlying SlaveManager object to initialize its I2C bus

**Parameters**

| | |
|---|---|
| *ip* | The IP address to listen on within the network |
| *port* | The TCP port to listen on |

**Exceptions**

| | |
|---|---|
| *std::invalid_argument* | if the passed IP address or port number are invalid |
| *std::runtime_error* | if the socket creation fails |

Definition at line 17 of file BusServer.cpp.

#### 6.2.3.4 start()

```
void BusServer::start ( )
```

Start the main loop of the BusServer.

This will first initialize the underlying I2C connections to the directly-connected slave devices, and then start accepting and processing network clients

Definition at line 74 of file BusServer.cpp.

### 6.2.4 Member Data Documentation

#### 6.2.4.1 buffer

```
char BusServer::buffer[BUFFER_SIZE]  [private]
```

Definition at line 55 of file BusServer.h.

#### 6.2.4.2 listening_address

```
struct sockaddr_in BusServer::listening_address  [private]
```

Definition at line 53 of file BusServer.h.

#### 6.2.4.3 listening_fd

```
int BusServer::listening_fd  [private]
```

Definition at line 51 of file BusServer.h.

#### 6.2.4.4 slave_manager

```
SlaveManager BusServer::slave_manager  [private]
```

Definition at line 57 of file BusServer.h.

#### 6.2.4.5 wemos_bridge_connected

```
bool BusServer::wemos_bridge_connected = false  [private]
```

Definition at line 54 of file BusServer.h.

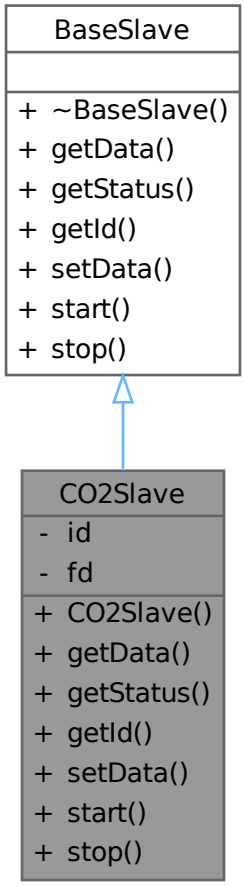
The documentation for this class was generated from the following files:

- include/BusServer.h
- src/BusServer.cpp

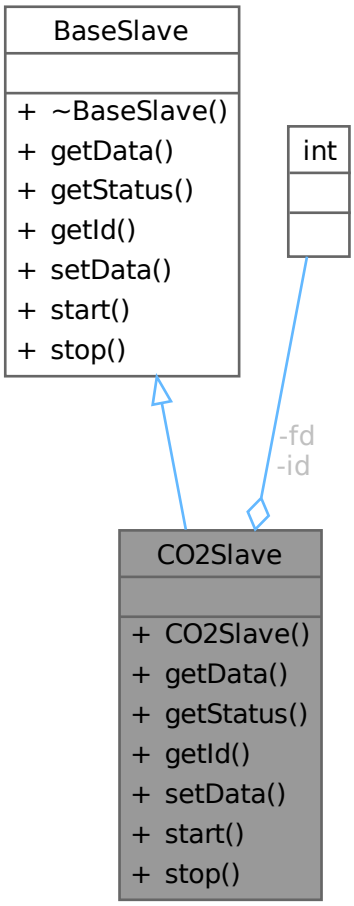
## 6.3 CO2Slave Class Reference

```
#include <CO2Slave.h>
```

Inheritance diagram for CO2Slave:



Collaboration diagram for CO2Slave:




### Public Member Functions

- CO2Slave (uint8_t id, int i2c_address)
- void * getData () override
- bool getStatus () override
- int getId () override
- void setData (void *data) override
- void start (int i2c_fd) override
- void stop () override

## Public Member Functions inherited from BaseSlave

- virtual ~BaseSlave ()=default

### Private Attributes

- int id
- int fd

### 6.3.1 Detailed Description

Definition at line 6 of file CO2Slave.h.

### 6.3.2 Constructor & Destructor Documentation

#### 6.3.2.1 CO2Slave()

```
CO2Slave::CO2Slave (
            uint8_t id,
            int i2c_address )
```

Definition at line 3 of file CO2Slave.cpp.

### 6.3.3 Member Function Documentation

#### 6.3.3.1 getData()

```
void * CO2Slave::getData ( )  [override], [virtual]
```

Implements BaseSlave.

Definition at line 9 of file CO2Slave.cpp.

#### 6.3.3.2 getId()

```
int CO2Slave::getId ( )  [override], [virtual]
```

Implements BaseSlave.

Definition at line 13 of file CO2Slave.cpp.

#### 6.3.3.3 getStatus()

```
bool CO2Slave::getStatus ( )  [override], [virtual]
```

Implements BaseSlave.

Definition at line 11 of file CO2Slave.cpp.

#### 6.3.3.4 setData()

```
void CO2Slave::setData (
            void * data )  [override], [virtual]
```

Implements BaseSlave.

Definition at line 15 of file CO2Slave.cpp.

#### 6.3.3.5 start()

```
void CO2Slave::start (
            int i2c_fd )  [override], [virtual]
```

Implements BaseSlave.

Definition at line 17 of file CO2Slave.cpp.

#### 6.3.3.6 stop()

```
void CO2Slave::stop ( )  [override], [virtual]
```

Implements BaseSlave.

Definition at line 19 of file CO2Slave.cpp.

### 6.3.4 Member Data Documentation

#### 6.3.4.1 fd

```
int CO2Slave::fd  [private]
```

Definition at line 19 of file CO2Slave.h.

#### 6.3.4.2 id

```
int CO2Slave::id  [private]
```

Definition at line 18 of file CO2Slave.h.

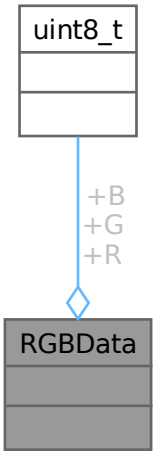
The documentation for this class was generated from the following files:

- include/CO2Slave.h
- src/CO2Slave.cpp

## 6.4 RGBData Struct Reference

`#include <RGBSlave.h>`

Collaboration diagram for RGBData:




### Public Attributes

- uint8_t R
- uint8_t G
- uint8_t B

### 6.4.1 Detailed Description

Definition at line 6 of file RGBSlave.h.

### 6.4.2 Member Data Documentation

#### 6.4.2.1 B

`uint8_t RGBData::B`

Definition at line 7 of file RGBSlave.h.

#### 6.4.2.2 G

`uint8_t RGBData::G`

Definition at line 7 of file RGBSlave.h.

#### 6.4.2.3 R

```
uint8_t RGBData::R
```

Definition at line 7 of file RGBSlave.h.

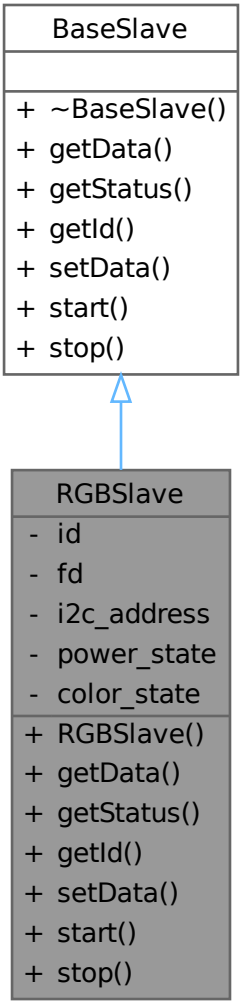
The documentation for this struct was generated from the following file:

- include/RGBSlave.h

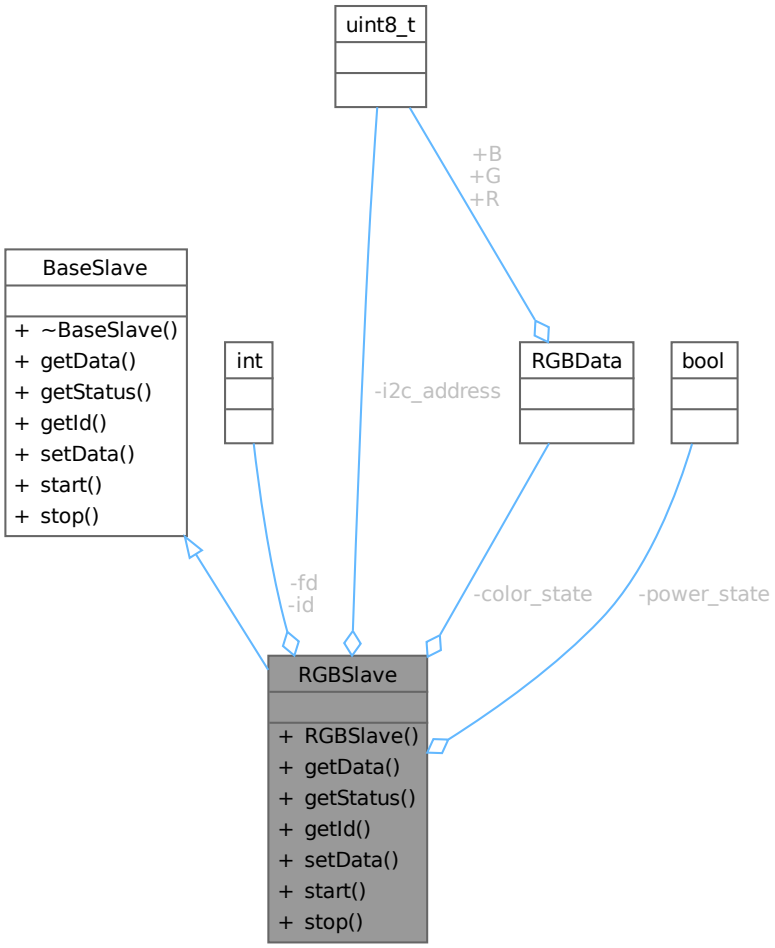
## 6.5 RGBSlave Class Reference

```
#include <RGBSlave.h>
```

Inheritance diagram for RGBSlave:



Collaboration diagram for RGBSlave:




### Public Member Functions

- RGBSlave (uint8_t id, uint8_t i2c_address)
- void * getData ()
- bool getStatus ()
- int getId ()
- void setData (void *data)
- void start (int i2c_fd)
- void stop ()

## Public Member Functions inherited from BaseSlave

- virtual ~BaseSlave ()=default

**Private Attributes**

- int id
- int fd
- uint8_t i2c_address
- bool power_state
- RGBData color_state

### 6.5.1 Detailed Description

Definition at line 10 of file RGBSlave.h.

### 6.5.2 Constructor & Destructor Documentation

#### 6.5.2.1 RGBSlave()

```
RGBSlave::RGBSlave (
            uint8_t id,
            uint8_t i2c_address )
```

Definition at line 3 of file RGBSlave.cpp.

### 6.5.3 Member Function Documentation

#### 6.5.3.1 getData()

```
void * RGBSlave::getData ( )  [virtual]
```

Implements BaseSlave.

Definition at line 5 of file RGBSlave.cpp.

#### 6.5.3.2 getId()

```
int RGBSlave::getId ( )  [virtual]
```

Implements BaseSlave.

Definition at line 28 of file RGBSlave.cpp.

#### 6.5.3.3 getStatus()

```
bool RGBSlave::getStatus ( )  [virtual]
```

Implements BaseSlave.

Definition at line 19 of file RGBSlave.cpp.

#### 6.5.3.4 setData()

```
void RGBSlave::setData (
            void * data )  [virtual]
```

Implements BaseSlave.

Definition at line 30 of file RGBSlave.cpp.

#### 6.5.3.5 start()

```
void RGBSlave::start (
            int i2c_fd )  [virtual]
```

Implements BaseSlave.

Definition at line 41 of file RGBSlave.cpp.

#### 6.5.3.6 stop()

```
void RGBSlave::stop ( )  [virtual]
```

Implements BaseSlave.

Definition at line 43 of file RGBSlave.cpp.

### 6.5.4 Member Data Documentation

#### 6.5.4.1 color_state

```
RGBData RGBSlave::color_state  [private]
```

Definition at line 26 of file RGBSlave.h.

#### 6.5.4.2 fd

```
int RGBSlave::fd  [private]
```

Definition at line 22 of file RGBSlave.h.

#### 6.5.4.3 i2c_address

```
uint8_t RGBSlave::i2c_address  [private]
```

Definition at line 23 of file RGBSlave.h.

#### 6.5.4.4 id

```
int RGBSlave::id  [private]
```

Definition at line 21 of file RGBSlave.h.

#### 6.5.4.5 power_state

```
bool RGBSlave::power_state  [private]
```

Definition at line 25 of file RGBSlave.h.

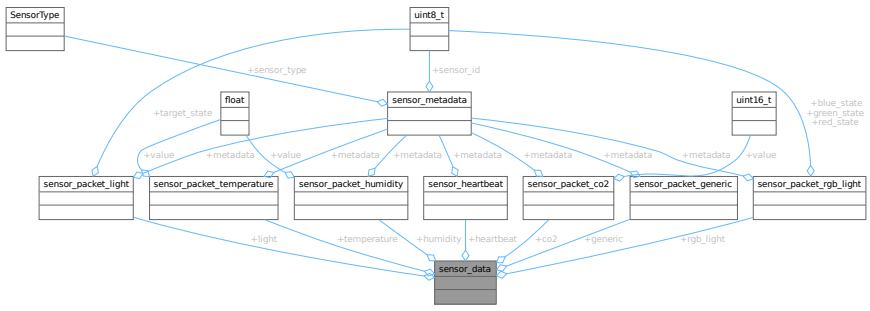
The documentation for this class was generated from the following files:

- include/RGBSlave.h
- src/RGBSlave.cpp

## 6.6 sensor_data Union Reference

```
#include <packets.h>
```

Collaboration diagram for sensor_data:




### Public Attributes

- struct sensor_heartbeat heartbeat
- struct sensor_packet_generic generic
- struct sensor_packet_temperature temperature
- struct sensor_packet_co2 co2
- struct sensor_packet_humidity humidity
- struct sensor_packet_light light
- struct sensor_packet_rgb_light rgb_light

### 6.6.1 Detailed Description

Definition at line 4 of file packets.h.

### 6.6.2 Member Data Documentation

#### 6.6.2.1 co2

```
struct sensor_packet_co2 sensor_data::co2
```

Definition at line 8 of file packets.h.

#### 6.6.2.2 generic

```
struct sensor_packet_generic sensor_data::generic
```

Definition at line 6 of file packets.h.

#### 6.6.2.3 heartbeat

```
struct sensor_heartbeat sensor_data::heartbeat
```

Definition at line 5 of file packets.h.

#### 6.6.2.4 humidity

```
struct sensor_packet_humidity sensor_data::humidity
```

Definition at line 9 of file packets.h.

#### 6.6.2.5 light

```
struct sensor_packet_light sensor_data::light
```

Definition at line 10 of file packets.h.

#### 6.6.2.6 rgb_light

```
struct sensor_packet_rgb_light sensor_data::rgb_light
```

Definition at line 11 of file packets.h.

#### 6.6.2.7 temperature

```
struct sensor_packet_temperature sensor_data::temperature
```

Definition at line 7 of file packets.h.

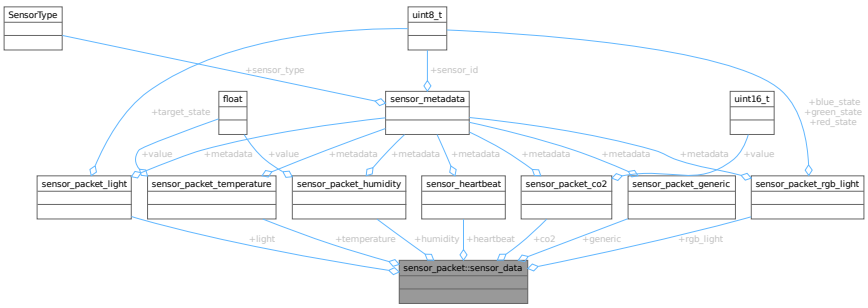
The documentation for this union was generated from the following file:

- include/packets.h

## 6.7 sensor_packet::sensor_data Union Reference

```
#include <packets.h>
```

Collaboration diagram for sensor_packet::sensor_data:




### Public Attributes

- struct sensor_heartbeat heartbeat
- struct sensor_packet_generic generic
- struct sensor_packet_temperature temperature
- struct sensor_packet_co2 co2
- struct sensor_packet_humidity humidity
- struct sensor_packet_light light
- struct sensor_packet_rgb_light rgb_light

### 6.7.1 Detailed Description

Definition at line 227 of file packets.h.

## 6.7.2 Member Data Documentation

### 6.7.2.1 co2

```
struct sensor_packet_co2 sensor_packet::sensor_data::co2
```

Definition at line 231 of file packets.h.

### 6.7.2.2 generic

```
struct sensor_packet_generic sensor_packet::sensor_data::generic
```

Definition at line 229 of file packets.h.

### 6.7.2.3 heartbeat

```
struct sensor_heartbeat sensor_packet::sensor_data::heartbeat
```

Definition at line 228 of file packets.h.

### 6.7.2.4 humidity

```
struct sensor_packet_humidity sensor_packet::sensor_data::humidity
```

Definition at line 232 of file packets.h.

### 6.7.2.5 light

```
struct sensor_packet_light sensor_packet::sensor_data::light
```

Definition at line 233 of file packets.h.

### 6.7.2.6 rgb_light

```
struct sensor_packet_rgb_light sensor_packet::sensor_data::rgb_light
```

Definition at line 234 of file packets.h.

### 6.7.2.7 temperature

```
struct sensor_packet_temperature sensor_packet::sensor_data::temperature
```

Definition at line 230 of file packets.h.

The documentation for this union was generated from the following file:

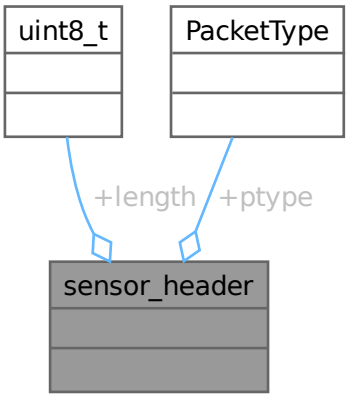
- include/packets.h

## 6.8 sensor_header Struct Reference

Header structure for sensor packets.

`#include <packets.h>`

Collaboration diagram for sensor_header:




### Public Attributes

- uint8_t length

  *Length of the packet excluding the header.*
- PacketType ptype

  *Type of the packet as PacketType (DATA, HEARTBEAT, etc.).*

### 6.8.1 Detailed Description

Header structure for sensor packets.

Definition at line 40 of file packets.h.

### 6.8.2 Member Data Documentation

#### 6.8.2.1 length

`uint8_t sensor_header::length`

Length of the packet excluding the header.

Definition at line 42 of file packets.h.

#### 6.8.2.2 ptype

```
PacketType sensor_header::ptype
```

Type of the packet as PacketType (DATA, HEARTBEAT, etc.).

Definition at line 44 of file packets.h.

The documentation for this struct was generated from the following file:

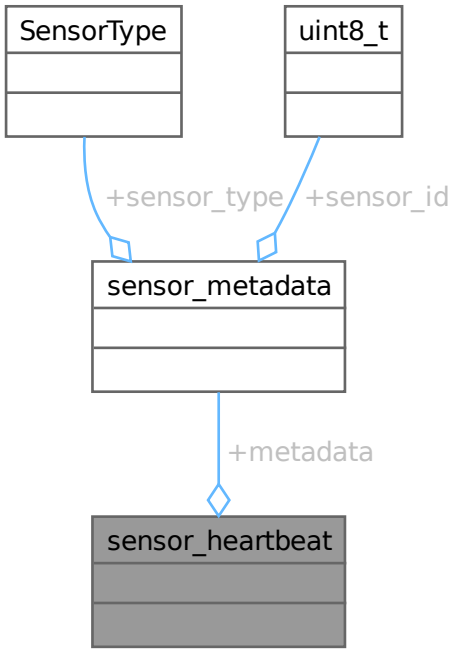
- include/packets.h

## 6.9 sensor_heartbeat Struct Reference

Structure for heartbeat packets.

```
#include <packets.h>
```

Collaboration diagram for sensor_heartbeat:




### Public Attributes

- struct sensor_metadata metadata

### 6.9.1 Detailed Description

Structure for heartbeat packets.

This structure contains the type and ID of the sensor being addressed. This structure is used for heartbeat packets sent by the sensors to indicate they are still alive.

Definition at line 69 of file packets.h.

### 6.9.2 Member Data Documentation

#### 6.9.2.1 metadata

```
struct sensor_metadata sensor_heartbeat::metadata
```

Definition at line 70 of file packets.h.

The documentation for this struct was generated from the following file:

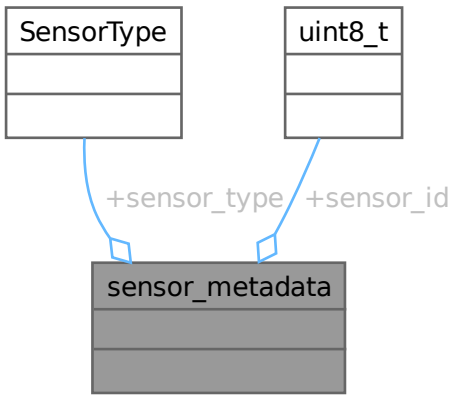
- include/packets.h

## 6.10 sensor_metadata Struct Reference

Structure for sensor metadata, which is always included in any packet.

```
#include <packets.h>
```

Collaboration diagram for sensor_metadata:



**Public Attributes**

- SensorType sensor_type
  *Type of the sensor being addressed as SensorType (one byte)*
- uint8_t sensor_id
  *ID of the sensor being addressed.*

### 6.10.1 Detailed Description

Structure for sensor metadata, which is always included in any packet.

Definition at line 52 of file packets.h.

### 6.10.2 Member Data Documentation

#### 6.10.2.1 sensor_id

```
uint8_t sensor_metadata::sensor_id
```

ID of the sensor being addressed.

Definition at line 56 of file packets.h.

#### 6.10.2.2 sensor_type

```
SensorType sensor_metadata::sensor_type
```

Type of the sensor being addressed as SensorType (one byte)

Definition at line 54 of file packets.h.

The documentation for this struct was generated from the following file:

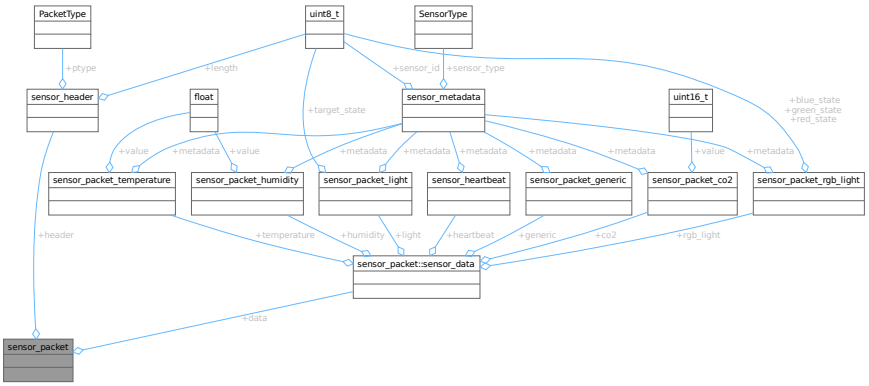
- include/packets.h

## 6.11 sensor_packet Struct Reference

Union structure for the entire sensor packet.

```
#include <packets.h>
```

Collaboration diagram for sensor_packet:



### Classes

- union sensor_data

### Public Attributes

- struct sensor_header header

  *Header of the packet containing length and type information.*
- union sensor_packet::sensor_data data

## 6.11.1 Detailed Description

Union structure for the entire sensor packet.

This structure is used to encapsulate the different types of sensor packets that can be sent and has the shape of a valid packet.

It contains a sensor_header followed by a union of different sensor data types. The union allows for different types of sensor data to be stored in the same memory location, depending on the packet type.

Example usage:
```
sensor_packet packet;
packet.header.length = sizeof(sensor_packet_generic);
packet.header.ptype = PacketType::DATA;
packet.data.generic.metadata.sensor_type = SensorType::BUTTON;
packet.data.generic.metadata.sensor_id = 1;

// Accessing the packet data
if (packet.header.ptype == PacketType::DATA) {
    if (packet.data.generic.metadata.sensor_type == SensorType::BUTTON) {
        uint8_t sensor_id = packet.data.generic.metadata.sensor_id;
        // Process button press event for sensor_id
    }
}
```

To use this structure to request data from the dashboard, you can set the ptype to DASHBOARD_GET to indicate that you want to request data from the backend (wemos bridge). Then, you use a sensor_packet_generic to specify the type of sensor you want to request data for and the ID of that sensor.

Example: We want to request temperature data from the backend (wemos bridge) for sensor ID 1.
```
sensor_packet packet;
packet.header.length = sizeof(sensor_packet_generic);
packet.header.ptype = PacketType::DASHBOARD_GET;
packet.data.generic.metadata.sensor_type = SensorType::TEMPERATURE;
packet.data.generic.metadata.sensor_id = 1;
```

The backend (wemos bridge) will then respond with a packet of type DASHBOARD_RESPONSE containing the requested data. Following the correct type packet for this example would be a sensor_packet_temperature.

Example: We want to change the color of an RGB light with ID 1 to red (255, 0, 0).
```
sensor_packet packet;
packet.header.length = sizeof(sensor_packet_rgb_light);
packet.header.ptype = PacketType::DASHBOARD_POST;
packet.data.rgb_light.metadata.sensor_type = SensorType::RGB_LIGHT;
packet.data.rgb_light.metadata.sensor_id = 1;
packet.data.rgb_light.red_state = 255;
packet.data.rgb_light.green_state = 0;
packet.data.rgb_light.blue_state = 0;
```

#### Note

The data field is a union that can hold different types of sensor data.

Definition at line 222 of file packets.h.

### 6.11.2 Member Data Documentation

#### 6.11.2.1 data

```
union sensor_packet::sensor_data sensor_packet::data
```

#### 6.11.2.2 header

```
struct sensor_header sensor_packet::header
```

Header of the packet containing length and type information.

Definition at line 224 of file packets.h.

The documentation for this struct was generated from the following file:

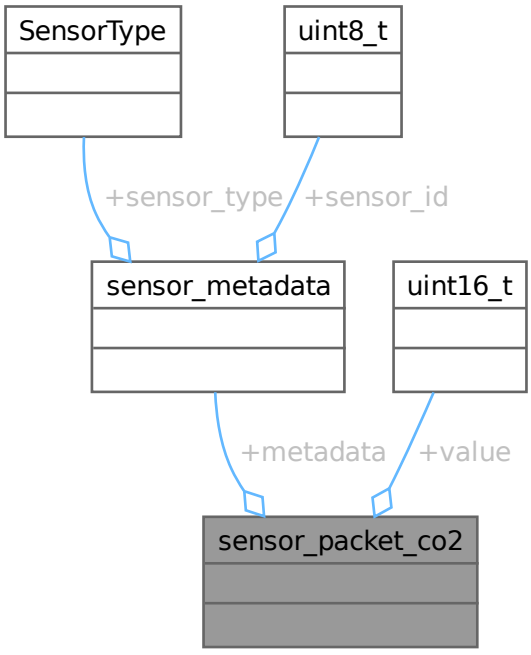
- include/packets.h

## 6.12 sensor_packet_co2 Struct Reference

Structure for CO2 sensor packets.

```
#include <packets.h>
```

Collaboration diagram for sensor_packet_co2:



**Public Attributes**

- struct sensor_metadata metadata
- uint16_t value

  *Value of the sensor reading the CO2 level represented in ppm.*

### 6.12.1 Detailed Description

Structure for CO2 sensor packets.

This structure contains the type, ID, and value of the CO2 sensor reading.

**Note**

The CO2 value is represented in parts per million (ppm).

Definition at line 107 of file packets.h.

### 6.12.2 Member Data Documentation

#### 6.12.2.1 metadata

```
struct sensor_metadata sensor_packet_co2::metadata
```

Definition at line 108 of file packets.h.

#### 6.12.2.2 value

```
uint16_t sensor_packet_co2::value
```

Value of the sensor reading the CO2 level represented in ppm.

Definition at line 110 of file packets.h.

The documentation for this struct was generated from the following file:

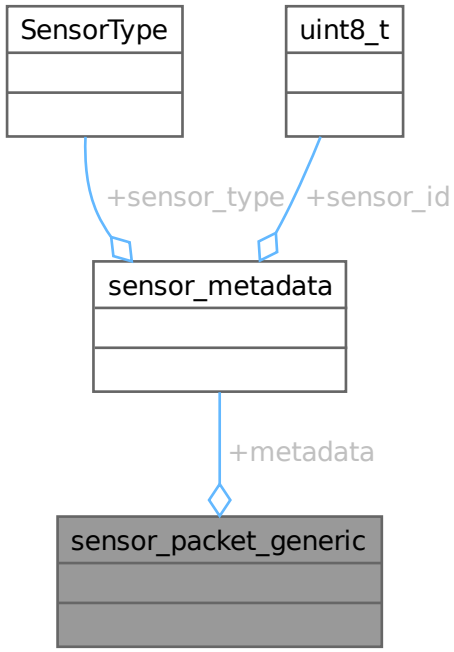
- include/packets.h

## 6.13 sensor_packet_generic Struct Reference

Structure for generic sensor packets.

`#include <packets.h>`

Collaboration diagram for sensor_packet_generic:




**Public Attributes**

- struct sensor_metadata metadata

### 6.13.1 Detailed Description

Structure for generic sensor packets.

This structure contains the type and ID of the sensor being addressed. This structure is used for generic sensor packets that do not require additional data. For example, it can be used for a simple button press event.

Definition at line 81 of file packets.h.

### 6.13.2 Member Data Documentation

#### 6.13.2.1 metadata

```
struct sensor_metadata sensor_packet_generic::metadata
```

Definition at line 82 of file packets.h.

The documentation for this struct was generated from the following file:

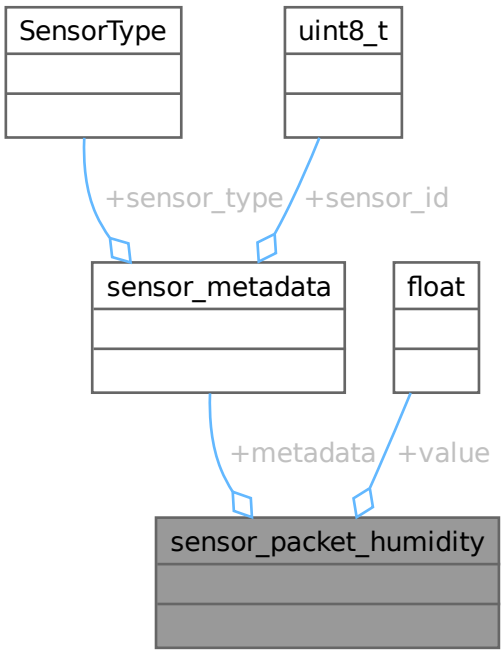
- include/packets.h

## 6.14 sensor_packet_humidity Struct Reference

Structure for humidity sensor packets.

```
#include <packets.h>
```

Collaboration diagram for sensor_packet_humidity:




**Public Attributes**

- struct sensor_metadata metadata
- float value

  *Value of the sensor reading the humidity level represented in percentage.*

### 6.14.1 Detailed Description

Structure for humidity sensor packets.

This structure contains the type, ID, and value of the humidity sensor reading.

**Note**

The humidity value is represented in percentage.

Definition at line 120 of file packets.h.

### 6.14.2 Member Data Documentation

#### 6.14.2.1 metadata

```
struct sensor_metadata sensor_packet_humidity::metadata
```

Definition at line 121 of file packets.h.

#### 6.14.2.2 value

```
float sensor_packet_humidity::value
```

Value of the sensor reading the humidity level represented in percentage.

Definition at line 123 of file packets.h.

The documentation for this struct was generated from the following file:

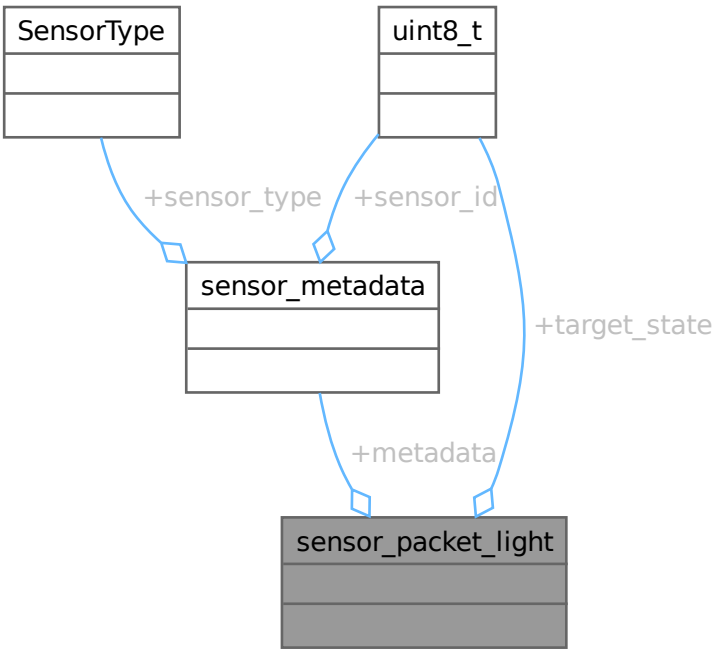
- include/packets.h

## 6.15 sensor_packet_light Struct Reference

Structure for light sensor packets.

```
#include <packets.h>
```

Collaboration diagram for sensor_packet_light:




**Public Attributes**

- struct sensor_metadata metadata
- uint8_t target_state

  *Target state of the light (on 1/off 0) represented as a boolean value.*

### 6.15.1 Detailed Description

Structure for light sensor packets.

This structure contains the type, ID, and target state of the light/led. This structure is used for light control packets sent to the light/led.

Definition at line 133 of file packets.h.

### 6.15.2 Member Data Documentation

#### 6.15.2.1 metadata

```
struct sensor_metadata sensor_packet_light::metadata
```

Definition at line 134 of file packets.h.

#### 6.15.2.2 target_state

`uint8_t sensor_packet_light::target_state`

Target state of the light (on 1/off 0) represented as a boolean value.

Definition at line 136 of file packets.h.

The documentation for this struct was generated from the following file:

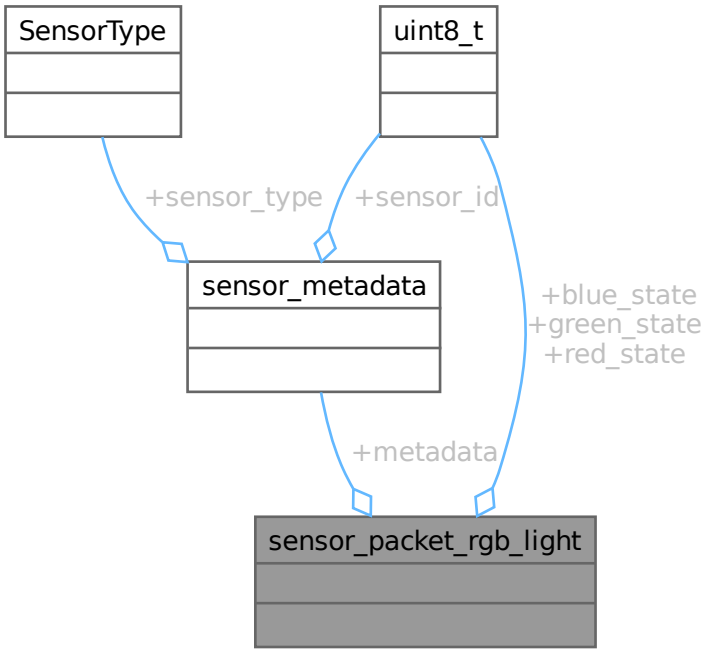
- include/packets.h

## 6.16 sensor_packet_rgb_light Struct Reference

Structure for RGB light sensor packets.

`#include <packets.h>`

Collaboration diagram for sensor_packet_rgb_light:




### Public Attributes

- struct sensor_metadata metadata
- uint8_t red_state

  *Target state of the red color (0-255) represented as an 8-bit integer.*
- uint8_t green_state

  *Target state of the green color (0-255) represented as an 8-bit integer.*
- uint8_t blue_state

  *Target state of the blue color (0-255) represented as an 8-bit integer.*

### 6.16.1 Detailed Description

Structure for RGB light sensor packets.

This structure contains the type, ID, and target color of the RGB light. This structure is used for RGB light control packets sent to the RGB light.

**Note**

The RGB values are represented as 8-bit integers (0-255).

Definition at line 147 of file packets.h.

### 6.16.2 Member Data Documentation

#### 6.16.2.1 blue_state

```
uint8_t sensor_packet_rgb_light::blue_state
```

Target state of the blue color (0-255) represented as an 8-bit integer.

Definition at line 154 of file packets.h.

#### 6.16.2.2 green_state

```
uint8_t sensor_packet_rgb_light::green_state
```

Target state of the green color (0-255) represented as an 8-bit integer.

Definition at line 152 of file packets.h.

#### 6.16.2.3 metadata

```
struct sensor_metadata sensor_packet_rgb_light::metadata
```

Definition at line 148 of file packets.h.

#### 6.16.2.4 red_state

```
uint8_t sensor_packet_rgb_light::red_state
```

Target state of the red color (0-255) represented as an 8-bit integer.

Definition at line 150 of file packets.h.

The documentation for this struct was generated from the following file:

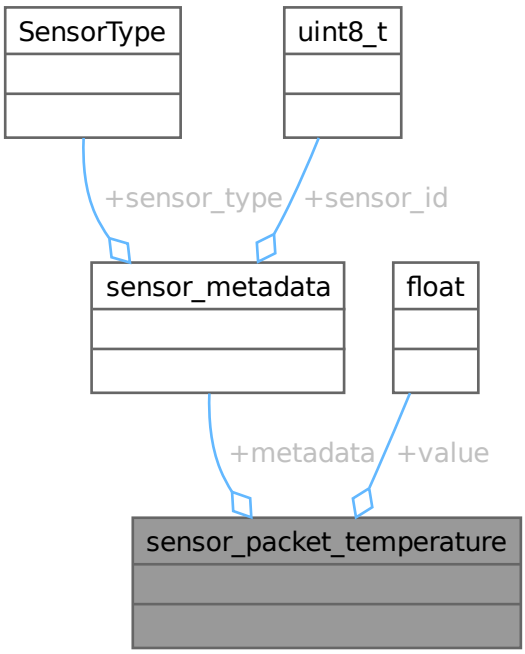
- include/packets.h

## 6.17 sensor_packet_temperature Struct Reference

Structure for temperature sensor packets.

`#include <packets.h>`

Collaboration diagram for sensor_packet_temperature:




### Public Attributes

- struct sensor_metadata metadata
- float value

  *Value of the sensor reading the temperature represented in Celcius.*

### 6.17.1 Detailed Description

Structure for temperature sensor packets.

This structure contains the type, ID, and value of the temperature sensor reading.

**Note**

The temperature value is represented in Celsius.

Definition at line 94 of file packets.h.

### 6.17.2 Member Data Documentation

#### 6.17.2.1 metadata

```
struct sensor_metadata sensor_packet_temperature::metadata
```

Definition at line 95 of file packets.h.

#### 6.17.2.2 value

```
float sensor_packet_temperature::value
```

Value of the sensor reading the temperature represented in Celcius.

Definition at line 97 of file packets.h.

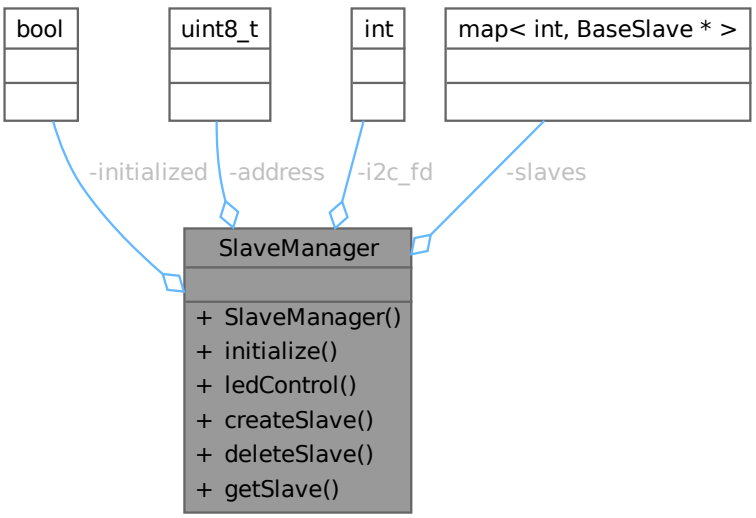
The documentation for this struct was generated from the following file:

- include/packets.h

## 6.18 SlaveManager Class Reference

```
#include <SlaveManager.h>
```

Collaboration diagram for SlaveManager:



### Public Member Functions

- SlaveManager ()
- void initialize ()

  *Setup the underlying I2C bus.*
- void ledControl (uint8_t led_number, uint8_t led_state)
- void createSlave (SensorType type, uint8_t id, int i2c_address)
- void deleteSlave (uint8_t id)

  *Unmaps the slave from the internal mapping.*
- BaseSlave * getSlave (int id)

  *Get a slavedevice with a given ID.*

### Private Attributes

- bool initialized = false
- uint8_t address = 0x01
- int i2c_fd = -1
- std::map< int, BaseSlave * > slaves

## 6.18.1 Detailed Description

Definition at line 9 of file SlaveManager.h.

## 6.18.2 Constructor & Destructor Documentation

### 6.18.2.1 SlaveManager()

```
SlaveManager::SlaveManager ( )
```

Definition at line 16 of file SlaveManager.cpp.

## 6.18.3 Member Function Documentation

### 6.18.3.1 createSlave()

```
void SlaveManager::createSlave (
            SensorType type,
            uint8_t id,
            int i2c_address )
```

Definition at line 31 of file SlaveManager.cpp.

### 6.18.3.2 deleteSlave()

```
void SlaveManager::deleteSlave (
            uint8_t id )
```

Unmaps the slave from the internal mapping.

**Parameters**

| | |
|---|---|
| *id* | The ID of the slave device to unmap |

Definition at line 48 of file SlaveManager.cpp.

#### 6.18.3.3 getSlave()

```
BaseSlave * SlaveManager::getSlave (
            int id )
```

Get a slavedevice with a given ID.

**Parameters**

| | |
|---|---|
| *id* | The ID of the slave device to retrieve |

Definition at line 57 of file SlaveManager.cpp.

#### 6.18.3.4 initialize()

```
void SlaveManager::initialize ( )
```

Setup the underlying I2C bus.

**Exceptions**

| | |
|---|---|
| *std__runtime_error* | if the I2C setup fails |

Definition at line 18 of file SlaveManager.cpp.

#### 6.18.3.5 ledControl()

```
void SlaveManager::ledControl (
            uint8_t led_number,
            uint8_t led_state )
```

Definition at line 29 of file SlaveManager.cpp.

### 6.18.4 Member Data Documentation

#### 6.18.4.1 address

```
uint8_t SlaveManager::address = 0x01  [private]
```

Definition at line 46 of file SlaveManager.h.

#### 6.18.4.2 i2c_fd

```
int SlaveManager::i2c_fd = -1  [private]
```

Definition at line 47 of file SlaveManager.h.

#### 6.18.4.3 initialized

```
bool SlaveManager::initialized = false  [private]
```

Definition at line 44 of file SlaveManager.h.

#### 6.18.4.4 slaves

```
std::map<int, BaseSlave*> SlaveManager::slaves  [private]
```

Definition at line 49 of file SlaveManager.h.

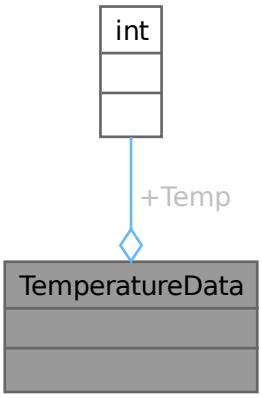
The documentation for this class was generated from the following files:

- include/SlaveManager.h
- src/SlaveManager.cpp

## 6.19 TemperatureData Struct Reference

```
#include <TemperatureSlave.h>
```

Collaboration diagram for TemperatureData:



**Public Attributes**

- int Temp

### 6.19.1 Detailed Description

Definition at line 6 of file TemperatureSlave.h.

### 6.19.2 Member Data Documentation

#### 6.19.2.1 Temp

```
int TemperatureData::Temp
```

Definition at line 7 of file TemperatureSlave.h.

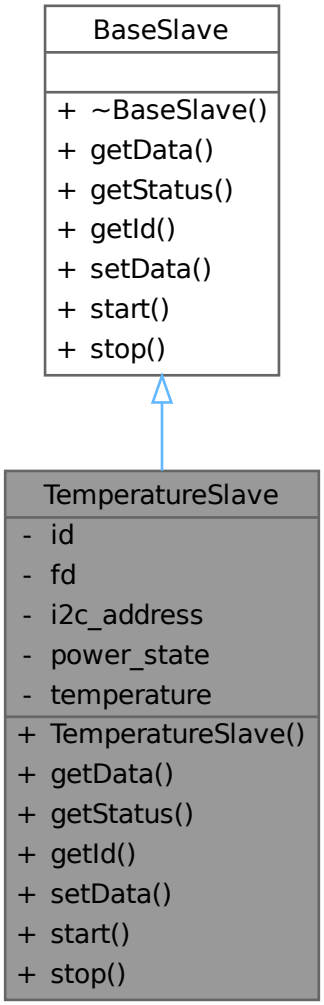
The documentation for this struct was generated from the following file:

- include/TemperatureSlave.h

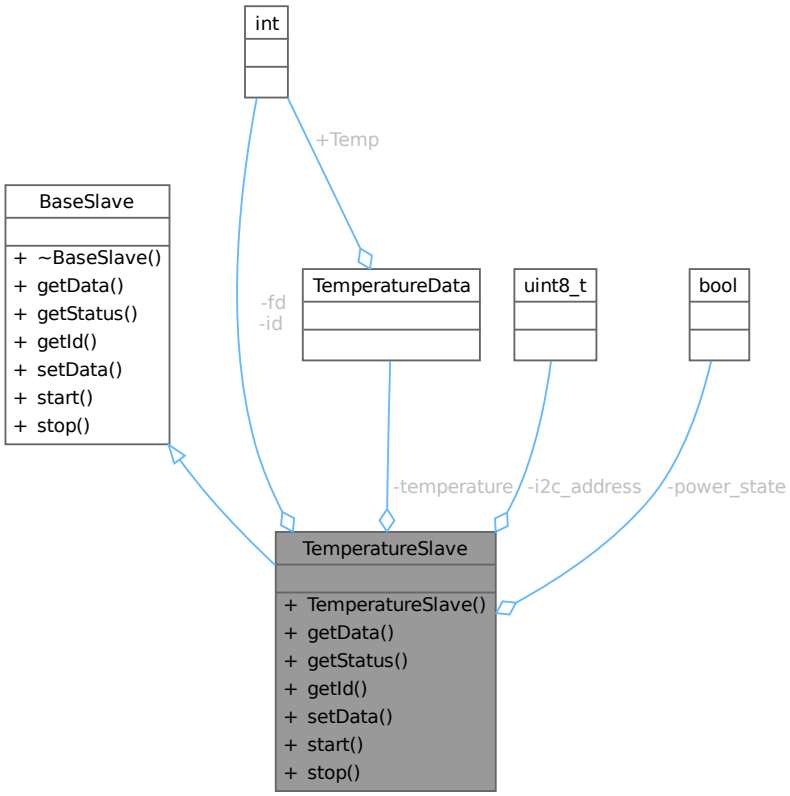
## 6.20 TemperatureSlave Class Reference

```
#include <TemperatureSlave.h>
```

Inheritance diagram for TemperatureSlave:



Collaboration diagram for TemperatureSlave:




### Public Member Functions

- TemperatureSlave (uint8_t id, uint8_t i2c_address)
- void * getData ()
- bool getStatus ()
- int getId ()
- void setData (void *data)
- void start (int i2c_fd)
- void stop ()

## Public Member Functions inherited from BaseSlave

- virtual ~BaseSlave ()=default

### Private Attributes

- int id
- int fd
- uint8_t i2c_address
- bool power_state
- TemperatureData temperature

### 6.20.1 Detailed Description

Definition at line 10 of file TemperatureSlave.h.

### 6.20.2 Constructor & Destructor Documentation

#### 6.20.2.1 TemperatureSlave()

```
TemperatureSlave::TemperatureSlave (
            uint8_t id,
            uint8_t i2c_address )
```

Definition at line 3 of file TemperatureSlave.cpp.

### 6.20.3 Member Function Documentation

#### 6.20.3.1 getData()

```
void * TemperatureSlave::getData ( )  [virtual]
```

Implements BaseSlave.

Definition at line 5 of file TemperatureSlave.cpp.

#### 6.20.3.2 getId()

```
int TemperatureSlave::getId ( )  [virtual]
```

Implements BaseSlave.

Definition at line 22 of file TemperatureSlave.cpp.

#### 6.20.3.3 getStatus()

```
bool TemperatureSlave::getStatus ( )  [virtual]
```

Implements BaseSlave.

Definition at line 13 of file TemperatureSlave.cpp.

#### 6.20.3.4 setData()

```
void TemperatureSlave::setData (
            void * data )  [virtual]
```

Implements BaseSlave.

Definition at line 24 of file TemperatureSlave.cpp.

#### 6.20.3.5 start()

```
void TemperatureSlave::start (
            int i2c_fd )  [virtual]
```

Implements BaseSlave.

Definition at line 31 of file TemperatureSlave.cpp.

#### 6.20.3.6 stop()

```
void TemperatureSlave::stop ( )  [virtual]
```

Implements BaseSlave.

Definition at line 33 of file TemperatureSlave.cpp.

### 6.20.4 Member Data Documentation

#### 6.20.4.1 fd

```
int TemperatureSlave::fd  [private]
```

Definition at line 22 of file TemperatureSlave.h.

#### 6.20.4.2 i2c_address

```
uint8_t TemperatureSlave::i2c_address  [private]
```

Definition at line 23 of file TemperatureSlave.h.

#### 6.20.4.3 id

```
int TemperatureSlave::id  [private]
```

Definition at line 21 of file TemperatureSlave.h.

#### 6.20.4.4 power_state

```
bool TemperatureSlave::power_state  [private]
```

Definition at line 25 of file TemperatureSlave.h.

#### 6.20.4.5 temperature

```
TemperatureData TemperatureSlave::temperature  [private]
```

Definition at line 26 of file TemperatureSlave.h.

The documentation for this class was generated from the following files:

- include/TemperatureSlave.h
- src/TemperatureSlave.cpp

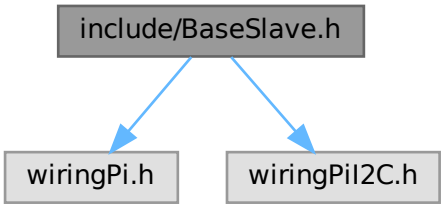
# Chapter 7

# File Documentation

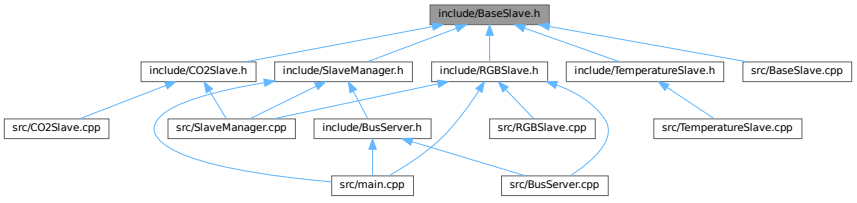
## 7.1 include/BaseSlave.h File Reference

```
#include <wiringPi.h>
#include <wiringPiI2C.h>
```

Include dependency graph for BaseSlave.h:




This graph shows which files directly or indirectly include this file:




### Classes

- class BaseSlave

## 7.2 BaseSlave.h

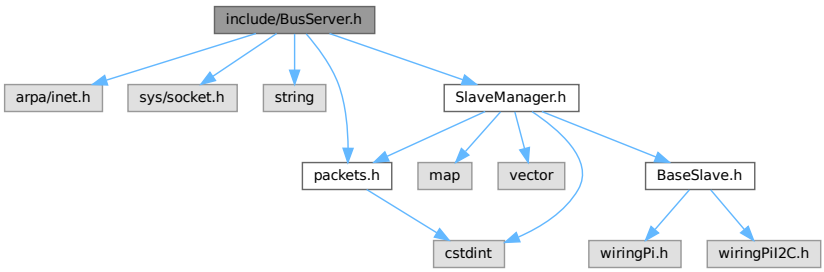
Go to the documentation of this file.

```
00001 #pragma once
00002
00003 #include <wiringPi.h>
00004 #include <wiringPiI2C.h>
00005
00006 class BaseSlave {
00007    public:
00008     virtual ~BaseSlave() = default;
00009     virtual void* getData() = 0;
00010     virtual bool getStatus() = 0;
00011     virtual int getId() = 0;
00012     virtual void setData(void* data) = 0;
00013     virtual void start(int i2c_fd) = 0;
00014     virtual void stop() = 0;
00015 };
```

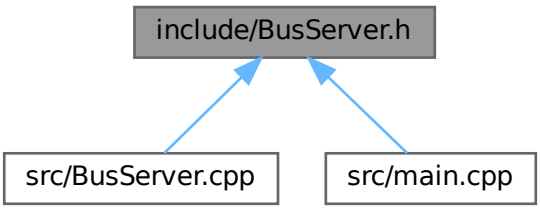
## 7.3 include/BusServer.h File Reference

```
#include <arpa/inet.h>
#include <sys/socket.h>
#include <string>
#include "SlaveManager.h"
#include "packets.h"
```

Include dependency graph for BusServer.h:




This graph shows which files directly or indirectly include this file:



### Classes

- class BusServer

### Macros

- #define BUFFER_SIZE 1024

## 7.3.1 Macro Definition Documentation

### 7.3.1.1 BUFFER_SIZE

```
#define BUFFER_SIZE 1024
```

Definition at line 10 of file BusServer.h.

# 7.4 BusServer.h

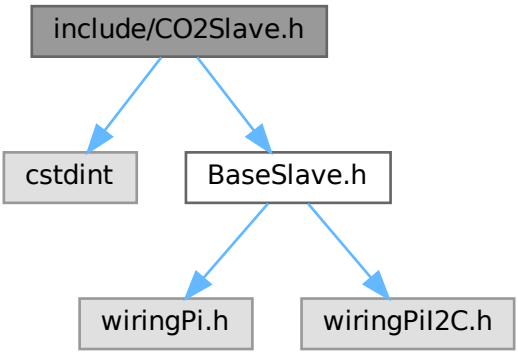
Go to the documentation of this file.

```
00001 #pragma once
00002 #include <arpa/inet.h>
00003 #include <sys/socket.h>
00004
00005 #include <string>
00006
00007 #include "SlaveManager.h"
00008 #include "packets.h"
00009
00010 #define BUFFER_SIZE 1024
00011
00012 class BusServer {
00013    public:
00014     BusServer() : listening_fd(-1) {}
00015
00025     void setup(std::string ip, int port);
00026
00031     void listen();
00032
00041     void send(struct sensor_packet* pkt, int fd);
00042
00048     void start();
00049
00050    private:
00051     int listening_fd;
00052
00053     struct sockaddr_in listening_address;
00054     bool wemos_bridge_connected = false;
00055     char buffer[BUFFER_SIZE];
00056
00057     SlaveManager slave_manager;
00058 };
```

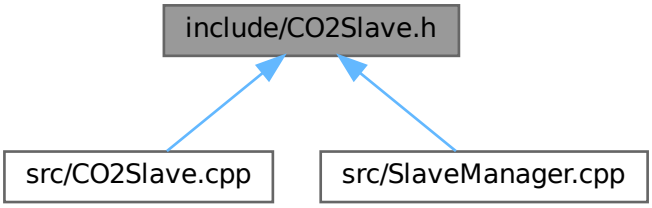
## 7.5 include/CO2Slave.h File Reference

```
#include <cstdint>
#include "BaseSlave.h"
```

Include dependency graph for CO2Slave.h:




This graph shows which files directly or indirectly include this file:




**Classes**

- class CO2Slave

## 7.6 CO2Slave.h

Go to the documentation of this file.

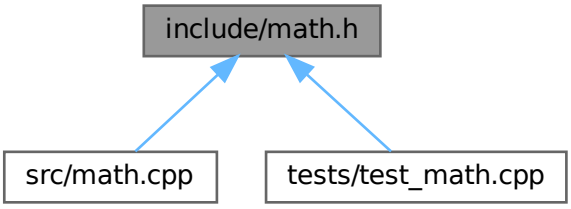
```
00001 #pragma once
00002 #include <cstdint>
00003
00004 #include "BaseSlave.h"
00005
```

```
00006 class CO2Slave : public BaseSlave {
00007    public:
00008     CO2Slave(uint8_t id, int i2c_address);
00009
00010     void* getData() override;
00011     bool getStatus() override;
00012     int getId() override;
00013     void setData(void* data) override;
00014     void start(int i2c_fd) override;
00015     void stop() override;
00016
00017    private:
00018     int id;
00019     int fd;
00020 };
```

## 7.7 include/math.h File Reference

Header file for math.cpp.

This graph shows which files directly or indirectly include this file:




### Functions

- int add (int a, int b)

  *Adds two integers.*
- int subtract (int a, int b)

  *Subtracts two integers.*

### 7.7.1 Detailed Description

Header file for math.cpp.

This file contains declarations for basic math operations.

**Author**

Daan Breur

Definition in file math.h.

### 7.7.2 Function Documentation

#### 7.7.2.1 add()

```
int add (
            int a,
            int b )
```

Adds two integers.

**Parameters**

| | |
|---|---|
| *a* | First integer. |
| *b* | Second integer. |

**Returns**

The sum of a and b.

This function takes two integers as input and returns their sum.

Definition at line 16 of file math.cpp.

#### 7.7.2.2 subtract()

```
int subtract (
            int a,
            int b )
```

Subtracts two integers.

**Parameters**

| | |
|---|---|
| *a* | First integer. |
| *b* | Second integer. |

**Returns**

The difference of a and b.

This function takes two integers as input and returns the result of subtracting b from a.

Definition at line 26 of file math.cpp.

## 7.8 math.h

Go to the documentation of this file.

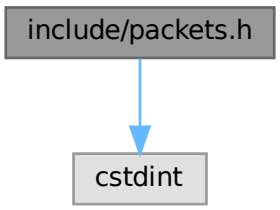
```
00001
```

```
00008 #ifndef MATH_H
00009 #define MATH_H
00010
00011 int add(int a, int b);
00012 int subtract(int a, int b);
00013
00014 #endif
```

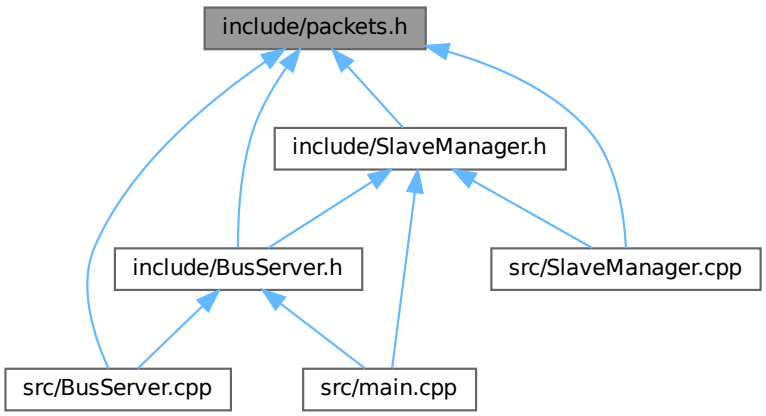
## 7.9 include/packets.h File Reference

Header file for packets.h.

`#include <cstdint>`
Include dependency graph for packets.h:




This graph shows which files directly or indirectly include this file:




### Classes

- struct sensor_header

*Header structure for sensor packets.*

- struct sensor_metadata

  *Structure for sensor metadata, which is always included in any packet.*
- struct sensor_heartbeat

  *Structure for heartbeat packets.*
- struct sensor_packet_generic

  *Structure for generic sensor packets.*
- struct sensor_packet_temperature

  *Structure for temperature sensor packets.*
- struct sensor_packet_co2

  *Structure for CO2 sensor packets.*
- struct sensor_packet_humidity

  *Structure for humidity sensor packets.*
- struct sensor_packet_light

  *Structure for light sensor packets.*
- struct sensor_packet_rgb_light

  *Structure for RGB light sensor packets.*
- struct sensor_packet

  *Union structure for the entire sensor packet.*
- union sensor_packet::sensor_data

- union sensor_data

## Enumerations

- enum class SensorType : uint8_t {
  NOOP = 0 , BUTTON = 1 , TEMPERATURE = 2 , CO2 = 3 ,
  HUMIDITY = 4 , PRESSURE = 5 , LIGHT = 6 , MOTION = 7 ,
  RGB_LIGHT = 8 }
- enum class PacketType : uint8_t {
  DATA = 0 , HEARTBEAT = 1 , DASHBOARD_POST = 2 , DASHBOARD_GET = 3 ,
  DASHBOARD_RESPONSE = 4 }

## Functions

- struct sensor_header __attribute__ ((packed))

## Variables

- uint8_t length

  *Length of the packet excluding the header.*
- PacketType ptype

  *Type of the packet as PacketType (DATA, HEARTBEAT, etc.).*
- SensorType sensor_type

  *Type of the sensor being addressed as SensorType (one byte)*
- uint8_t sensor_id

  *ID of the sensor being addressed.*

- struct sensor_metadata metadata
- float value

  *Value of the sensor reading the temperature represented in Celcius.*
- uint8_t target_state

  *Target state of the light (on 1/off 0) represented as a boolean value.*
- uint8_t red_state

  *Target state of the red color (0-255) represented as an 8-bit integer.*
- uint8_t green_state

  *Target state of the green color (0-255) represented as an 8-bit integer.*
- uint8_t blue_state

  *Target state of the blue color (0-255) represented as an 8-bit integer.*
- struct sensor_header header

  *Header of the packet containing length and type information.*
- union sensor_data data

### 7.9.1 Detailed Description

Header file for packets.h.

This files origin is from the Wemos project

**Warning**

THIS FILE MUST BE KEPT IN SYNC IN OTHER PROJECTS

**Author**

Daan Breur

Erynn Scholtes

Definition in file packets.h.

### 7.9.2 Enumeration Type Documentation

#### 7.9.2.1 PacketType

```
enum class PacketType :  uint8_t  [strong]
```

**Enumerator**

| | |
|---|---|
| DATA | |
| HEARTBEAT | |
| DASHBOARD_POST | |
| DASHBOARD_GET | |
| DASHBOARD_RESPONSE | |

Definition at line 27 of file packets.h.

#### 7.9.2.2 SensorType

```
enum class SensorType :  uint8_t  [strong]
```

**Enumerator**

| | |
|---|---|
| NOOP | |
| BUTTON | |
| TEMPERATURE | |
| CO2 | |
| HUMIDITY | |
| PRESSURE | |
| LIGHT | |
| MOTION | |
| RGB_LIGHT | |

Definition at line 15 of file packets.h.

### 7.9.3 Function Documentation

#### 7.9.3.1 __attribute__()

```
struct sensor_header __attribute__ (
             (packed)  )
```

### 7.9.4 Variable Documentation

#### 7.9.4.1 blue_state

```
uint8_t blue_state
```

Target state of the blue color (0-255) represented as an 8-bit integer.

Definition at line 6 of file packets.h.

#### 7.9.4.2 data

```
union sensor_data data
```

#### 7.9.4.3 green_state

```
uint8_t green_state
```

Target state of the green color (0-255) represented as an 8-bit integer.

Definition at line 4 of file packets.h.

#### 7.9.4.4 header

```
struct sensor_header header
```

Header of the packet containing length and type information.

Definition at line 1 of file packets.h.

#### 7.9.4.5 length

```
uint8_t length
```

Length of the packet excluding the header.

Definition at line 1 of file packets.h.

#### 7.9.4.6 metadata

```
struct sensor_metadata metadata
```

Definition at line 0 of file packets.h.

#### 7.9.4.7 ptype

```
PacketType ptype
```

Type of the packet as PacketType (DATA, HEARTBEAT, etc.).

Definition at line 3 of file packets.h.

#### 7.9.4.8 red_state

```
uint8_t red_state
```

Target state of the red color (0-255) represented as an 8-bit integer.

Definition at line 2 of file packets.h.

#### 7.9.4.9 sensor_id

```
uint8_t sensor_id
```

ID of the sensor being addressed.

Definition at line 3 of file packets.h.

#### 7.9.4.10 sensor_type

```
SensorType sensor_type
```

Type of the sensor being addressed as SensorType (one byte)

Definition at line 1 of file packets.h.

#### 7.9.4.11 target_state

```
uint8_t target_state
```

Target state of the light (on 1/off 0) represented as a boolean value.

Definition at line 2 of file packets.h.

#### 7.9.4.12 value

```
float value
```

Value of the sensor reading the temperature represented in Celcius.

Value of the sensor reading the humidity level represented in percentage.

Value of the sensor reading the CO2 level represented in ppm.

Definition at line 2 of file packets.h.

## 7.10 packets.h

Go to the documentation of this file.

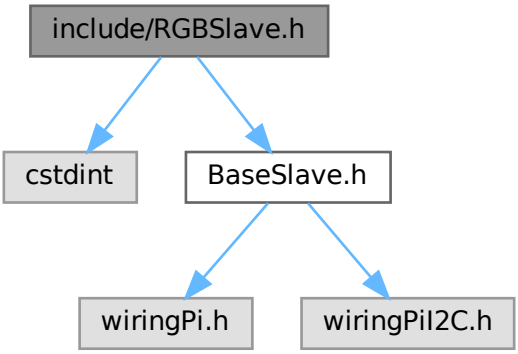
```
00001
00010 #ifndef PACKETS_H
00011 #define PACKETS_H
00012
00013 #include <cstdint>
00014
00015 enum class SensorType : uint8_t {
00016     NOOP = 0,
00017     BUTTON = 1,
00018     TEMPERATURE = 2,
00019     CO2 = 3,
00020     HUMIDITY = 4,
00021     PRESSURE = 5,
00022     LIGHT = 6,
00023     MOTION = 7,
00024     RGB_LIGHT = 8,
00025 };
00026
00027 enum class PacketType : uint8_t {
00028     DATA = 0,
00029     HEARTBEAT = 1,
00030     DASHBOARD_POST = 2,
00031     DASHBOARD_GET = 3,
00032     DASHBOARD_RESPONSE = 4
00033 };
00034
00040 struct sensor_header {
00042     uint8_t length;
00044     PacketType ptype;
00045 } __attribute__((packed));
00046
00052 struct sensor_metadata {
```

```
00054     SensorType sensor_type;
00056     uint8_t sensor_id;
00057 } __attribute__((packed));
00058
00059 // Specific packet structures (ensure alignment/packing matches expected format)
00060
00069 struct sensor_heartbeat {
00070     struct sensor_metadata metadata;
00071 } __attribute__((packed));
00072
00081 struct sensor_packet_generic {
00082     struct sensor_metadata metadata;
00083     // /** @brief Whether the sensor did or did not trigger */
00084     // bool value;
00085 } __attribute__((packed));
00086
00094 struct sensor_packet_temperature {
00095     struct sensor_metadata metadata;
00097     float value;
00098 } __attribute__((packed));
00099
00107 struct sensor_packet_co2 {
00108     struct sensor_metadata metadata;
00110     uint16_t value;
00111 } __attribute__((packed));
00112
00120 struct sensor_packet_humidity {
00121     struct sensor_metadata metadata;
00123     float value;
00124 } __attribute__((packed));
00125
00133 struct sensor_packet_light {
00134     struct sensor_metadata metadata;
00136     uint8_t target_state;
00137 } __attribute__((packed));
00138
00147 struct sensor_packet_rgb_light {
00148     struct sensor_metadata metadata;
00150     uint8_t red_state;
00152     uint8_t green_state;
00154     uint8_t blue_state;
00155 } __attribute__((packed));
00156 // --- End Structures ---
00157
00222 struct sensor_packet {
00224     struct sensor_header header;
00225
00227     union sensor_data {
00228         struct sensor_heartbeat heartbeat;
00229         struct sensor_packet_generic generic;
00230         struct sensor_packet_temperature temperature;
00231         struct sensor_packet_co2 co2;
00232         struct sensor_packet_humidity humidity;
00233         struct sensor_packet_light light;
00234         struct sensor_packet_rgb_light rgb_light;
00235     } data;
00236 } __attribute__((packed));
00237
00238 #endif  // PACKETS_H
```

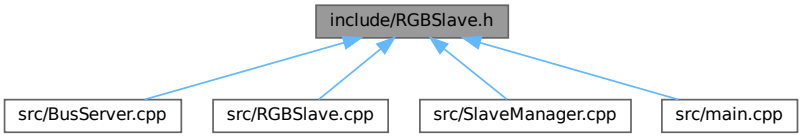
## 7.11 include/RGBSlave.h File Reference

```
#include <cstdint>
#include "BaseSlave.h"
```

Include dependency graph for RGBSlave.h:




This graph shows which files directly or indirectly include this file:




### Classes

- struct RGBData
- class RGBSlave

### Functions

- struct RGBData __attribute__ ((packed))

### Variables

- uint8_t R
- uint8_t G
- uint8_t B
- RGBSlave __attribute__

### 7.11.1 Function Documentation

#### 7.11.1.1 __attribute__()

```
struct RGBData __attribute__ (
             (packed)  )
```

### 7.11.2 Variable Documentation

#### 7.11.2.1 __attribute__

```
struct sensor_packet __attribute__
```

#### 7.11.2.2 B

```
uint8_t B
```

Definition at line 0 of file RGBSlave.h.

#### 7.11.2.3 G

```
uint8_t G
```

Definition at line 0 of file RGBSlave.h.

#### 7.11.2.4 R

```
uint8_t R
```

Definition at line 0 of file RGBSlave.h.

## 7.12 RGBSlave.h

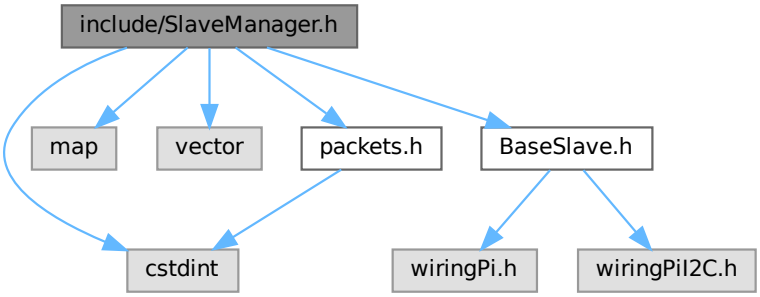
Go to the documentation of this file.

```
00001 #pragma once
00002 #include <cstdint>
00003
00004 #include "BaseSlave.h"
00005
00006 struct RGBData {
00007     uint8_t R, G, B;
00008 } __attribute__((packed));
00009
00010 class RGBSlave : public BaseSlave {
00011    public:
00012     RGBSlave(uint8_t id, uint8_t i2c_address);
00013     void* getData();
00014     bool getStatus();
00015     int getId();
00016     void setData(void* data);
00017     void start(int i2c_fd);
00018     void stop();
00019
00020    private:
00021     int id;
00022     int fd;
00023     uint8_t i2c_address;
00024
00025     bool power_state;
00026     RGBData color_state;
00027 };
```

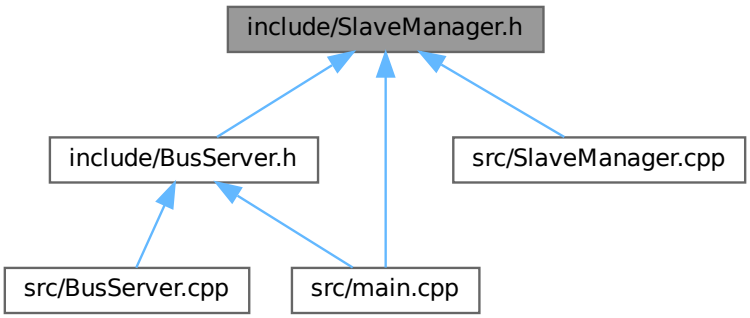
## 7.13 include/SlaveManager.h File Reference

```
#include <cstdint>
#include <map>
#include <vector>
#include "BaseSlave.h"
#include "packets.h"
```

Include dependency graph for SlaveManager.h:




This graph shows which files directly or indirectly include this file:




**Classes**

- class SlaveManager

## 7.14 SlaveManager.h

Go to the documentation of this file.

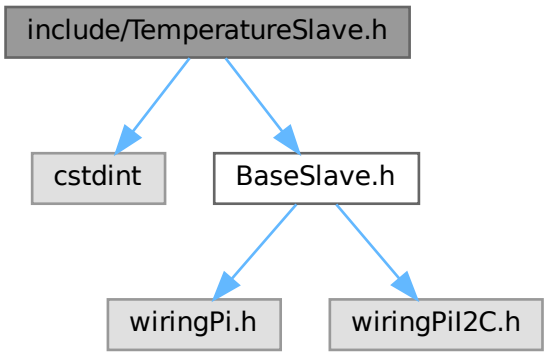
```
00001 #pragma once
```

```
00002 #include <cstdint>
00003 #include <map>
00004 #include <vector>
00005
00006 #include "BaseSlave.h"
00007 #include "packets.h"
00008
00009 class SlaveManager {
00010    public:
00011     SlaveManager();
00012
00017     void initialize();
00018
00019     void ledControl(uint8_t led_number, uint8_t led_state);
00020
00021     /*
00022      * @brief Creates a new slave device into the internal mapping
00023      * @details Assigns a pre-known SensorType and ID to an I2C device, and then opens the I2C
00024      * connection to it
00025      * @param type The SensorType of the sensor, as defined in packets.h
00026      * @param id The ID of the slave device
00027      * @param i2c_address The I2C address of the slave device
00028      */
00029     void createSlave(SensorType type, uint8_t id, int i2c_address);
00030
00035     void deleteSlave(uint8_t id);
00036
00041     BaseSlave* getSlave(int id);
00042
00043    private:
00044     bool initialized = false;
00045
00046     uint8_t address = 0x01;
00047     int i2c_fd = -1;
00048
00049     std::map<int, BaseSlave*> slaves;  // maps ID to BaseSlave ptr
00050 };
```

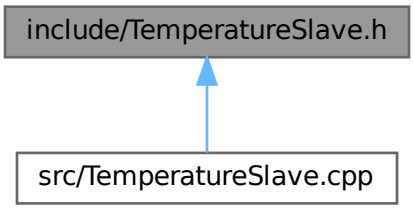
## 7.15 include/TemperatureSlave.h File Reference

```
#include <cstdint>
#include "BaseSlave.h"
```

Include dependency graph for TemperatureSlave.h:



This graph shows which files directly or indirectly include this file:




### Classes

- struct TemperatureData
- class TemperatureSlave

### Functions

- struct TemperatureData __attribute__ ((packed))

### Variables

- int Temp
- TemperatureSlave __attribute__

## 7.15.1 Function Documentation

### 7.15.1.1 __attribute__()

```
struct TemperatureData __attribute__ (
            (packed)  )
```

## 7.15.2 Variable Documentation

### 7.15.2.1 __attribute__

```
TemperatureSlave __attribute__
```

### 7.15.2.2 Temp

```
int Temp
```

Definition at line 0 of file TemperatureSlave.h.

## 7.16 TemperatureSlave.h

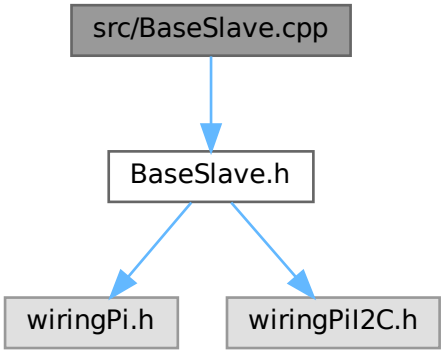
Go to the documentation of this file.

```
00001 #pragma once
00002 #include <cstdint>
00003
00004 #include "BaseSlave.h"
00005
00006 struct TemperatureData {
00007     int Temp;
00008 } __attribute__((packed));
00009
00010 class TemperatureSlave : public BaseSlave {
00011    public:
00012     TemperatureSlave(uint8_t id, uint8_t i2c_address);
00013     void* getData();
00014     bool getStatus();
00015     int getId();
00016     void setData(void* data);
00017     void start(int i2c_fd);
00018     void stop();
00019
00020    private:
00021     int id;
00022     int fd;
00023     uint8_t i2c_address;
00024
00025     bool power_state;
00026     TemperatureData temperature;
00027 };
```

## 7.17 README.md File Reference

## 7.18 src/BaseSlave.cpp File Reference

`#include "BaseSlave.h"`
Include dependency graph for BaseSlave.cpp:




## 7.19 BaseSlave.cpp

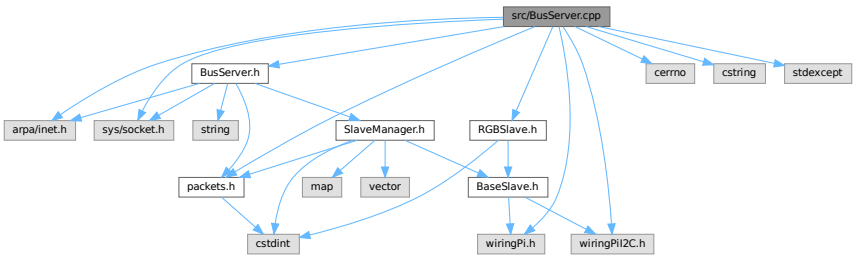
Go to the documentation of this file.

```
00001 #include "BaseSlave.h"
```

## 7.20 src/BusServer.cpp File Reference

```
#include "BusServer.h"
#include <arpa/inet.h>
#include <sys/socket.h>
#include <cerrno>
#include <cstring>
#include <stdexcept>
#include "RGBSlave.h"
#include "packets.h"
#include "wiringPi.h"
#include "wiringPiI2C.h"
```

Include dependency graph for BusServer.cpp:




### Macros

- #define RGB_SLAVE_ADDRESS 0x42

### 7.20.1 Macro Definition Documentation

#### 7.20.1.1 RGB_SLAVE_ADDRESS

```
#define RGB_SLAVE_ADDRESS 0x42
```

Definition at line 15 of file BusServer.cpp.

## 7.21 BusServer.cpp

Go to the documentation of this file.

```
00001 #include "BusServer.h"
00002
00003 #include <arpa/inet.h>
00004 #include <sys/socket.h>
00005
00006 #include <cerrno>
00007 #include <cstring>
00008 #include <stdexcept>
00009
00010 #include "RGBSlave.h"
00011 #include "packets.h"
00012 #include "wiringPi.h"
00013 #include "wiringPiI2C.h"
00014
00015 #define RGB_SLAVE_ADDRESS 0x42
```

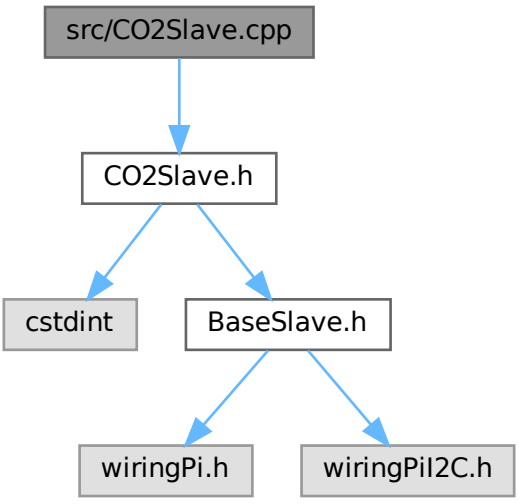
```
00016
00017 void BusServer::setup(std::string ip, int port) {
00018     // slave_manager.initialize();
00019
00020     memset(&listening_address, 0, sizeof(listening_address));
00021
00022     if (port <= 0 || port > 65535) {
00023         throw std::invalid_argument("invalid port passed");
00024     }
00025
00026     if (0 == inet_aton(ip.c_str(), &listening_address.sin_addr)) {
00027         perror("inet_aton()");
00028         throw std::invalid_argument("invalid IP address passed");
00029     }
00030
00031     listening_address.sin_family = AF_INET;
00032     listening_address.sin_port = htons(port);
00033
00034     listening_fd = socket(AF_INET, SOCK_STREAM, 0);
00035     if (-1 == listening_fd) {
00036         perror("socket()");
00037         throw std::runtime_error("failed to create socket");
00038     }
00039
00040     {
00041         int one = 1;
00042         if (-1 ==
00043             setsockopt(listening_fd, SOL_SOCKET, SO_REUSEADDR | SO_REUSEPORT, &one, sizeof(one))) {
00044             perror("setsockopt()");
00045             throw std::runtime_error("failed to set socket options");
00046         }
00047     }
00048
00049     socklen_t len = sizeof(listening_address);
00050
00051     if (-1 == bind(listening_fd, (struct sockaddr*)&listening_address, len)) {
00052         perror("bind()");
00053         throw std::runtime_error("failed to bind socket");
00054     }
00055 }
00056
00057 void BusServer::listen() {
00058     if (-1 == ::listen(listening_fd, 8)) {
00059         perror("listen()");
00060         throw std::runtime_error("failed to listen on socket");
00061     }
00062 }
00063
00064 void BusServer::send(struct sensor_packet* packet_ptr, int fd) {
00065     if (!wemos_bridge_connected) {
00066         throw std::runtime_error("no longer connected to socket");
00067     }
00068     if (-1 == ::send(fd, packet_ptr, sizeof(struct sensor_header) + packet_ptr->header.length, 0)) {
00069         perror("send()");
00070         throw std::runtime_error("failed to send on socket");
00071     }
00072 }
00073
00074 void BusServer::start() {
00075     // start off by mapping pre-known addresses to ID's
00076     slave_manager.createSlave(SensorType::RGB_LIGHT, 128, RGB_SLAVE_ADDRESS);
00077
00078     listen();
00079
00080     while (true) {
00081         char buffer[32] = {0};
00082         bool net_request = false;
00083
00084         {
00085             struct sockaddr_in client_address = {0};
00086             socklen_t client_address_length;
00087
00088             int new_fd = accept4(listening_fd, (struct sockaddr*)&client_address,
00089                                  &client_address_length, SOCK_NONBLOCK);
00090
00091             if (-1 == new_fd) {
00092                 int err = errno;
00093                 switch (err) {
00094                     case EWOULDBLOCK:
00095                         // no client has tried to connect; no big deal
00096                         break;
00097
00098                     default:
00099                         perror("accept4()");
00100                         throw std::runtime_error("accept4() failed");
00101                         break;
00102                 }
```

```
00103             } else {
00104                 if (-1 == recv(new_fd, buffer, sizeof(buffer), 0)) {
00105                     int err = errno;
00106                     perror("recv()");
00107                     throw std::runtime_error("reading from client socket failed for some reason");
00108                 } else {
00109                     net_request = true;
00110                 }
00111             }
00112         }
00113 
00114         if (net_request) {
00115             struct sensor_packet* pkt_ptr = (struct sensor_packet*)buffer;
00116             BaseSlave* the_slave = slave_manager.getSlave(pkt_ptr->data.generic.metadata.sensor_id);
00117             uint8_t values[8] = {0};
00118 
00119             switch (pkt_ptr->header.ptype) {
00120                 case PacketType::DASHBOARD_POST:
00121                     switch (pkt_ptr->data.generic.metadata.sensor_type) {
00122                         case SensorType::LIGHT:
00123                             values[0] = pkt_ptr->data.light.target_state;
00124 
00125                             the_slave->setData(values);
00126                             break;
00127 
00128                         case SensorType::RGB_LIGHT:
00129                             struct RGBData rgb_data = {.on = 255,
00130                                                        .R = pkt_ptr->data.rgb_light.red_state,
00131                                                        .G = pkt_ptr->data.rgb_light.green_state,
00132                                                        .B = pkt_ptr->data.rgb_light.blue_state};
00133 
00134                             the_slave->setData(&rgb_data);
00135                             break;
00136                     }
00137                     break;
00138                 case PacketType::DASHBOARD_GET:
00139 
00140                     break;
00141             }
00142         }
00143     }
00144 }
```

## 7.22 src/CO2Slave.cpp File Reference

`#include "CO2Slave.h"`

Include dependency graph for CO2Slave.cpp:



## 7.23 CO2Slave.cpp

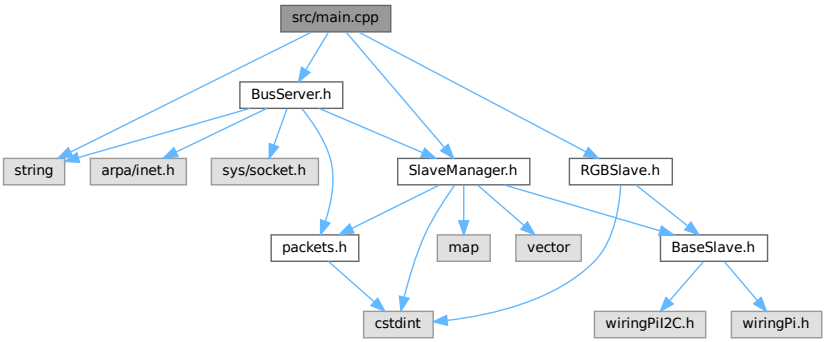
Go to the documentation of this file.

```
00001 #include "CO2Slave.h"
00002
00003 CO2Slave::CO2Slave(uint8_t id, int i2c_address) : id(id) {
00004     /*
00005      * Open I2C connection and save the FD in the 'fd' member variable
00006      */
00007 }
00008
00009 void* CO2Slave::getData() { return nullptr; }
00010
00011 bool CO2Slave::getStatus() { return nullptr; }
00012
00013 int CO2Slave::getId() { return id; }
00014
00015 void CO2Slave::setData(void* data) {}
00016
00017 void CO2Slave::start(int i2c_fd) {}
00018
00019 void CO2Slave::stop() {}
```

## 7.24 src/main.cpp File Reference

```
#include <string>
#include "BusServer.h"
#include "RGBSlave.h"
#include "SlaveManager.h"
```

Include dependency graph for main.cpp:




### Functions

- int main ()

### 7.24.1 Function Documentation

#### 7.24.1.1 main()

```
int main ( )
```

Definition at line 7 of file main.cpp.

## 7.25 main.cpp

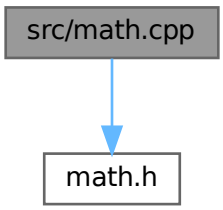
Go to the documentation of this file.

```
00001 #include <string>
00002
00003 #include "BusServer.h"
00004 #include "RGBSlave.h"
00005 #include "SlaveManager.h"
00006
00007 int main() {
00008     BusServer bus_server;
00009     SlaveManager slave_manager;
00010     sensor_packet_rgb_light packet;
00011     // packet.metadata.sensor_type = SensorType::RGB_LIGHT;
00012     // packet.metadata.sensor_id = 0x80;
00013     packet.red_state = 255;
00014     packet.green_state = 0;
00015     packet.blue_state = 100;
00016
00017     // bus_server.setup("0.0.0.0", 5000);
00018     // bus_server.start();
00019     slave_manager.initialize();
00020
00021     slave_manager.createSlave(SensorType::RGB_LIGHT, 0x80, 0x55);
00022     BaseSlave* base_slave = slave_manager.getSlave(0x80);
00023     RGBSlave* rgb_slave = dynamic_cast<RGBSlave*>(base_slave);
00024     rgb_slave->setData(&packet);
00025 }
```

## 7.26 src/math.cpp File Reference

Implementation of basic math operations.

`#include "math.h"`
Include dependency graph for math.cpp:




### Functions

- int add (int a, int b)

  *Adds two integers.*
- int subtract (int a, int b)

  *Subtracts two integers.*

### 7.26.1 Detailed Description

Implementation of basic math operations.

**Author**

Daan Breur

Definition in file math.cpp.

### 7.26.2 Function Documentation

#### 7.26.2.1 add()

```
int add (
            int a,
            int b )
```

Adds two integers.

**Parameters**

| | |
|---|---|
| *a* | First integer. |
| *b* | Second integer. |

**Returns**

The sum of a and b.

This function takes two integers as input and returns their sum.

Definition at line 16 of file math.cpp.

#### 7.26.2.2 subtract()

```
int subtract (
            int a,
            int b )
```

Subtracts two integers.

**Parameters**

| | |
|---|---|
| *a* | First integer. |
| *b* | Second integer. |

**Returns**

The difference of a and b.

This function takes two integers as input and returns the result of subtracting b from a.

Definition at line 26 of file math.cpp.

## 7.27 math.cpp

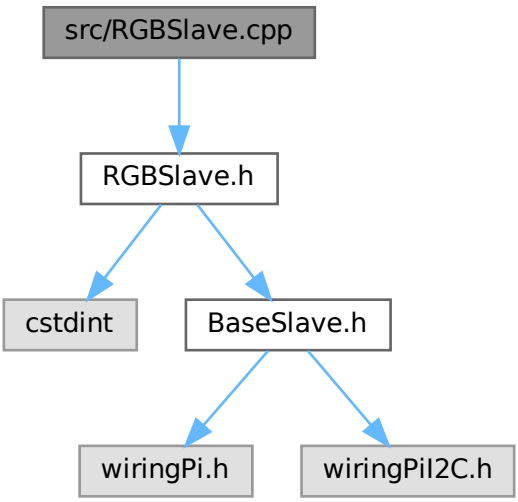
Go to the documentation of this file.

```
00001
00006 #include "math.h"
00007
00016 int add(int a, int b) { return a + b; }
00017
00026 int subtract(int a, int b) { return a - b; }
```

## 7.28 src/RGBSlave.cpp File Reference

```
#include "RGBSlave.h"
```

Include dependency graph for RGBSlave.cpp:




## 7.29 RGBSlave.cpp

Go to the documentation of this file.

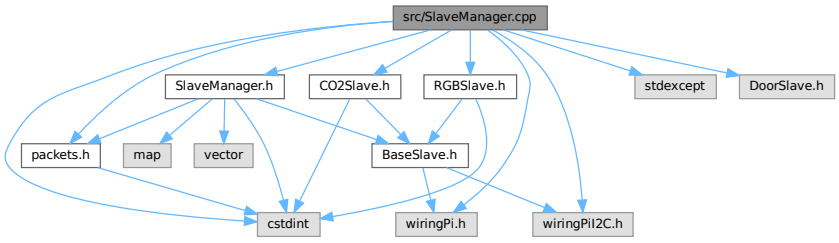
```
00001 #include "RGBSlave.h"
00002
00003 RGBSlave::RGBSlave(uint8_t id, uint8_t i2c_address) : id(id), i2c_address(i2c_address) {}
00004
```

```
00005 void* RGBSlave::getData() {
00006     uint8_t r, g, b;
00007 
00008     r = wiringPiI2CRead(fd);
00009     g = wiringPiI2CRead(fd);
00010     b = wiringPiI2CRead(fd);
00011 
00012     color_state.R = r;
00013     color_state.G = g;
00014     color_state.B = b;
00015 
00016     return;
00017 }
00018 
00019 bool RGBSlave::getStatus() {
00020     getData();
00021     if (color_state.R == 0 && color_state.G == 0 && color_state.B == 0) {
00022         return false;
00023     } else {
00024         return true;
00025     }
00026 }
00027 
00028 int RGBSlave::getId() { return id; }
00029 
00030 void RGBSlave::setData(void* data) {
00031     RGBData* rgb_data = (RGBData*)data;
00032     uint8_t r = rgb_data->R;
00033     uint8_t g = rgb_data->G;
00034     uint8_t b = rgb_data->B;
00035 
00036     wiringPiI2CWrite(fd, r);
00037     wiringPiI2CWrite(fd, g);
00038     wiringPiI2CWrite(fd, b);
00039 }
00040 
00041 void RGBSlave::start(int i2c_fd) { fd = i2c_fd; }
00042 
00043 void RGBSlave::stop() { fd = -1; }
```

## 7.30 src/SlaveManager.cpp File Reference

```
#include "SlaveManager.h"
#include <wiringPi.h>
#include <wiringPiI2C.h>
#include <cstdint>
#include <stdexcept>
#include "CO2Slave.h"
#include "DoorSlave.h"
#include "RGBSlave.h"
#include "packets.h"
```

Include dependency graph for SlaveManager.cpp:




### Macros

- #define MASTER_ADDRESS 0x01

### 7.30.1 Macro Definition Documentation

#### 7.30.1.1 MASTER_ADDRESS

```
#define MASTER_ADDRESS 0x01
```

Definition at line 14 of file SlaveManager.cpp.

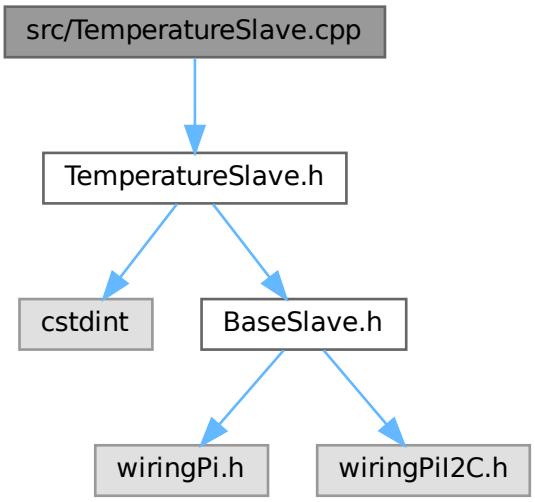
## 7.31 SlaveManager.cpp

Go to the documentation of this file.

```
00001 #include "SlaveManager.h"
00002
00003 #include <wiringPi.h>
00004 #include <wiringPiI2C.h>
00005
00006 #include <cstdint>
00007 #include <stdexcept>
00008
00009 #include "CO2Slave.h"
00010 #include "DoorSlave.h"
00011 #include "RGBSlave.h"
00012 #include "packets.h"
00013
00014 #define MASTER_ADDRESS 0x01
00015
00016 SlaveManager::SlaveManager() : address(MASTER_ADDRESS) {}
00017
00018 void SlaveManager::initialize() {
00019     // maybe need setup not sure.
00020
00021     i2c_fd = wiringPiI2CSetup(address);
00022     if (-1 == i2c_fd) {
00023         throw std::runtime_error("I2C setup failed");
00024     } else {
00025         printf("I2C setup succesful");
00026     };
00027 }
00028
00029 void SlaveManager::ledControl(uint8_t led_number, uint8_t led_state) {}
00030
00031 void SlaveManager::createSlave(SensorType type, uint8_t id, int i2c_address) {
00032     BaseSlave* newSlave = nullptr;
00033     switch (type) {
00034         case SensorType::CO2:
00035             newSlave = new CO2Slave(id, i2c_address);
00036             break;
00037         case SensorType::RGB_LIGHT:
00038             newSlave = new RGBSlave(id, i2c_address);
00039             break;
00040         // case /* door */:
00041         //     newSlave = new DoorSlave(id, i2c_address);
00042         //     break;
00043         default:
00044             return;  // Invalid type
00045     }
00046     slaves[id] = newSlave;
00047 }
00048 void SlaveManager::deleteSlave(uint8_t id) {
00049     if (nullptr != slaves[id]) {
00050         /*
00051          * Disconnect I2C device from bus
00052          */
00053         delete slaves[id];
00054     }
00055 }
00056
00057 BaseSlave* SlaveManager::getSlave(int id) { return slaves[id]; }
```

## 7.32 src/TemperatureSlave.cpp File Reference

`#include "TemperatureSlave.h"`
Include dependency graph for TemperatureSlave.cpp:




## 7.33 TemperatureSlave.cpp

Go to the documentation of this file.

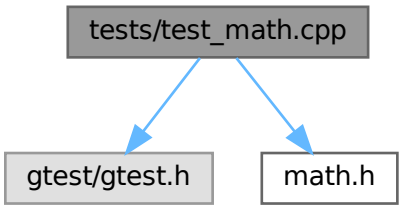
```
00001 #include "TemperatureSlave.h"
00002
00003 TemperatureSlave::TemperatureSlave(uint8_t id, uint8_t i2c_address): id(id), i2c_address(i2c_address)
      {}
00004
00005 void* TemperatureSlave::getData() {
00006     int temp;
00007
00008     temp = wiringPiI2CRead(fd);
00009
00010     return;
00011 }
00012
00013 bool TemperatureSlave::getStatus() {
00014     getData();
00015     if (temperature.Temp == 0){
00016         return false;
00017     } else {
00018         return true;
00019     }
00020 }
00021
00022 int TemperatureSlave::getId() { return id; }
00023
00024 void TemperatureSlave::setData(void* data) {
00025     TemperatureData* temp_data = (TemperatureData*)data;
00026     int temp = temp_data->Temp;
00027
00028     wiringPiI2CWrite(fd, temp);
00029 }
00030
00031 void TemperatureSlave::start(int i2c_fd) { fd = i2c_fd; }
00032
00033 void TemperatureSlave::stop() { fd = -1; }
```

## 7.34 tests/test_math.cpp File Reference

Unit tests for mathematical operations using Google Test framework.

```
#include <gtest/gtest.h>
#include "math.h"
```

Include dependency graph for test_math.cpp:




### Functions

- TEST (MathTest, Add)
- TEST (MathTest, Subtract)
- TEST (MathTest, SubtractNegative)

### 7.34.1 Detailed Description

Unit tests for mathematical operations using Google Test framework.

This file contains test cases for verifying the correctness of functions defined in the "math.h" header. The tests ensure that the mathematical operations behave as expected under various conditions.

**Test** MathTest.Add

- Verifies that the `add` function correctly computes the sum of two integers.
- Example: `add(2, 3)` should return `5`.

**Test** MathTest.Subtract

- Verifies that the `subtract` function correctly computes the difference between two integers.
- Examples:
  - `subtract(10, 3)` should return `7`.
  - `subtract(9, 3)` should return `6`.

**Test** MathTest.SubtractNegative

- Verifies that the `subtract` function handles subtraction with negative integers correctly.
- Example: `subtract(10, -3)` should return `13`.

Definition in file test_math.cpp.

### 7.34.2 Function Documentation

#### 7.34.2.1 TEST() [1/3]

```
TEST (
            MathTest ,
            Add  )
```

Definition at line 29 of file test_math.cpp.

#### 7.34.2.2 TEST() [2/3]

```
TEST (
            MathTest ,
            Subtract  )
```

Definition at line 31 of file test_math.cpp.

#### 7.34.2.3 TEST() [3/3]

```
TEST (
            MathTest ,
            SubtractNegative  )
```

Definition at line 36 of file test_math.cpp.

## 7.35 test_math.cpp

Go to the documentation of this file.

```
00001
00025 #include <gtest/gtest.h>
00026
00027 #include "math.h"
00028
00029 TEST(MathTest, Add) { EXPECT_EQ(add(2, 3), 5); }
00030
00031 TEST(MathTest, Subtract) {
00032     EXPECT_EQ(subtract(10, 3), 7);
00033     EXPECT_EQ(subtract(9, 3), 6);
00034 }
00035
00036 TEST(MathTest, SubtractNegative) { EXPECT_EQ(subtract(10, -3), 13); }
```

# Index