Wemos Bridge Server

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Chapter 1

Wemos Bridge Server

Chapter 2

Test List

Member TEST (I2CClientTests, setup_ValidPort)
I2CClientTests.setup_ValidPort

Member TEST (I2CClientTests, setup_InvalidPort_Negative)
I2CClientTests.setup_InvalidPort_Negative

Member TEST (I2CClientTests, setup_InvalidPort_Zero)
I2CClientTests.setup_InvalidPort_Zero

Member TEST (I2CClientTests, setup_InvalidPort_High)
I2CClientTests.setup_InvalidPort_High

Member TEST (WemosServerTest, Constructor_ValidPort)
WemosServerTest.Constructor_ValidPort

Member TEST (WemosServerTest, Constructor_InvalidPort_Negative)
WemosServerTest.Constructor_InvalidPort_Negative

Member TEST (WemosServerTest, Constructor_InvalidPort_Zero)
WemosServerTest.Constructor_InvalidPort_Zero

Member TEST (WemosServerTest, Constructor_InvalidPort_High)
WemosServerTest.Constructor_InvalidPort_High

Member TEST (WemosServerTest, Constructor_ValidHubIPAddress)
WemosServerTest.Constructor_ValidHubIPAddress

Member TEST (WemosServerTest, Constructor_InvalidHubIPAddress)
WemosServerTest.Constructor_InvalidHubIPAddress

Member TEST (WemosServerTest, Constructor_ValidHubPort)
WemosServerTest.Constructor_ValidHubPort

Member TEST (WemosServerTest, Constructor_InvalidHubPort_Negative)
WemosServerTest.Constructor_InvalidHubPort_Negative

Member TEST (WemosServerTest, Constructor_InvalidHubPort_High)
WemosServerTest.Constructor_InvalidHubPort_High

Member TEST (WemosServerTest, Constructor_InvalidHubPort_Zero)
WemosServerTest.Constructror_InvalidHubPort_Zero

Chapter 3

Topic Index

3.1 Topics

Here is a list of all topics with brief descriptions:

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:

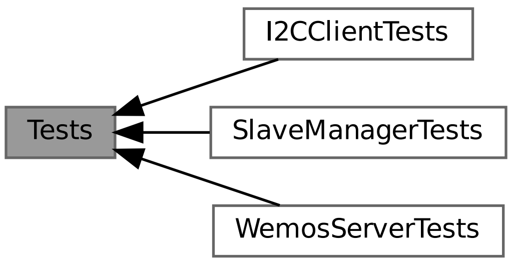
Chapter 6

Topic Documentation

6.1 Tests

Unit tests for the Wemos Bridge application.

Collaboration diagram for Tests:



Modules

- WemosServerTests

  All tests related to the WemosServer class.
- I2CClientTests

  All tests related to the I2CClient class.
- SlaveManagerTests

  All tests related to the SlaveManager class.

6.1.1 Detailed Description

Unit tests for the Wemos Bridge application.

6.1.2 WemosServerTests

All tests related to the WemosServer class.

Collaboration diagram for WemosServerTests:

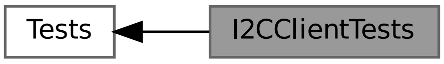
Tests
WemosServerTests

All tests related to the WemosServer class.

6.1.3 I2CClientTests

All tests related to the I2CClient class.

Collaboration diagram for I2CClientTests:



Functions

- TEST (I2CClientTests, setup_ValidPort)

  Test the setup() function with valid port numbers.
- TEST (I2CClientTests, setup_InvalidPort_Negative)
- TEST (I2CClientTests, setup_InvalidPort_Zero)
- TEST (I2CClientTests, setup_InvalidPort_High)

6.1.3.1 Detailed Description

All tests related to the I2CClient class.

6.1.3.2 Function Documentation

6.1.3.2.1 TEST() [1/4]

```
TEST (
            I2CClientTests ,
            setup_InvalidPort_High )
```

Test I2CClientTests.setup_InvalidPort_High

- Verify that the setup() function throws an exception when a port number greater than 65535 is provided.
- Expects std::invalid_argument to be thrown.

Definition at line 57 of file test_i2cclient.cpp.

6.1.3.2.2 TEST() [2/4]

```
TEST (
            I2CClientTests ,
            setup_InvalidPort_Negative )
```

Test I2CClientTests.setup_InvalidPort_Negative

- Verify that the setup() function throws an exception when a negative port number is provided.
- Expects std::invalid_argument to be thrown.

Definition at line 32 of file test_i2cclient.cpp.

6.1.3.2.3 TEST() [3/4]

```
TEST (
            I2CClientTests ,
            setup_InvalidPort_Zero )
```

Test I2CClientTests.setup_InvalidPort_Zero

- Verify that the setup() function throws an exception when a port number of zero is provided.
- Expects std::invalid_argument to be thrown.

Definition at line 44 of file test_i2cclient.cpp.

6.1.3.2.4 TEST() [4/4]

```
TEST (
            I2CClientTests ,
            setup_ValidPort  )
```

Test the setup() function with valid port numbers.

Test I2CClientTests.setup_ValidPort

- Test the setup() function of I2CClient with valid port numbers.
- Expect no exceptions to be thrown.

Definition at line 18 of file test_i2cclient.cpp.

6.1.4 SlaveManagerTests

All tests related to the SlaveManager class.

Collaboration diagram for SlaveManagerTests:

Tests
SlaveManagerTests

All tests related to the SlaveManager class.

6.2 Packets

Contains all packet definitions in the application.

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.

6.2.1 Detailed Description

Contains all packet definitions in the application.

Warning

THESE MUST BE KEPT IN SYNC WITH OTHER SOFTWARE

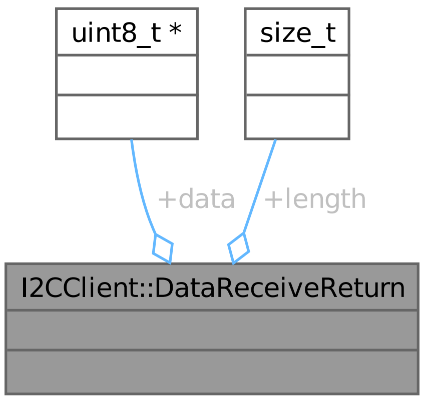
Chapter 7

Class Documentation

7.1 I2CClient::DataReceiveReturn Struct Reference

```
#include <i2cclient.h>
```

Collaboration diagram for I2CClient::DataReceiveReturn:



Public Attributes

- uint8_t ∗ data
- size_t length

7.1.1 Detailed Description

Definition at line 52 of file i2cclient.h.

7.1.2 Member Data Documentation

7.1.2.1 data

```
uint8_t* I2CClient::DataReceiveReturn::data
```

Definition at line 53 of file i2cclient.h.

7.1.2.2 length

```
size_t I2CClient::DataReceiveReturn::length
```

Definition at line 54 of file i2cclient.h.

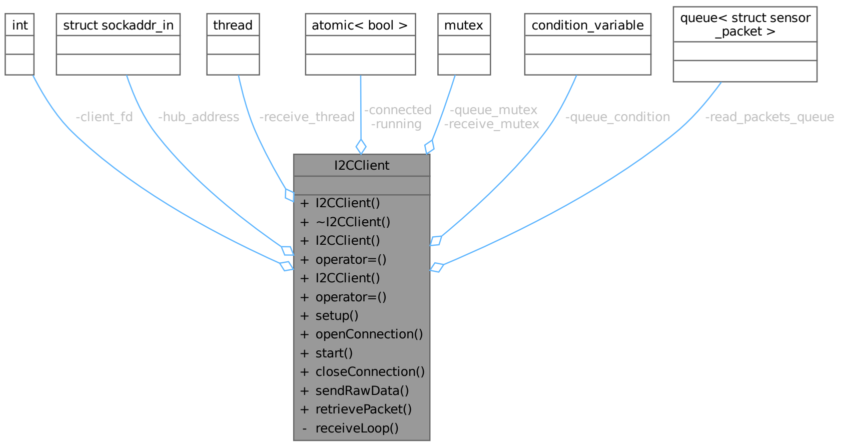
The documentation for this struct was generated from the following file:

- include/i2cclient.h

7.2 I2CClient Class Reference

```
#include <i2cclient.h>
```

Collaboration diagram for I2CClient:



Classes

- struct DataReceiveReturn

Public Member Functions

- I2CClient ()

  Constructor for I2CClient class.
- ∼I2CClient ()
- I2CClient (const I2CClient &)=delete
- I2CClient & operator= (const I2CClient &)=delete
- I2CClient (I2CClient &&)=delete
- I2CClient & operator= (I2CClient &&)=delete
- void setup (const std::string &ip, int port)

  Initializes the settings necessary for connecting to the I2C hub.
- bool openConnection ()

  Connects to the I2C hub.
- void start ()

  Starts the I2C client.
- void closeConnection ()

  Disconnects from the I2C hub.
- void sendRawData (uint8_t ∗data, size_t length)

  Internal method to send data to the I2C hub.
- struct sensor_packet retrievePacket (bool block=false)

  Sends packet data to the I2C hub.

Private Member Functions

- void receiveLoop ()

  Internal receive loop for handling incoming data from the I2C hub.

Private Attributes

- int client_fd
- struct sockaddr_in hub_address
- std::thread receive_thread
- std::atomic< bool > connected
- std::atomic< bool > running
- std::mutex receive_mutex
- std::mutex queue_mutex
- std::condition_variable queue_condition
- std::queue< struct sensor_packet > read_packets_queue

7.2.1 Detailed Description

Definition at line 24 of file i2cclient.h.

7.2.2 Constructor & Destructor Documentation

7.2.2.1 I2CClient() `[1/3]`

```
I2CClient::I2CClient ( )
```

Constructor for I2CClient class.

This constructor initializes the I2C client with the specified IP address and port.

Exceptions

std::invalid_argument	if the port number is invalid.

Warning

This constructor does not start the I2C client. Use setup(), openConnection() and start() instead.

Definition at line 28 of file i2cclient.cpp.

7.2.2.2 ∼I2CClient()

```
I2CClient::∼I2CClient ( )
```

Definition at line 32 of file i2cclient.cpp.

7.2.2.3 I2CClient() `[2/3]`

```
I2CClient::I2CClient (
             const I2CClient &  )  [delete]
```

7.2.2.4 I2CClient() `[3/3]`

```
I2CClient::I2CClient (
             I2CClient &&  )  [delete]
```

7.2.3 Member Function Documentation

7.2.3.1 closeConnection()

```
void I2CClient::closeConnection ( )
```

Disconnects from the I2C hub.

This method closes the connection to the I2C hub.

Definition at line 193 of file i2cclient.cpp.

7.2.3.2 openConnection()

```
bool I2CClient::openConnection ( )
```

Connects to the I2C hub.

This method establishes a connection to the I2C hub using the specified IP address and port.

Returns

true if the connection is successful, false otherwise.

Definition at line 149 of file i2cclient.cpp.

7.2.3.3 operator=() [1/2]

```
I2CClient & I2CClient::operator= (
            const I2CClient & )  [delete]
```

7.2.3.4 operator=() [2/2]

```
I2CClient & I2CClient::operator= (
            I2CClient && )  [delete]
```

7.2.3.5 receiveLoop()

```
void I2CClient::receiveLoop ( )  [private]
```

Internal receive loop for handling incoming data from the I2C hub.

This method runs in a separate thread and continuously listens for incoming data from the I2C hub. It processes the received data and stores it in a buffer for later use.

Warning

This method should not be called directly. It is intended to be used internally by the class.

Definition at line 45 of file i2cclient.cpp.

7.2.3.6 retrievePacket()

```
struct sensor_packet I2CClient::retrievePacket (
            bool block = false )
```

Sends packet data to the I2C hub.

Parameters

t.↩ b.d.	

Exceptions

std::runtime_error	if sending data fails.

Receives data from the I2C hub.

Parameters

block	Whether or not to block until a packet can be retrieved

Returns

A struct containing the received packet data.

Exceptions

std::runtime_error	if receiving data fails.

Definition at line 212 of file i2cclient.cpp.

7.2.3.7 sendRawData()

```
void I2CClient::sendRawData (
            uint8_t * data,
            size_t length )
```

Internal method to send data to the I2C hub.

Parameters

data	The data to send to the I2C hub.
length	The length of the data to send.

Exceptions

std::runtime_error	if sending data fails.

Definition at line 205 of file i2cclient.cpp.

7.2.3.8 setup()

```
void I2CClient::setup (
            const std::string & ip,
            int port )
```

Initializes the settings necessary for connecting to the I2C hub.

This method initializes the remote address details (IP address and port) for the I2C hub to connect to.

Parameters

ip	The IP address of the I2C hub.
port	The port number of the I2C hub.

Exceptions

std::invalid_argument	if an invalid IP address or port is passed

Definition at line 137 of file i2cclient.cpp.

7.2.3.9 start()

```
void I2CClient::start ( )
```

Starts the I2C client.

This method starts the I2C client and begins listening for incoming data from the I2C hub.

Exceptions

std::runtime_error	if the client is not connected to the hub.

Definition at line 181 of file i2cclient.cpp.

7.2.4 Member Data Documentation

7.2.4.1 client_fd

```
int I2CClient::client_fd [private]
```

Definition at line 26 of file i2cclient.h.

7.2.4.2 connected

```
std::atomic<bool> I2CClient::connected [private]
```

Definition at line 32 of file i2cclient.h.

7.2.4.3 hub_address

```
struct sockaddr_in I2CClient::hub_address [private]
```

Definition at line 28 of file i2cclient.h.

7.2.4.4 queue_condition

```
std::condition_variable I2CClient::queue_condition [private]
```

Definition at line 38 of file i2cclient.h.

7.2.4.5 queue_mutex

```
std::mutex I2CClient::queue_mutex [private]
```

Definition at line 36 of file i2cclient.h.

7.2.4.6 read_packets_queue

```
std::queue<struct sensor_packet> I2CClient::read_packets_queue [private]
```

Definition at line 40 of file i2cclient.h.

7.2.4.7 receive_mutex

```
std::mutex I2CClient::receive_mutex [private]
```

Definition at line 35 of file i2cclient.h.

7.2.4.8 receive_thread

```
std::thread I2CClient::receive_thread [private]
```

Definition at line 30 of file i2cclient.h.

7.2.4.9 running

```
std::atomic<bool> I2CClient::running [private]
```

Definition at line 33 of file i2cclient.h.

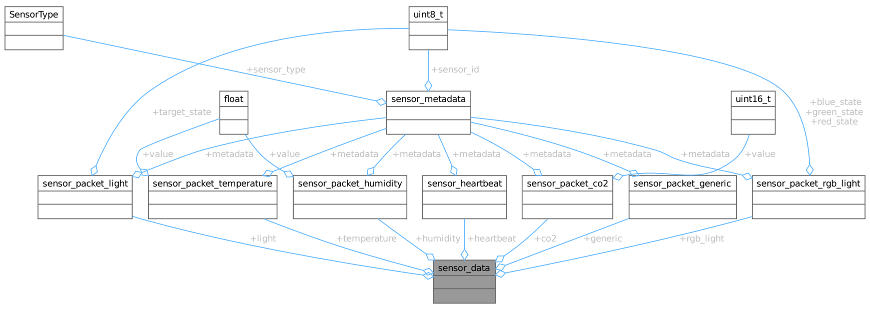
The documentation for this class was generated from the following files:

- include/i2cclient.h
- src/i2cclient.cpp

7.3 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

7.3.1 Detailed Description

Definition at line 4 of file packets.h.

7.3.2 Member Data Documentation

7.3.2.1 co2

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

Definition at line 8 of file packets.h.

7.3.2.2 generic

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

Definition at line 6 of file packets.h.

7.3.2.3 heartbeat

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

Definition at line 5 of file packets.h.

7.3.2.4 humidity

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

Definition at line 9 of file packets.h.

7.3.2.5 light

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

Definition at line 10 of file packets.h.

7.3.2.6 rgb_light

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

Definition at line 11 of file packets.h.

7.3.2.7 temperature

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

Definition at line 7 of file packets.h.

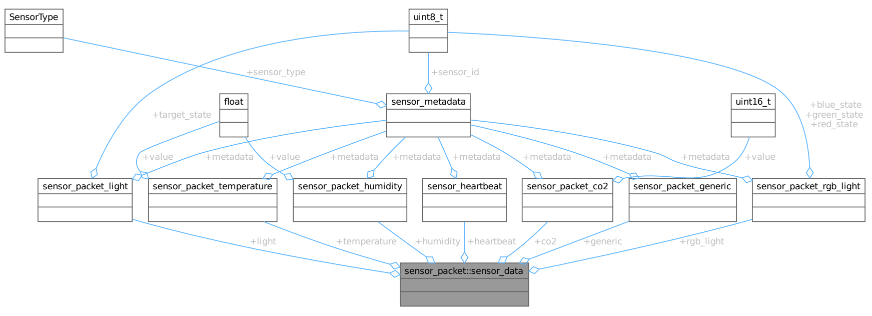
The documentation for this union was generated from the following file:

- include/packets.h

7.4 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

7.4.1 Detailed Description

Definition at line 227 of file packets.h.

7.4.2 Member Data Documentation

7.4.2.1 co2

`struct sensor_packet_co2 sensor_packet::sensor_data::co2`

Definition at line 231 of file packets.h.

7.4.2.2 generic

`struct sensor_packet_generic sensor_packet::sensor_data::generic`

Definition at line 229 of file packets.h.

7.4.2.3 heartbeat

`struct sensor_heartbeat sensor_packet::sensor_data::heartbeat`

Definition at line 228 of file packets.h.

7.4.2.4 humidity

`struct sensor_packet_humidity sensor_packet::sensor_data::humidity`

Definition at line 232 of file packets.h.

7.4.2.5 light

`struct sensor_packet_light sensor_packet::sensor_data::light`

Definition at line 233 of file packets.h.

7.4.2.6 rgb_light

`struct sensor_packet_rgb_light sensor_packet::sensor_data::rgb_light`

Definition at line 234 of file packets.h.

7.4.2.7 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:

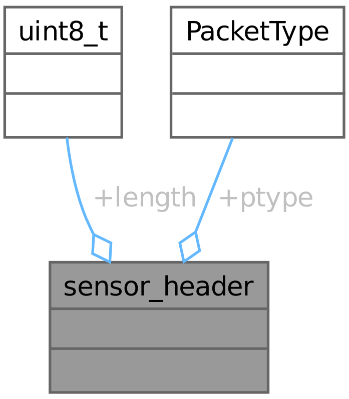
- include/packets.h

7.5 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.).

7.5.1 Detailed Description

Header structure for sensor packets.

Definition at line 40 of file packets.h.

7.5.2 Member Data Documentation

7.5.2.1 length

`uint8_t sensor_header::length`

Length of the packet excluding the header.

Definition at line 42 of file packets.h.

7.5.2.2 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:

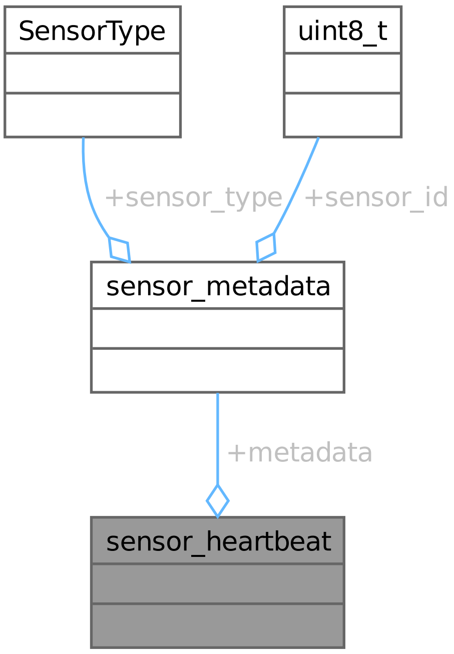
- include/packets.h

7.6 sensor_heartbeat Struct Reference

Structure for heartbeat packets.

`#include <packets.h>`

Collaboration diagram for sensor_heartbeat:



Public Attributes

- struct sensor_metadata metadata

7.6.1 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.

7.6.2 Member Data Documentation

7.6.2.1 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:

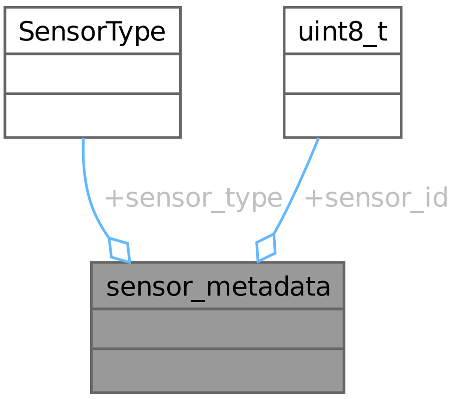
- include/packets.h

7.7 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.

7.7.1 Detailed Description

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

Definition at line 52 of file packets.h.

7.7.2 Member Data Documentation

7.7.2.1 sensor_id

```
uint8_t sensor_metadata::sensor_id
```

ID of the sensor being addressed.

Definition at line 56 of file packets.h.

7.7.2.2 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:

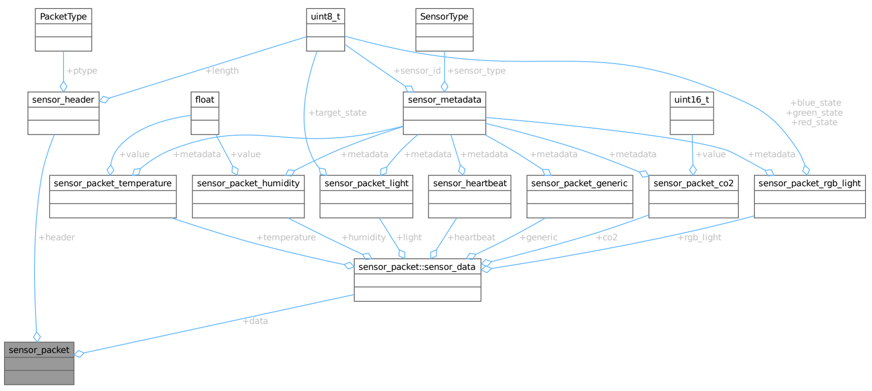
- include/packets.h

7.8 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

7.8.1 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.

7.8.2 Member Data Documentation

7.8.2.1 data

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

7.8.2.2 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:

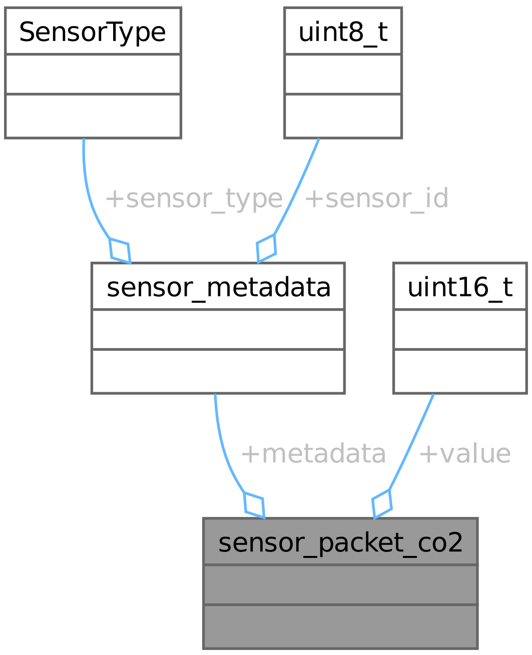
- include/packets.h

7.9 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.

7.9.1 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.

7.9.2 Member Data Documentation

7.9.2.1 metadata

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

Definition at line 108 of file packets.h.

7.9.2.2 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:

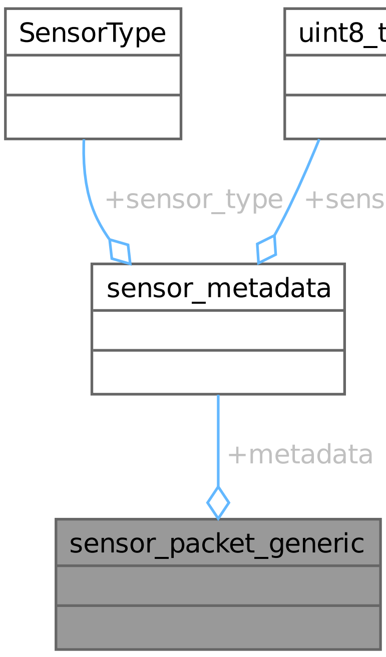
- include/packets.h

7.10 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

7.10.1 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.

7.10.2 Member Data Documentation

7.10.2.1 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:

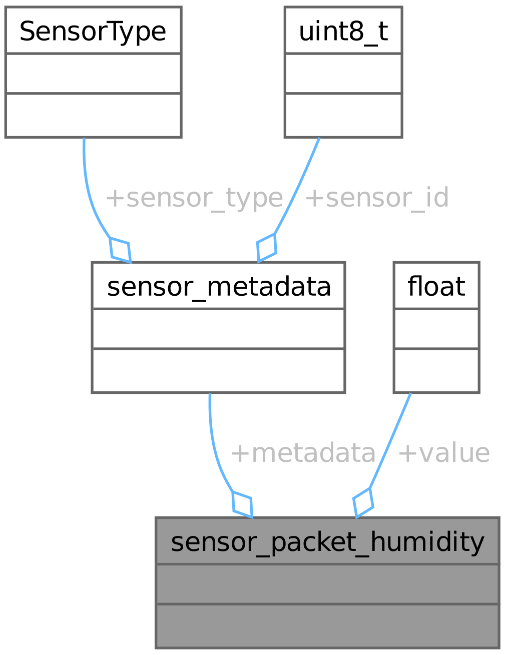
- include/packets.h

7.11 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.

7.11.1 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.

7.11.2 Member Data Documentation

7.11.2.1 metadata

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

Definition at line 121 of file packets.h.

7.11.2.2 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:

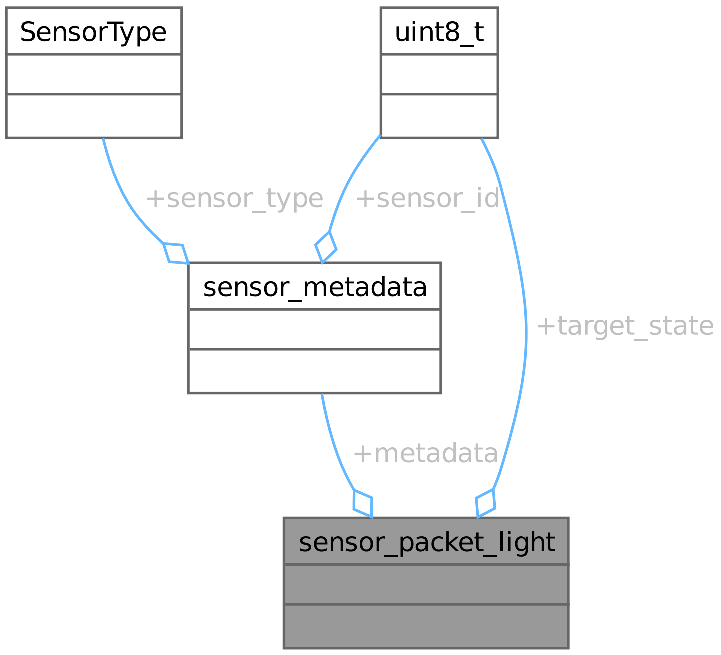
- include/packets.h

7.12 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.

7.12.1 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.

7.12.2 Member Data Documentation

7.12.2.1 metadata

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

Definition at line 134 of file packets.h.

7.12.2.2 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:

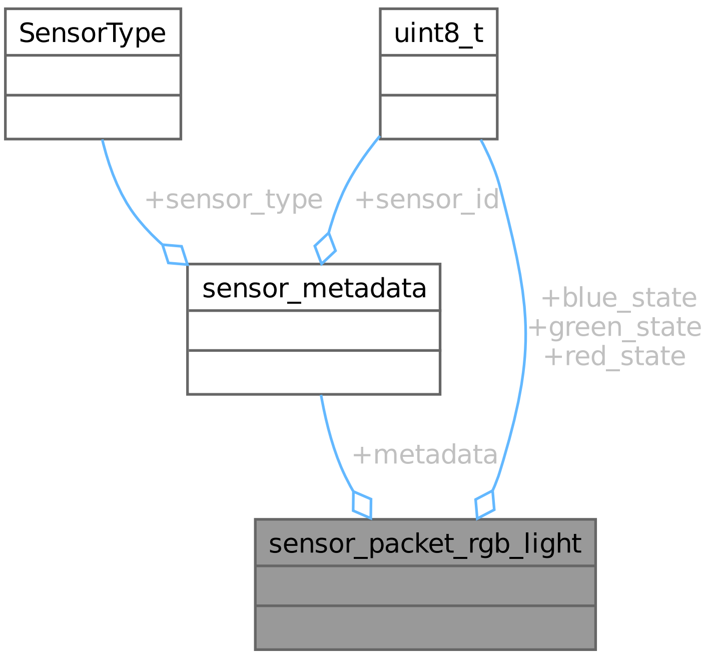
- include/packets.h

7.13 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.

7.13.1 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.

7.13.2 Member Data Documentation

7.13.2.1 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.

7.13.2.2 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.

7.13.2.3 metadata

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

Definition at line 148 of file packets.h.

7.13.2.4 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:

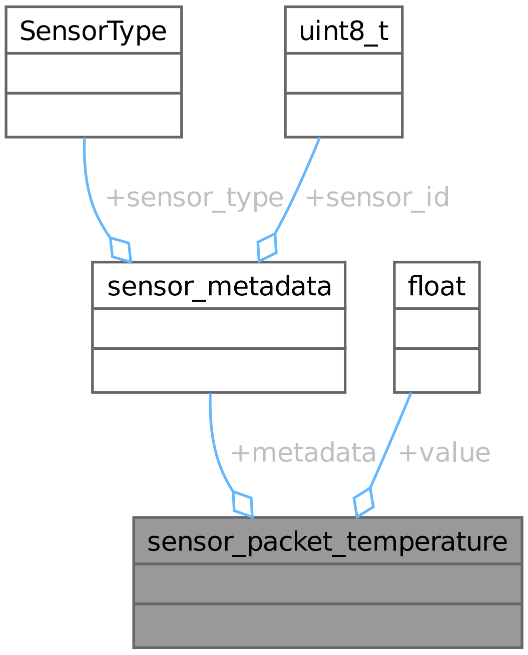
- include/packets.h

7.14 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.

7.14.1 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.

7.14.2 Member Data Documentation

7.14.2.1 metadata

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

Definition at line 95 of file packets.h.

7.14.2.2 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:

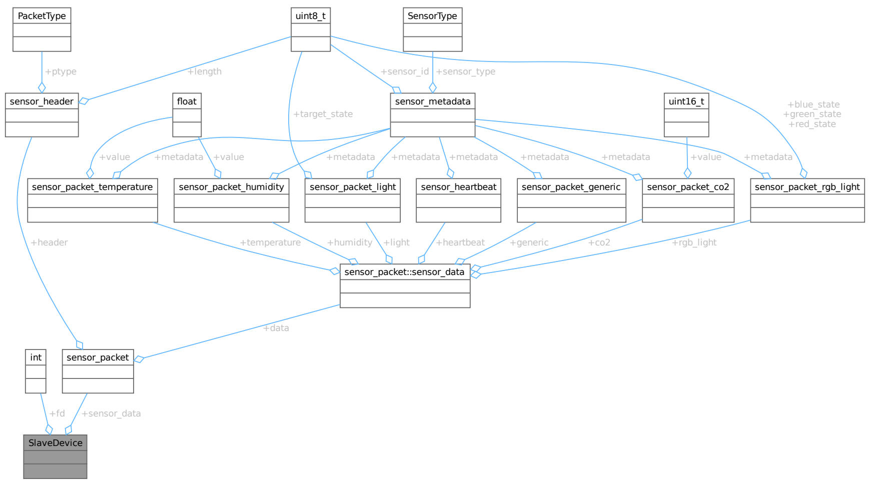
- include/packets.h

7.15 SlaveDevice Struct Reference

Structure representing a slave device.

```
#include <slavemanager.h>
```

Collaboration diagram for SlaveDevice:



Public Attributes

- int fd
- struct sensor_packet sensor_data

7.15.1 Detailed Description

Structure representing a slave device.

This structure contains the file descriptor associated with the slave device.

Definition at line 27 of file slavemanager.h.

7.15.2 Member Data Documentation

7.15.2.1 fd

```
int SlaveDevice::fd
```

Definition at line 28 of file slavemanager.h.

7.15.2.2 sensor_data

```
struct sensor_packet SlaveDevice::sensor_data
```

Definition at line 29 of file slavemanager.h.

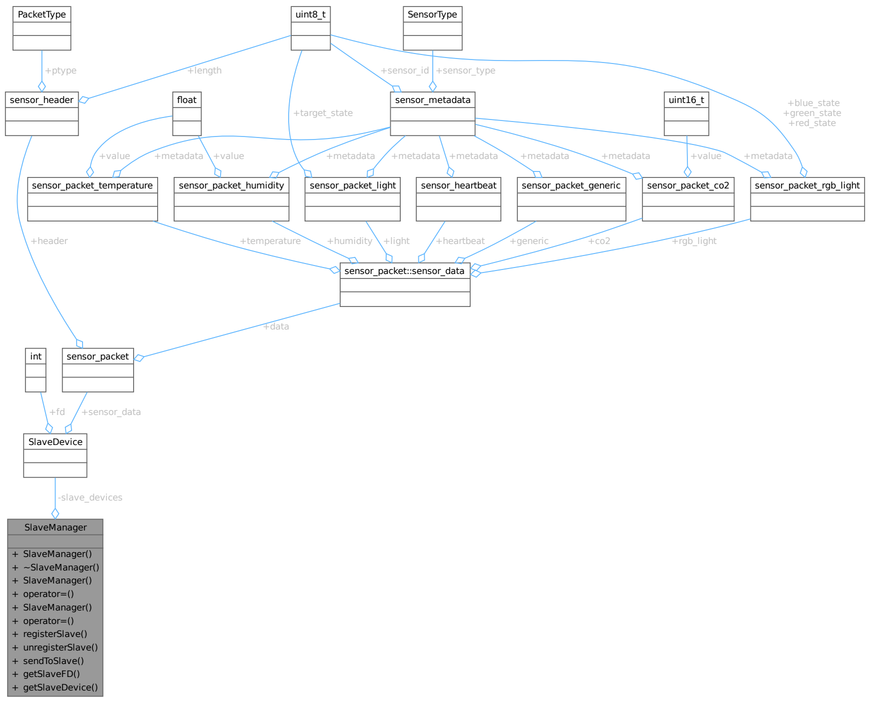
The documentation for this struct was generated from the following file:

- include/slavemanager.h

7.16 SlaveManager Class Reference

```
#include <slavemanager.h>
```

Collaboration diagram for SlaveManager:



Public Member Functions

- SlaveManager ()
- ∼SlaveManager ()
- SlaveManager (const SlaveManager &)=delete
- SlaveManager & operator= (const SlaveManager &)=delete
- SlaveManager (SlaveManager &&)=delete
- SlaveManager & operator= (SlaveManager &&)=delete
- void registerSlave (uint8_t slave_id, int fd)

    Registers a slave device with the given ID and file descriptor.
- void unregisterSlave (uint8_t slave_id)

    Unregisters a slave device with the given ID.
- int sendToSlave (uint8_t slave_id, const void ∗data, size_t length)

    Sends data to the slave device with the given ID.
- int getSlaveFD (uint8_t slave_id) const

    Gets the file descriptor associated with the given slave ID.
- SlaveDevice getSlaveDevice (uint8_t slave_id) const

    Gets the SlaveDevice associated with the given slave ID.

Private Attributes

- SlaveDevice slave_devices [MAX_SLAVE_ID+1]

7.16.1 Detailed Description

Definition at line 32 of file slavemanager.h.

7.16.2 Constructor & Destructor Documentation

7.16.2.1 SlaveManager() [1/3]

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

Definition at line 17 of file slavemanager.cpp.

7.16.2.2 ∼SlaveManager()

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

Definition at line 23 of file slavemanager.cpp.

7.16.2.3 SlaveManager() [2/3]

```
SlaveManager::SlaveManager (
            const SlaveManager &  )  [delete]
```

7.16.2.4 SlaveManager() [3/3]

```
SlaveManager::SlaveManager (
            SlaveManager && )  [delete]
```

7.16.3 Member Function Documentation

7.16.3.1 getSlaveDevice()

```
SlaveDevice SlaveManager::getSlaveDevice (
            uint8_t slave_id ) const
```

Gets the SlaveDevice associated with the given slave ID.

Parameters

slave←↩ _id	The ID of the slave device.

Returns

The SlaveDevice associated with the slave id.

Definition at line 84 of file slavemanager.cpp.

7.16.3.2 getSlaveFD()

```
int SlaveManager::getSlaveFD (
            uint8_t slave_id ) const
```

Gets the file descriptor associated with the given slave ID.

Parameters

slave←↩ _id	The ID of the slave device.

Returns

The file descriptor associated with the slave device.

Definition at line 75 of file slavemanager.cpp.

7.16.3.3 operator=() [1/2]

```
SlaveManager & SlaveManager::operator= (
            const SlaveManager & )  [delete]
```

7.16.3.4 operator=() [2/2]

```
SlaveManager & SlaveManager::operator= (
            SlaveManager && )  [delete]
```

7.16.3.5 registerSlave()

```
void SlaveManager::registerSlave (
            uint8_t slave_id,
            int fd )
```

Registers a slave device with the given ID and file descriptor.

Parameters

slave↩ _id	The ID of the slave device to register.
fd	The file descriptor associated with the slave device.

Exceptions

std::invalid_argument	if the slave ID is invalid.

Definition at line 32 of file slavemanager.cpp.

7.16.3.6 sendToSlave()

```
int SlaveManager::sendToSlave (
            uint8_t slave_id,
            const void * data,
            size_t length )
```

Sends data to the slave device with the given ID.

Parameters

slave↩ _id	The ID of the slave device to send data to.
data	The data to send to the slave device.
length	The length of the data to send.

Returns

0 on success, -1 on failure.

Definition at line 54 of file slavemanager.cpp.

7.16.3.7 unregisterSlave()

```
void SlaveManager::unregisterSlave (
            uint8_t slave_id )
```

Unregisters a slave device with the given ID.

Parameters

slave↵_id	The ID of the slave device to unregister.

Exceptions

std::invalid_argument	if the slave ID is invalid.

Warning

This method closes the file descriptor associated with the slave device.

Definition at line 43 of file slavemanager.cpp.

7.16.4 Member Data Documentation

7.16.4.1 slave_devices

```
SlaveDevice SlaveManager::slave_devices[MAX_SLAVE_ID+1]  [private]
```

Definition at line 34 of file slavemanager.h.

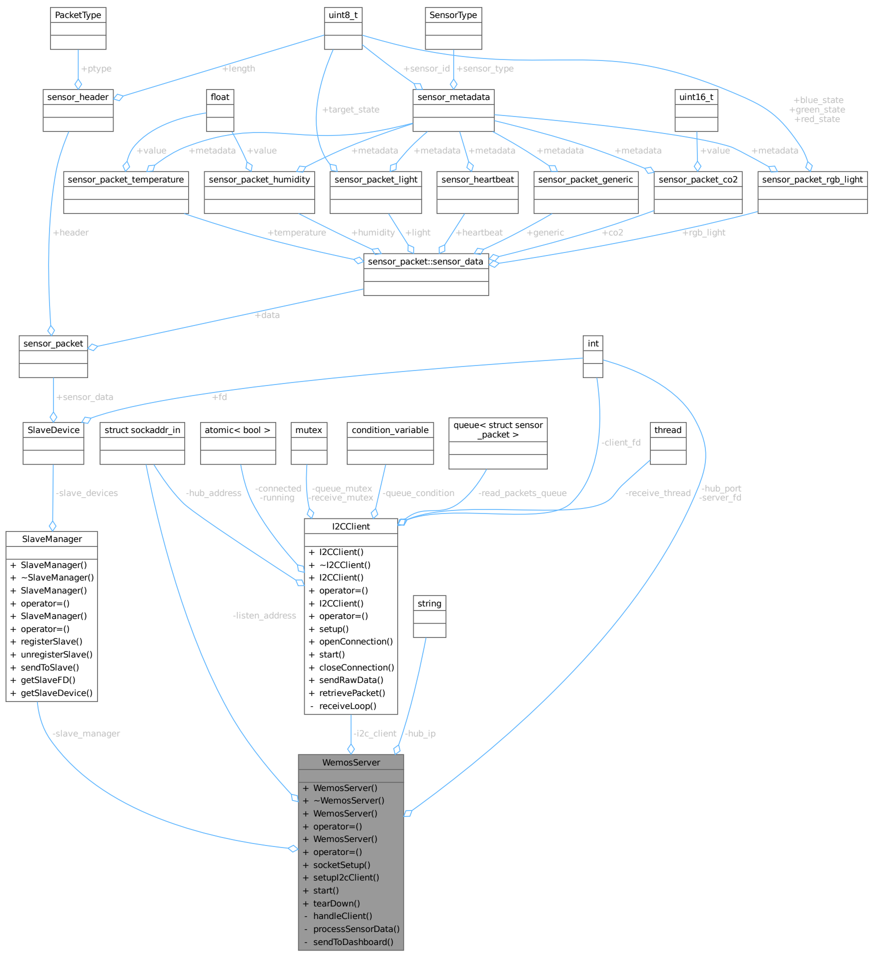
The documentation for this class was generated from the following files:

- include/slavemanager.h
- src/slavemanager.cpp

7.17 WemosServer Class Reference

```
#include <wemosserver.h>
```

Collaboration diagram for WemosServer:



Public Member Functions

- WemosServer (int port, const std::string &hub_ip, int hub_port)

    Constructor for WemosServer class.
- ∼WemosServer ()
- WemosServer (const WemosServer &)=delete
- WemosServer & operator= (const WemosServer &)=delete
- WemosServer (WemosServer &&)=delete
- WemosServer & operator= (WemosServer &&)=delete
- void socketSetup ()

    Sets up the server socket and starts listening for incoming connections.
- void setupI2cClient ()

    Sets up the I2C client for communication with the I2C hub.
- void start ()
- void tearDown ()

Private Member Functions

- void handleClient (int client_fd, const struct sockaddr_in &client_address)
- void processSensorData (const struct sensor_packet ∗data)
- void sendToDashboard (int dashboard_fd, uint8_t sensor_id)

Private Attributes

- int server_fd
- struct sockaddr_in listen_address
- I2CClient i2c_client
- std::string hub_ip
- int hub_port
- SlaveManager slave_manager

7.17.1 Detailed Description

Definition at line 20 of file wemosserver.h.

7.17.2 Constructor & Destructor Documentation

7.17.2.1 WemosServer() [1/3]

```
WemosServer::WemosServer (
            int port,
            const std::string & hub_ip,
            int hub_port )
```

Constructor for WemosServer class.

This constructor initializes the server with the specified port, hub IP address, and hub port.

Parameters

port	The port number on which the server will listen for incoming connections.
hub_ip	The IP address of the I2C hub.
hub_port	The port number of the I2C hub.

Exceptions

std::invalid_argument	if the port number is invalid.

Warning

This constructor does not start the server loop. The loop() method should be called separately to start accepting client connections.

Definition at line 187 of file wemosserver.cpp.

7.17.2.2 ∼WemosServer()

```
WemosServer::∼WemosServer ( )
```

Definition at line 201 of file wemosserver.cpp.

7.17.2.3 WemosServer() [2/3]

```
WemosServer::WemosServer (
            const WemosServer & ) [delete]
```

7.17.2.4 WemosServer() [3/3]

```
WemosServer::WemosServer (
            WemosServer && ) [delete]
```

7.17.3 Member Function Documentation

7.17.3.1 handleClient()

```
void WemosServer::handleClient (
            int client_fd,
            const struct sockaddr_in & client_address ) [private]
```

Definition at line 39 of file wemosserver.cpp.

7.17.3.2 operator=() [1/2]

```
WemosServer & WemosServer::operator= (
            const WemosServer & ) [delete]
```

7.17.3.3 operator=() [2/2]

```
WemosServer & WemosServer::operator= (
            WemosServer && ) [delete]
```

7.17.3.4 processSensorData()

```
void WemosServer::processSensorData (
            const struct sensor_packet * data ) [private]
```

Definition at line 115 of file wemosserver.cpp.

7.17.3.5 sendToDashboard()

```
void WemosServer::sendToDashboard (
            int dashboard_fd,
            uint8_t sensor_id ) [private]
```

Definition at line 175 of file wemosserver.cpp.

7.17.3.6 setupI2cClient()

```
void WemosServer::setupI2cClient ( )
```

Sets up the I2C client for communication with the I2C hub.

Definition at line 237 of file wemosserver.cpp.

7.17.3.7 socketSetup()

```
void WemosServer::socketSetup ( )
```

Sets up the server socket and starts listening for incoming connections.

This method creates a socket, binds it to the specified port, and starts listening for incoming client connections. It also sets the socket options to allow address reuse.

Exceptions

std::runtime_error	if socket creation, binding, or listening fails.

Warning

This metho d should be called before starting the server loop.

Definition at line 206 of file wemosserver.cpp.

7.17.3.8 start()

```
void WemosServer::start ( )
```

Definition at line 239 of file wemosserver.cpp.

7.17.3.9 tearDown()

```
void WemosServer::tearDown ( )
```

Definition at line 275 of file wemosserver.cpp.

7.17.4 Member Data Documentation

7.17.4.1 hub_ip

```
std::string WemosServer::hub_ip [private]
```

Definition at line 26 of file wemosserver.h.

7.17.4.2 hub_port

```
int WemosServer::hub_port  [private]
```

Definition at line 27 of file wemosserver.h.

7.17.4.3 i2c_client

```
I2CClient WemosServer::i2c_client  [private]
```

Definition at line 25 of file wemosserver.h.

7.17.4.4 listen_address

```
struct sockaddr_in WemosServer::listen_address  [private]
```

Definition at line 23 of file wemosserver.h.

7.17.4.5 server_fd

```
int WemosServer::server_fd  [private]
```

Definition at line 22 of file wemosserver.h.

7.17.4.6 slave_manager

```
SlaveManager WemosServer::slave_manager  [private]
```

Definition at line 29 of file wemosserver.h.

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

- include/wemosserver.h
- src/wemosserver.cpp

Chapter 8

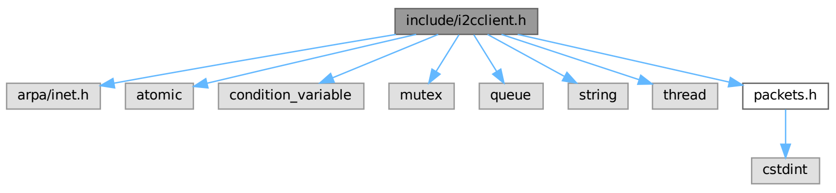
File Documentation

8.1 include/i2cclient.h File Reference

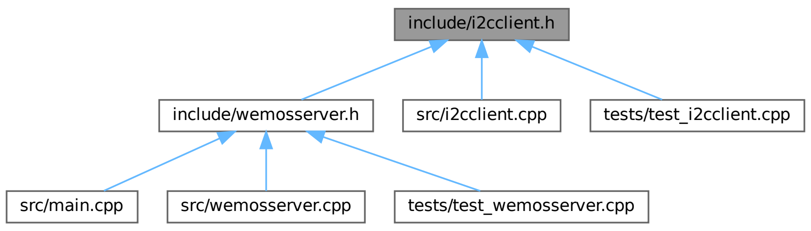
Header file for i2cclient.cpp.

```
#include <arpa/inet.h>
#include <atomic>
#include <condition_variable>
#include <mutex>
#include <queue>
#include <string>
#include <thread>
#include "packets.h"
```

Include dependency graph for i2cclient.h:



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



Classes

- class I2CClient
- struct I2CClient::DataReceiveReturn

8.1.1 Detailed Description

Header file for i2cclient.cpp.

This file contains declarations for the classes and functions used in the Wemos server application.

Author

Daan Breur

Erynn Scholtes

Definition in file i2cclient.h.

8.2 i2cclient.h

Go to the documentation of this file.

```

#ifndef I2CCLIENT_H
#define I2CCLIENT_H

#include <arpa/inet.h>

#include <atomic>
#include <condition_variable>
#include <mutex>
#include <queue>
#include <string>
#include <thread>

#include "packets.h"

class I2CClient {
  private:
   int client_fd;

   struct sockaddr_in hub_address;

   std::thread receive_thread;

   std::atomic<bool> connected;
   std::atomic<bool> running;

   std::mutex receive_mutex;
   std::mutex queue_mutex;

   std::condition_variable queue_condition;

   std::queue<struct sensor_packet> read_packets_queue;

   void receiveLoop();

  public:
   struct DataReceiveReturn {
       uint8_t *data;
       size_t length;
   };

  public:
   I2CClient();
   ~I2CClient();

   I2CClient(const I2CClient &) = delete;
   I2CClient &operator=(const I2CClient &) = delete;
   I2CClient(I2CClient &&) = delete;
```

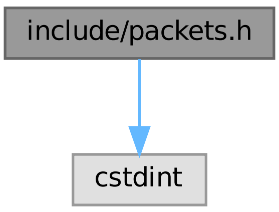
```
    I2CClient &operator=(I2CClient &&) = delete;

    void setup(const std::string &ip, int port);

    bool openConnection();

    void start();

    void closeConnection();

    void sendRawData(uint8_t *data, size_t length);

    // void sendData();

    struct sensor_packet retrievePacket(bool block = false);
};

#endif
```

8.3 include/packets.h File Reference

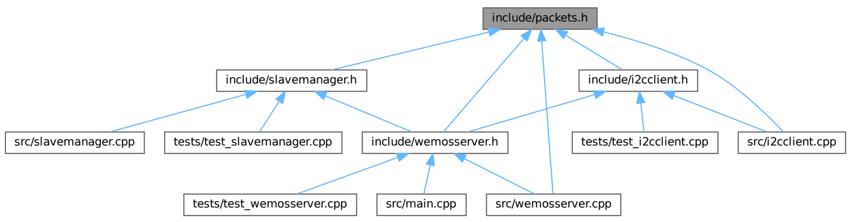
Header file for packets.h.

`#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

8.3.1 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.

8.3.2 Enumeration Type Documentation

8.3.2.1 PacketType

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

Enumerator

DATA	
HEARTBEAT	
DASHBOARD_POST	
DASHBOARD_GET	
DASHBOARD_RESPONSE	

Definition at line 27 of file packets.h.

8.3.2.2 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.

8.3.3 Function Documentation

8.3.3.1 __attribute__()

```
struct sensor_packet __attribute__ (
             (packed) )
```

8.3.4 Variable Documentation

8.3.4.1 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.

8.3.4.2 data

```
union sensor_data data
```

8.3.4.3 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.

8.3.4.4 header

```
struct sensor_header header
```

Header of the packet containing length and type information.

Definition at line 1 of file packets.h.

8.3.4.5 length

```
uint8_t length
```

Length of the packet excluding the header.

Definition at line 1 of file packets.h.

8.3.4.6 metadata

```
struct sensor_metadata metadata
```

Definition at line 0 of file packets.h.

8.3.4.7 ptype

```
PacketType ptype
```

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

Definition at line 3 of file packets.h.

8.3.4.8 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.

8.3.4.9 sensor_id

```
uint8_t sensor_id
```

ID of the sensor being addressed.

Definition at line 3 of file packets.h.

8.3.4.10 sensor_type

```
SensorType sensor_type
```

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

Definition at line 1 of file packets.h.

8.3.4.11 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.

8.3.4.12 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.

8.4 packets.h

Go to the documentation of this file.

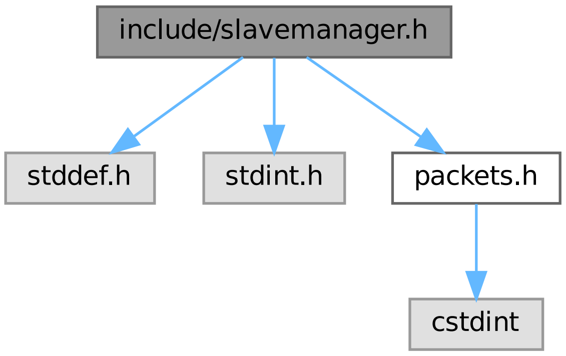
```
00001
00010 #ifndef PACKETS_H
00011 #define PACKETS_H
00012
00013 #include <cstdint>
00014
00015 enum class SensorType : uint8_t {
00016     NOOP = 0,
00017     BUTTON = 1,
00018     TEMPERATURE = 2,
00019     CO2 = 3,
00020     HUMIDITY = 4,
00021     PRESSURE = 5,
00022     LIGHT = 6,
00023     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 {
    SensorType sensor_type;
    uint8_t sensor_id;
} __attribute__((packed));

// Specific packet structures (ensure alignment/packing matches expected format)

struct sensor_heartbeat {
    struct sensor_metadata metadata;
} __attribute__((packed));

struct sensor_packet_generic {
    struct sensor_metadata metadata;
    // /** @brief Whether the sensor did or did not trigger */
    // bool value;
} __attribute__((packed));

struct sensor_packet_temperature {
    struct sensor_metadata metadata;
    float value;
} __attribute__((packed));

struct sensor_packet_co2 {
    struct sensor_metadata metadata;
    uint16_t value;
} __attribute__((packed));

struct sensor_packet_humidity {
    struct sensor_metadata metadata;
    float value;
} __attribute__((packed));

struct sensor_packet_light {
    struct sensor_metadata metadata;
    uint8_t target_state;
} __attribute__((packed));

struct sensor_packet_rgb_light {
    struct sensor_metadata metadata;
    uint8_t red_state;
    uint8_t green_state;
    uint8_t blue_state;
} __attribute__((packed));
// --- End Structures ---

struct sensor_packet {
    struct sensor_header header;

    union sensor_data {
        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;
    } data;
} __attribute__((packed));

#endif  // PACKETS_H
```

8.5 include/slavemanager.h File Reference

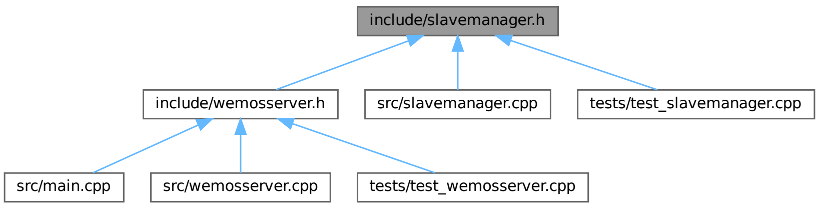
Header file for slavemanager.cpp.

```
#include <stddef.h>
#include <stdint.h>
#include "packets.h"
```

Include dependency graph for slavemanager.h:



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



Classes

- struct SlaveDevice

  Structure representing a slave device.
- class SlaveManager

Macros

- #define MAX_SLAVE_ID 0xFF

  Biggest possible slave ID.

8.5.1 Detailed Description

Header file for slavemanager.cpp.

This file contains declarations for the SlaveManager class and the SlaveDevice struct. The SlaveManager class is responsible for managing slave devices and their file descriptors.

Author

Daan Breur

Definition in file slavemanager.h.

8.5.2 Macro Definition Documentation

8.5.2.1 MAX_SLAVE_ID

```
#define MAX_SLAVE_ID 0xFF
```

Biggest possible slave ID.

Definition at line 16 of file slavemanager.h.

8.6 slavemanager.h

Go to the documentation of this file.

```
00001
00010 #ifndef SLAVEMANAGER_H
00011 #define SLAVEMANAGER_H
00012
00016 #define MAX_SLAVE_ID 0xFF
00017
00018 #include <stddef.h>
00019 #include <stdint.h>
00020
00021 #include "packets.h"
00022
00027 struct SlaveDevice {
00028     int fd;
00029     struct sensor_packet sensor_data;
00030 };
00031
00032 class SlaveManager {
00033    private:
00034     SlaveDevice slave_devices[MAX_SLAVE_ID + 1];
00035
00036    public:
00037     SlaveManager();
00038     ~SlaveManager();
00039
00040     SlaveManager(const SlaveManager &) = delete;
00041     SlaveManager &operator=(const SlaveManager &) = delete;
00042     SlaveManager(SlaveManager &&) = delete;
00043     SlaveManager &operator=(SlaveManager &&) = delete;
00044
00051     void registerSlave(uint8_t slave_id, int fd);
00052
00059     void unregisterSlave(uint8_t slave_id);
00060
00068     int sendToSlave(uint8_t slave_id, const void *data, size_t length);
00069
00075     int getSlaveFD(uint8_t slave_id) const;
00076
00082     SlaveDevice getSlaveDevice(uint8_t slave_id) const;
00083 };
00084
00085 #endif
```

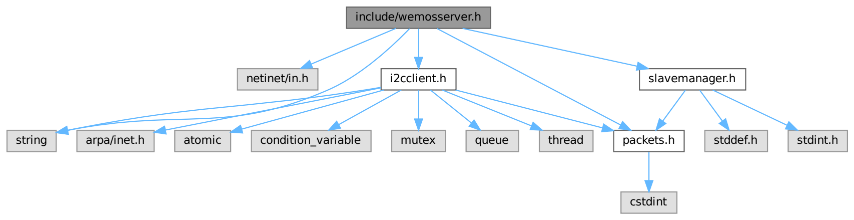
8.7 include/wemosserver.h File Reference

Header file for wemosserver.cpp.

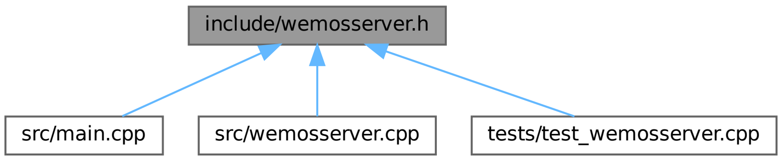
```
#include <netinet/in.h>
#include <string>
#include "i2cclient.h"
#include "packets.h"
```

```
#include "slavemanager.h"
```

Include dependency graph for wemosserver.h:



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



Classes

- class WemosServer

8.7.1 Detailed Description

Header file for wemosserver.cpp.

This file contains declarations for the classes and functions used in the Wemos server application.

Author

Daan Breur

Definition in file wemosserver.h.

8.8 wemosserver.h

Go to the documentation of this file.

```
#ifndef WEMOSSERVER_H
#define WEMOSSERVER_H

#include <netinet/in.h>

#include <string>

#include "i2cclient.h"
#include "packets.h"
#include "slavemanager.h"

class WemosServer {
  private:
   int server_fd;
   struct sockaddr_in listen_address;

   I2CClient i2c_client;
   std::string hub_ip;
   int hub_port;

   SlaveManager slave_manager;

   void handleClient(int client_fd, const struct sockaddr_in &client_address);

   void processSensorData(const struct sensor_packet *data);

   void sendToDashboard(int dashboard_fd, uint8_t sensor_id);

  public:
   WemosServer(int port, const std::string &hub_ip, int hub_port);
   ~WemosServer();

   WemosServer(const WemosServer &) = delete;
   WemosServer &operator=(const WemosServer &) = delete;
   WemosServer(WemosServer &&) = delete;
   WemosServer &operator=(WemosServer &&) = delete;

   void socketSetup();

   void setupI2cClient();

   void start();

   void tearDown();
};

#endif
```

8.9 modules.dox File Reference

8.10 README.md File Reference

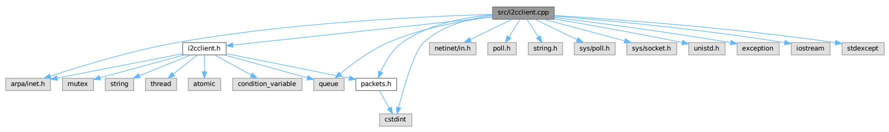
8.11 src/i2cclient.cpp File Reference

Implementation of I2CClient class.

```
#include "i2cclient.h"
#include <arpa/inet.h>
#include <netinet/in.h>
#include <poll.h>
#include <string.h>
#include <sys/poll.h>
#include <sys/socket.h>
#include <unistd.h>
```

```
#include <cstdint>
#include <exception>
#include <iostream>
#include <queue>
#include <stdexcept>
#include "packets.h"
```

Include dependency graph for i2cclient.cpp:



Macros

- #define BUFFER_SIZE 1024
- #define THREAD_RELINQUISH(mut)

8.11.1 Detailed Description

Implementation of I2CClient class.

Author

Daan Breur

Erynn Scholtes

Definition in file i2cclient.cpp.

8.11.2 Macro Definition Documentation

8.11.2.1 BUFFER_SIZE

```
#define BUFFER_SIZE 1024
```

Definition at line 26 of file i2cclient.cpp.

8.11.2.2 THREAD_RELINQUISH

```
#define THREAD_RELINQUISH(
                mut )
```

Value:

```
    {                                  \
        mut.unlock();                  \
        continue;                      \
    }
```

Definition at line 39 of file i2cclient.cpp.

8.12 i2cclient.cpp

Go to the documentation of this file.

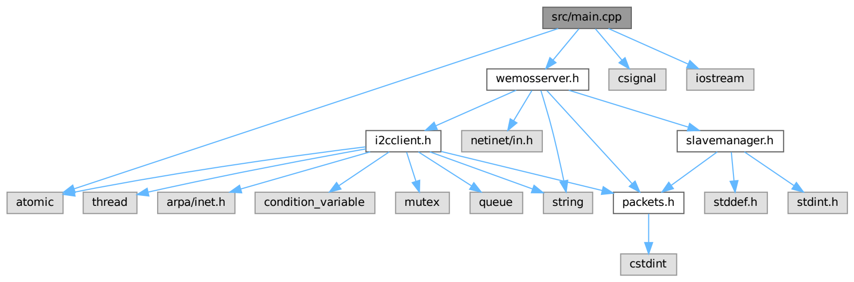
```
#include "i2cclient.h"

#include <arpa/inet.h>
#include <netinet/in.h>
#include <poll.h>
#include <string.h>
#include <sys/poll.h>
#include <sys/socket.h>
#include <unistd.h>

#include <cstdint>
#include <exception>
#include <iostream>
#include <queue>
#include <stdexcept>

#include "packets.h"

#define BUFFER_SIZE 1024

I2CClient::I2CClient() : client_fd(-1), connected(false), running(false) {
    memset(&hub_address, 0, sizeof(hub_address));
}

I2CClient::~I2CClient() {
    if (connected) closeConnection();
}

// first unlocks the mutex passed, then continues in the while loop
// WARNING: ! only use when the mutex is currently locked !
// just "continue;" otherwise
#define THREAD_RELINQUISH(mut) \
    {                          \
        mut.unlock();          \
        continue;              \
    }

void I2CClient::receiveLoop() {
    uint8_t receive_buffer[BUFFER_SIZE] = {0};
    struct pollfd pf;

    pf.fd = client_fd;
    pf.events = POLLIN;

    while (true == running && true == connected) {
        // TODO: revise error handling within the loop;
        // maybe always stop loop on error, instead of just continuing?
        // problem for another time :clueless:
        // - Erynn

        receive_mutex.lock();

        // poll offers an easy way to wait up to one second between iterations
        int sockets_ready = poll(&pf, 1, 1000);

        if (sockets_ready < 1) {
            // something went wrong
            if (sockets_ready == -1) perror("poll() failed");  // error happened, else timeout

            THREAD_RELINQUISH(receive_mutex);
        }

        // if we get here, there is guaranteed to be readable data.
        // either this data is because the other end disconnected, or because there
        // is proper data to read from the wire
        int amount_read = recv(pf.fd, receive_buffer, BUFFER_SIZE, MSG_DONTWAIT);

        if (amount_read == -1) {
            // error occured, errno set
            perror("recv() failed");

            THREAD_RELINQUISH(receive_mutex);
        } else if (amount_read == 0) {
            // socket disconnected
            connected = false;
            running = false;
            client_fd = -1;

            THREAD_RELINQUISH(receive_mutex);
        }

        receive_mutex.unlock();

        std::cout « "Received " « amount_read « " bytes from Raspberry PI I2C controller."
                  « std::endl;

        for (int i = 0; i < amount_read; ++i) {
            printf("%02X ", receive_buffer[i]);
        }
        printf("\n");

        {
            size_t buffer_offset = 0;

            do {
                const struct sensor_header *head =
                    (const struct sensor_header *)&receive_buffer[buffer_offset];
                uint8_t length = head->length;
                uint8_t p_type = (uint8_t)head->ptype;

                uint8_t s_type = receive_buffer[sizeof(*head)];

                if ((buffer_offset + sizeof(*head) + length) > amount_read) {
                    // oopsie woopsie; incomplete packet from RPI
                    printf(
                        "We received an incomplete packet from the Raspberry Pi I2C controller; "
                        "Discarding...\n");
                    break;
                }

                struct sensor_packet packet = {0};
                int to_copy = sizeof(*head) + length;
                if (to_copy > sizeof(packet)) to_copy = sizeof(packet);
                memcpy(&packet, receive_buffer + buffer_offset, to_copy);

                queue_mutex.lock();
                read_packets_queue.push(packet);
                queue_mutex.unlock();
                queue_condition.notify_one();  // maybe switch this with the line before if issues
                                               // occur - Erynn

                buffer_offset += sizeof(*head) + length;
            } while (buffer_offset + sizeof(struct sensor_header) <= amount_read);
        }
    }

    std::terminate();
}

void I2CClient::setup(const std::string &hub_ip, int hub_port) {
    if (inet_pton(AF_INET, hub_ip.c_str(), &hub_address.sin_addr) <= 0) {
        perror("inet_pton()");
        throw std::invalid_argument("Invalid IP address");
    }

    if (hub_port <= 0 || hub_port > 65535) throw std::invalid_argument("Invalid port number");

    hub_address.sin_family = AF_INET;
    hub_address.sin_port = htons(hub_port);
}

bool I2CClient::openConnection() {
    if (client_fd >= 0) {
        close(client_fd);
        client_fd = -1;
    }
    connected = false;

    std::string ip(inet_ntoa(hub_address.sin_addr));
    uint16_t port = ntohs(hub_address.sin_port);

    std::cout « "Connecting to I2C hub at " « ip « ":" « port « std::endl;

    client_fd = socket(AF_INET, SOCK_STREAM, 0);
    if (client_fd < 0) {
        std::cerr « "Socket creation failed" « std::endl;
        return false;
    }

    if (connect(client_fd, (struct sockaddr *)&hub_address, sizeof(hub_address)) < 0) {
        int err = errno;
        std::cerr « "Connection failed: " « strerror(err) « std::endl;
        close(client_fd);
        client_fd = -1;
        return false;
    }

    std::cout « "Connected to I2C hub at " « ip « ":" « port « std::endl;
    connected = true;

    return true;
}

void I2CClient::start() {
    if (!connected) {
        std::cerr
            « "Could not start communicating with I2C-bridge because not connected to I2C hub"
            « std::endl;
        throw std::runtime_error("Not connected to I2C-bridge");
    }

    running = true;
    receive_thread = std::thread(&I2CClient::receiveLoop, this);
}

void I2CClient::closeConnection() {
    if (!connected) {
        std::cerr « "Could not close the connection to I2C-bridge because not connected to I2C "
                     "hub (either already closed, or never connected in the first place)"
                  « std::endl;
        return;
    }

    running = false;
    receive_thread.join();
}

void I2CClient::sendRawData(uint8_t *data, size_t length) {
    if (send(client_fd, data, length, 0) == -1) {
        perror("send() failed");
        throw std::runtime_error("Sending data to I2C-bridge failed");
    }
}

struct sensor_packet I2CClient::retrievePacket(bool block) {
    queue_mutex.lock();

    if (read_packets_queue.size() < 1 && !block) {
        // there are no packets available to retrieve,
        // and we're not blocking
        queue_mutex.unlock();
        throw std::runtime_error("No packet data available to retrieve from I2C-bridge");
    } else if (read_packets_queue.size() < 1) {
        // there are no packets available, but we block until there is
        std::unique_lock lk(queue_mutex);
        queue_condition.wait(lk);
    }

    struct sensor_packet return_packet;
    memcpy(&return_packet, &read_packets_queue.front(), sizeof(return_packet));
    read_packets_queue.pop();

    queue_mutex.unlock();

    return return_packet;
}
```

8.13 src/main.cpp File Reference

Main entrypoint for Wemos Bridge Server application.

```
#include <atomic>
#include <csignal>
#include <iostream>
#include "wemosserver.h"
```

Include dependency graph for main.cpp:



Macros

- #define SERVER_PORT 5000
- #define I2C_HUB_IP "10.0.0.3"
- #define I2C_HUB_PORT 5000

Functions

- std::atomic< bool > global_shutdown_flag (false)
- void signalHandler (int signum)
- int main ()

8.13.1 Detailed Description

Main entrypoint for Wemos Bridge Server application.

Definition in file main.cpp.

8.13.2 Macro Definition Documentation

8.13.2.1 I2C_HUB_IP

```
#define I2C_HUB_IP "10.0.0.3"
```

Definition at line 13 of file main.cpp.

8.13.2.2 I2C_HUB_PORT

```
#define I2C_HUB_PORT 5000
```

Definition at line 14 of file main.cpp.

8.13.2.3 SERVER_PORT

```
#define SERVER_PORT 5000
```

Definition at line 12 of file main.cpp.

8.13.3 Function Documentation

8.13.3.1 global_shutdown_flag()

```
std::atomic< bool > global_shutdown_flag (
             false )
```

8.13.3.2 main()

```
int main ( )
```

Definition at line 25 of file main.cpp.

8.13.3.3 signalHandler()

```
void signalHandler (
             int signum )
```

Definition at line 18 of file main.cpp.

8.14 main.cpp

Go to the documentation of this file.

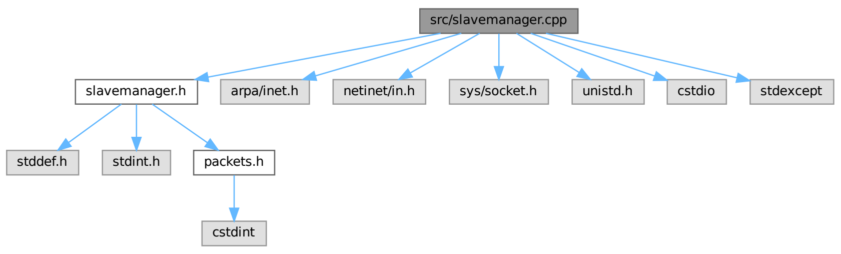
```
00001
00006 #include <atomic>
00007 #include <csignal>
00008 #include <iostream>
00009
00010 #include "wemosserver.h"
00011
00012 #define SERVER_PORT 5000
00013 #define I2C_HUB_IP "10.0.0.3"
00014 #define I2C_HUB_PORT 5000
00015
00016 std::atomic<bool> global_shutdown_flag(false);
00017
00018 void signalHandler(int signum) {
00019     std::cout « "Interrupt signal (" « signum « ") received.\n";
00020     if (signum == SIGINT || signum == SIGTERM) {
00021         global_shutdown_flag = true;
00022     }
00023 }
00024
00025 int main() {
00026     setbuf(stdout, NULL);
00027     std::cout « "Starting Wemos Bridge on port " « SERVER_PORT « std::endl;
00028
00029     // signal(SIGINT, signalHandler);
00030     // signal(SIGTERM, signalHandler);
00031
00032     WemosServer server(SERVER_PORT, I2C_HUB_IP, I2C_HUB_PORT);
00033     server.start();
00034
00035     return 0;
00036 }
```

8.15 src/slavemanager.cpp File Reference

Implementation of SlaveManager class.

```
#include "slavemanager.h"
#include <arpa/inet.h>
#include <netinet/in.h>
#include <sys/socket.h>
#include <unistd.h>
#include <cstdio>
#include <stdexcept>
```

Include dependency graph for slavemanager.cpp:



8.15.1 Detailed Description

Implementation of SlaveManager class.

Author

Daan Breur

Definition in file slavemanager.cpp.

8.16 slavemanager.cpp

Go to the documentation of this file.

```

#include "slavemanager.h"

#include <arpa/inet.h>
#include <netinet/in.h>
#include <sys/socket.h>
#include <unistd.h>

#include <cstdio>
#include <stdexcept>

SlaveManager::SlaveManager() {
    for (int i = 0; i <= MAX_SLAVE_ID; ++i) {
        slave_devices[i].fd = -1;
    }
}

SlaveManager::~SlaveManager() {
    for (int i = 0; i <= MAX_SLAVE_ID; ++i) {
        if (slave_devices[i].fd >= 0) {
            close(slave_devices[i].fd);
            slave_devices[i].fd = -1;
        }
    }
}

void SlaveManager::registerSlave(uint8_t slave_id, int fd) {
    if (slave_id > MAX_SLAVE_ID || slave_id < 0) {
        printf("Invalid slave ID=%u\n", slave_id);
        throw std::invalid_argument("Invalid slave ID");
    }

    printf("Registering new slave ID=%u\n", slave_id);

    slave_devices[slave_id].fd = fd;
}

void SlaveManager::unregisterSlave(uint8_t slave_id) {
    if (slave_id > MAX_SLAVE_ID || slave_id < 0) {
        printf("Invalid slave ID=%u\n", slave_id);
        throw std::invalid_argument("Invalid slave ID");
    }

    printf("Unregistering slave ID=%u\n", slave_id);
    close(slave_devices[slave_id].fd);
    slave_devices[slave_id].fd = -1;
}

int SlaveManager::sendToSlave(uint8_t slave_id, const void *data, size_t length) {
    if (slave_id > MAX_SLAVE_ID || slave_id < 0) {
        printf("Invalid slave ID=%u\n", slave_id);
        throw std::invalid_argument("Invalid slave ID");
    }

    printf("Sending %zu bytes to slave ID=%u\n", length, slave_id);
    if (slave_devices[slave_id].fd < 0) {
        printf("Slave ID=%u not registered\n", slave_id);
        return -1;
    }

    ssize_t bytes_sent = send(slave_devices[slave_id].fd, data, length, 0);
    if (bytes_sent < 0) {
        perror("send to slave failed");
        return -1;
    }

    return 0;
}

int SlaveManager::getSlaveFD(uint8_t slave_id) const {
    if (slave_id > MAX_SLAVE_ID || slave_id < 0) {
        printf("Invalid slave ID=%u\n", slave_id);
        throw std::invalid_argument("Invalid slave ID");
    }

    return slave_devices[slave_id].fd;
}

SlaveDevice SlaveManager::getSlaveDevice(uint8_t slave_id) const {
    if (slave_id > MAX_SLAVE_ID || slave_id < 0) {
        printf("Invalid slave ID=%u\n", slave_id);
        throw std::invalid_argument("Invalid slave ID");
    }

    return slave_devices[slave_id];
}
```

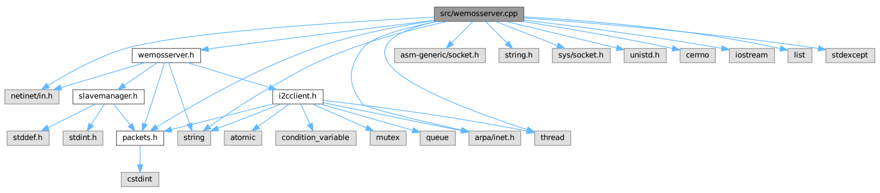
8.17 src/wemosserver.cpp File Reference

Implementation of WemosServer class.

```
#include "wemosserver.h"
#include <arpa/inet.h>
#include <asm-generic/socket.h>
#include <netinet/in.h>
#include <string.h>
#include <sys/socket.h>
```

```
#include <unistd.h>
#include <cerrno>
#include <iostream>
#include <list>
#include <stdexcept>
#include <string>
#include <thread>
#include "packets.h"
```

Include dependency graph for wemosserver.cpp:



Macros

- #define BUFFER_SIZE 1024

  Maximum data size to be read or sent over the wire.
- #define MAX_CLIENTS 100

  Maximum number of clients that can be connected to the server.

8.17.1 Detailed Description

Implementation of WemosServer class.

This file contains the implementation of the WemosServer class, which handles the server functionality for the Wemos device. It includes methods for setting up the server, handling client connections, and communicating with the I2C hub.

Author

Daan Breur

Definition in file wemosserver.cpp.

8.17.2 Macro Definition Documentation

8.17.2.1 BUFFER_SIZE

```
#define BUFFER_SIZE 1024
```

Maximum data size to be read or sent over the wire.

Definition at line 31 of file wemosserver.cpp.

8.17.2.2 MAX_CLIENTS

```
#define MAX_CLIENTS 100
```

Maximum number of clients that can be connected to the server.

Definition at line 36 of file wemosserver.cpp.

8.18 wemosserver.cpp

Go to the documentation of this file.

```
00001
00010 #include "wemosserver.h"
00011
00012 #include <arpa/inet.h>
00013 #include <asm-generic/socket.h>
00014 #include <netinet/in.h>
00015 #include <string.h>
00016 #include <sys/socket.h>
00017 #include <unistd.h>
00018
00019 #include <cerrno>
00020 #include <iostream>
00021 #include <list>
00022 #include <stdexcept>
00023 #include <string>
00024 #include <thread>
00025
00026 #include "packets.h"
00027
00031 #define BUFFER_SIZE 1024
00032
00036 #define MAX_CLIENTS 100
00037
00038 // private methods start here
00039 void WemosServer::handleClient(int client_fd, const struct sockaddr_in &client_address) {
00040     uint8_t buffer[BUFFER_SIZE] = {0};
00041     ssize_t bytes_received;
00042
00043     std::cout « "Thread " « std::this_thread::get_id() « " : Connection accepted from "
00044               « inet_ntoa(client_address.sin_addr) « ':' « ntohs(client_address.sin_port)
00045               « std::endl;
00046
00047     while ((bytes_received = recv(client_fd, buffer, BUFFER_SIZE, 0)) > 0) {
00048         printf("Received %zd bytes from %s:%d:\n", bytes_received,
00049                inet_ntoa(client_address.sin_addr), ntohs(client_address.sin_port));
00050
00051         for (int i = 0; i < bytes_received; i++) printf("%02X ", buffer[i]);
00052         printf("\n");
00053
00054         size_t offset = 0;
00055         while (offset + 2 <= bytes_received) {
00056             struct sensor_packet *pkt_ptr = (struct sensor_packet *)&buffer[offset];
00057             uint8_t data_length = pkt_ptr->header.length;
00058             PacketType ptype = pkt_ptr->header.ptype;
00059             SensorType s_type = pkt_ptr->data.generic.metadata.sensor_type;
00060
00061             if (offset + data_length + sizeof(struct sensor_header) > bytes_received) {
00062                 printf("Incomplete packet received, discarding\n");
00063                 break;
00064             }
00065
00066             switch (ptype) {
00067                 case PacketType::DATA:
00068                     printf("Packet length: %u, type: %u\n", data_length, s_type);
00069
00070                     processSensorData((const struct sensor_packet *)&buffer[offset]);
00071                     break;
00072
00073                 case PacketType::HEARTBEAT:
00074                     printf("Heartbeat packet: ID=%u, type=%u\n",
00075                            pkt_ptr->data.heartbeat.metadata.sensor_id,
00076                            pkt_ptr->data.heartbeat.metadata.sensor_type);
00077
00078                     // Register the slave device
00079                     slave_manager.registerSlave(pkt_ptr->data.heartbeat.metadata.sensor_id,
00080                                                 client_fd);
```

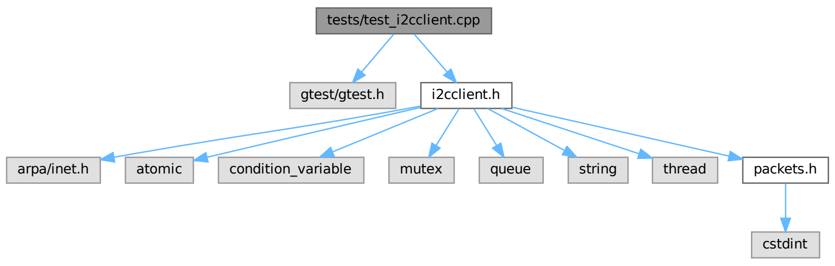
```
                    break;

                case PacketType::DASHBOARD_GET:
                    printf("Dashboard requested data on sensor: ID=%u, type=%u",
                           pkt_ptr->data.generic.metadata.sensor_id,
                           pkt_ptr->data.generic.metadata.sensor_type);

                    sendToDashboard(client_fd, pkt_ptr->data.generic.metadata.sensor_id);
                    break;

                case PacketType::DASHBOARD_POST:
                    // the dashboard is trying to update something

                    break;

                default:
                    // unknown packet type
                    break;
            }

            offset += data_length + sizeof(struct sensor_header);
        }
    }

    if (bytes_received == 0) {
        printf("Connection closed by %s:%d\n", inet_ntoa(client_address.sin_addr),
               ntohs(client_address.sin_port));
    } else if (bytes_received < 0) {
        perror("recv failed");
    }

    close(client_fd);
}

void WemosServer::processSensorData(const struct sensor_packet *packet) {
    switch (packet->data.generic.metadata.sensor_type) {
        case SensorType::BUTTON: {
            printf("Processing button data: ID=%u\n", packet->data.generic.metadata.sensor_id);

            // TODO: een tafel-knop ingedrukt
            /*
            if (btn->id == 0x69) {
                toggle_led(0x50);
                struct sensor_header header = {.length = sizeof(struct sensor_packet_light),
                                               .type = DATA};
                struct sensor_packet_light led_control = {
                    .type = LIGHT, .id = 0x50, .target_state = get_led_state(0x50)};

                uint8_t buffer[sizeof(struct sensor_header) + sizeof(struct sensor_packet_light)] =
                    {0};
                memcpy(buffer, &header, sizeof(header));
                memcpy(buffer + sizeof(header), &led_control, sizeof(led_control));

                send_to_slave(0x50, &buffer, sizeof(buffer));
            }

            if (btn->id == 0x70) {
                toggle_led(0x55);
                struct i2c_led_control led_control = {.led_number = 0x55,
                                                      .led_state = get_led_state(0x55)};
                send_to_rpi(&led_control, sizeof(led_control));
            }
            */

            break;
        }
        case SensorType::TEMPERATURE: {
            printf("Processing temperature data: ID=%u, Value=%.2f\n",
                   packet->data.temperature.metadata.sensor_id, packet->data.temperature.value);

            // TODO: do temperature things
            break;
        }
        case SensorType::CO2: {
            printf("Processing CO2 data: ID=%u, Value=%u\n", packet->data.co2.metadata.sensor_id,
                   packet->data.co2.value);

            // TODO: do CO2 things
            break;
        }
        case SensorType::HUMIDITY: {
            printf("Processing humidity data: ID=%u, Value=%.2f\n",
                   packet->data.humidity.metadata.sensor_id, packet->data.humidity.value);

            // TODO: do humidity things
            break;
        }
        default:
            printf("No action defined for sensor type %u\n",
                   packet->data.generic.metadata.sensor_type);
            break;
    }
}

void WemosServer::sendToDashboard(int dashboard_fd, uint8_t slave_id) {
    struct sensor_packet sensor_data;

    sensor_data = slave_manager.getSlaveDevice(slave_id).sensor_data;
    sensor_data.header.ptype = PacketType::DASHBOARD_RESPONSE;

    int length_to_send = sensor_data.header.length + sizeof(struct sensor_header);

    send(dashboard_fd, &sensor_data, length_to_send, 0);
}
// private methods end here

WemosServer::WemosServer(int port, const std::string &hub_ip, int hub_port)
    : server_fd(-1), hub_ip(hub_ip), hub_port(hub_port), i2c_client() {
    if (port <= 0 || port > 65535) throw std::invalid_argument("Invalid listen port number");

    if (INADDR_NONE == inet_addr(hub_ip.c_str()))
        throw std::invalid_argument("Invalid hub IP address passed");
    if (hub_port <= 0 || hub_port > 65535) throw std::invalid_argument("Invalid hub port passed");

    memset(&listen_address, 0, sizeof(listen_address));
    listen_address.sin_family = AF_INET;
    listen_address.sin_addr = {INADDR_ANY};
    listen_address.sin_port = htons(port);
}

WemosServer::~WemosServer() {
    tearDown();
    // other shit
}

void WemosServer::socketSetup() {
    if ((server_fd = socket(AF_INET, SOCK_STREAM | SOCK_NONBLOCK, 0)) < 0) {
        perror("socket() failed");
        throw std::runtime_error("socket() failed");
        exit(EXIT_FAILURE);
    }

    const int enable_opt = 1;
    if (setsockopt(server_fd, SOL_SOCKET, SO_REUSEADDR | SO_REUSEPORT, &enable_opt,
                   sizeof(enable_opt)) < 0) {
        perror("setsockopt() failed");
        throw std::runtime_error("setsockopt() failed");
        exit(EXIT_FAILURE);
    }

    if (bind(server_fd, (struct sockaddr *)&listen_address, sizeof(listen_address)) < 0) {
        perror("bind() failed");
        throw std::runtime_error("bind() failed");
        exit(EXIT_FAILURE);
    }

    if (listen(server_fd, MAX_CLIENTS) < 0) {
        perror("listen() failed");
        throw std::runtime_error("listen() failed");
        exit(EXIT_FAILURE);
    }

    std::cout « "Listening on port " « ntohs(listen_address.sin_port) « " (max " « MAX_CLIENTS
              « " clients)" « std::endl;
}

void WemosServer::setupI2cClient() { i2c_client.setup(hub_ip, hub_port); }

void WemosServer::start() {
    socketSetup();

    setupI2cClient();
    i2c_client.openConnection();
    i2c_client.start();

    while (true) {
        struct sensor_packet pkt;
        try {
            pkt = i2c_client.retrievePacket();
            // std::cout « "packet received from the I2C hub!" « std::endl;

            // now do things with the I2C packet if necessary

        } catch (std::runtime_error &exc) {
            /* this means there is no new I2C packet available */
            // std::cerr « exc.what() « std::endl;
        }

        struct sockaddr_in client_address;
        socklen_t client_addr_len = sizeof(client_address);
        int client_fd = accept(server_fd, (struct sockaddr *)&client_address, &client_addr_len);

        if (-1 == client_fd) {
            // no one tried to connect
            continue;
        }

        std::cout « "Connection accepted from " « inet_ntoa(client_address.sin_addr) « ":"
                  « ntohs(client_address.sin_port) « std::endl;

        handleClient(client_fd, client_address);
    }
}

void WemosServer::tearDown() {
    close(server_fd);
    i2c_client.closeConnection();
}
```

8.19 tests/test_i2cclient.cpp File Reference

Unit tests for I2CClient class.

```
#include <gtest/gtest.h>
#include "i2cclient.h"
```

Include dependency graph for test_i2cclient.cpp:



Functions

- TEST (I2CClientTests, setup_ValidPort)

  Test the setup() function with valid port numbers.
- TEST (I2CClientTests, setup_InvalidPort_Negative)
- TEST (I2CClientTests, setup_InvalidPort_Zero)
- TEST (I2CClientTests, setup_InvalidPort_High)

8.19.1 Detailed Description

Unit tests for I2CClient class.

Author

Daan Breur

Definition in file test_i2cclient.cpp.

8.20 test_i2cclient.cpp

Go to the documentation of this file.

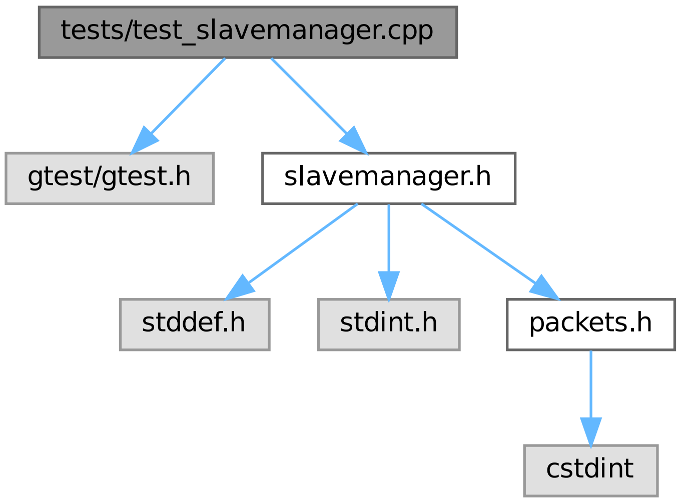
```
#include <gtest/gtest.h>

#include "i2cclient.h"

TEST(I2CClientTests, setup_ValidPort) {
    I2CClient server;
    EXPECT_NO_THROW(server.setup("10.0.0.1", 5000));
    EXPECT_NO_THROW(server.setup("10.0.0.1", 6969));
    EXPECT_NO_THROW(server.setup("10.0.0.1", 65535));
}

TEST(I2CClientTests, setup_InvalidPort_Negative) {
    I2CClient server;
    EXPECT_THROW(server.setup("10.0.0.1", -1), std::invalid_argument);
}

TEST(I2CClientTests, setup_InvalidPort_Zero) {
    I2CClient server;
    EXPECT_THROW(server.setup("10.0.0.1", 0), std::invalid_argument);
}

TEST(I2CClientTests, setup_InvalidPort_High) {
    I2CClient server;
    EXPECT_THROW(server.setup("10.0.0.1", 65536), std::invalid_argument);
    EXPECT_THROW(server.setup("10.0.0.1", 69696), std::invalid_argument);
}
```

8.21 tests/test_slavemanager.cpp File Reference

Unit tests for SlaveManager class.

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

Include dependency graph for test_slavemanager.cpp:



Functions

- TEST (SlaveManagerTests, RegisterSlave)
- TEST (SlaveManagerTests, UnregisterSlave)

8.21.1 Detailed Description

Unit tests for SlaveManager class.

Author

Daan Breur

Definition in file test_slavemanager.cpp.

8.21.2 Function Documentation

8.21.2.1 TEST() [1/2]

```
TEST (
            SlaveManagerTests ,
            RegisterSlave  )
```

Definition at line 10 of file test_slavemanager.cpp.

8.21.2.2 TEST() [2/2]

```
TEST (
            SlaveManagerTests ,
            UnregisterSlave  )
```

Definition at line 19 of file test_slavemanager.cpp.

8.22 test_slavemanager.cpp

Go to the documentation of this file.

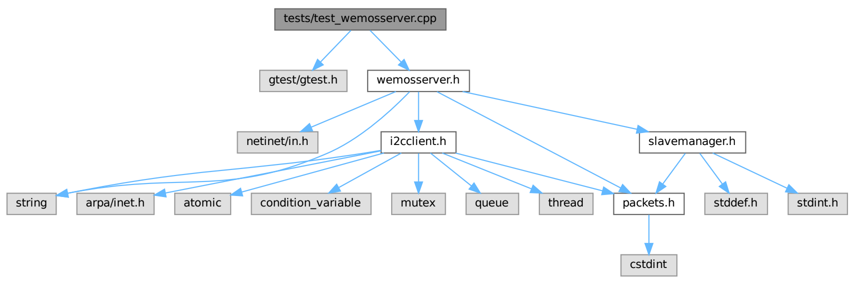
```
00001
00006 #include <gtest/gtest.h>
00007
00008 #include "slavemanager.h"
00009
00010 TEST(SlaveManagerTests, RegisterSlave) {
00011     SlaveManager manager;
00012     int fd = 5;
00013
00014     EXPECT_NO_THROW(manager.registerSlave(1, fd));
00015     EXPECT_EQ(manager.getSlaveFD(1), fd);
00016     EXPECT_EQ(manager.getSlaveDevice(1).fd, fd);
00017 }
00018
00019 TEST(SlaveManagerTests, UnregisterSlave) {
00020     SlaveManager manager;
00021     int fd = 5;
00022
00023     EXPECT_NO_THROW(manager.registerSlave(1, fd));
00024     EXPECT_EQ(manager.getSlaveFD(1), fd);
00025
00026     EXPECT_NO_THROW(manager.unregisterSlave(1));
00027     EXPECT_EQ(manager.getSlaveFD(1), -1);
00028     EXPECT_EQ(manager.getSlaveDevice(1).fd, -1);
00029 }
```

8.23 tests/test_wemosserver.cpp File Reference

Unit tests for WemosServer class.

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

Include dependency graph for test_wemosserver.cpp:



Functions

- TEST (WemosServerTest, Constructor_ValidPort)

  Test the constructor with valid port numbers.
- TEST (WemosServerTest, Constructor_InvalidPort_Negative)
- TEST (WemosServerTest, Constructor_InvalidPort_Zero)
- TEST (WemosServerTest, Constructor_InvalidPort_High)
- TEST (WemosServerTest, Constructor_ValidHubIPAddress)
- TEST (WemosServerTest, Constructor_InvalidHubIPAddress)

  Test the constructor with invalid hub IP addresses.
- TEST (WemosServerTest, Constructor_ValidHubPort)

  Test the constructor with valid hub port numbers.
- TEST (WemosServerTest, Constructor_InvalidHubPort_Negative)

  Test the constructor with invalid negative hub port numbers.
- TEST (WemosServerTest, Constructor_InvalidHubPort_High)

  Test the constructor with invalid hub port numbers.
- TEST (WemosServerTest, Constructor_InvalidHubPort_Zero)

  Test the constructor with invalid hub port numbers.

8.23.1 Detailed Description

Unit tests for WemosServer class.

This file contains unit tests for the WemosServer class, which handles the server functionality for the Wemos device. The tests cover various aspects of the class, including socket setup, client handling, and communication with the I2C hub.

Author

Daan Breur

Definition in file test_wemosserver.cpp.

8.23.2 Function Documentation

8.23.2.1 TEST() [1/10]

```
TEST (
            WemosServerTest ,
            Constructor_InvalidHubIPAddress  )
```

Test the constructor with invalid hub IP addresses.

Test WemosServerTest.Constructor_InvalidHubIPAddress

- Verify that the constructor throws an exception when an invalid hub IP address is provided.
- Testcases include:
  - Empty string
  - Invalid IP format (e.g., "192.168.0")
  - Non-numeric characters (e.g., "invalid_ip")
  - Out of range IP address (e.g., "256.256.256.256")
- Expects std::invalid_argument to be thrown.

Definition at line 88 of file test_wemosserver.cpp.

8.23.2.2 TEST() [2/10]

```
TEST (
            WemosServerTest ,
            Constructor_InvalidHubPort_High  )
```

Test the constructor with invalid hub port numbers.

Test WemosServerTest.Constructor_InvalidHubPort_High

- Test the constructor of WemosServer with invalid hub port numbers that are to high.
- Expect std::invalid_argument to be thrown.

Definition at line 125 of file test_wemosserver.cpp.

8.23.2.3 TEST() [3/10]

```
TEST (
            WemosServerTest ,
            Constructor_InvalidHubPort_Negative  )
```

Test the constructor with invalid negative hub port numbers.

Test WemosServerTest.Constructor_InvalidHubPort_Negative

- Test the constructor of WemosServer with invalid hub port numbers that are negative.
- Expect std::invalid_argument to be thrown.

Definition at line 113 of file test_wemosserver.cpp.

8.23.2.4 TEST() [4/10]

```
TEST (
            WemosServerTest ,
            Constructor_InvalidHubPort_Zero  )
```

Test the constructor with invalid hub port numbers.

Test WemosServerTest.Constructror_InvalidHubPort_Zero

- Test the constructor of WemosServer with invalid hub port numbers that are zero.
- Expect std::invalid_argument to be thrown.

Definition at line 138 of file test_wemosserver.cpp.

8.23.2.5 TEST() [5/10]

```
TEST (
            WemosServerTest ,
            Constructor_InvalidPort_High  )
```

Test WemosServerTest.Constructor_InvalidPort_High

- Verify that the constructor throws an exception when a port number greater than 65535 is provided.
- Expects std::invalid_argument to be thrown.

Definition at line 58 of file test_wemosserver.cpp.

8.23.2.6 TEST() [6/10]

```
TEST (
            WemosServerTest ,
            Constructor_InvalidPort_Negative  )
```

Test WemosServerTest.Constructor_InvalidPort_Negative

- Verify that the constructor throws an exception when a negative port number is provided.
- Expects std::invalid_argument to be thrown.

Definition at line 35 of file test_wemosserver.cpp.

8.23.2.7 TEST() [7/10]

```
TEST (
            WemosServerTest ,
            Constructor_InvalidPort_Zero  )
```

Test WemosServerTest.Constructor_InvalidPort_Zero

- Verify that the constructor throws an exception when a port number of zero is provided.
- Expects std::invalid_argument to be thrown.

Definition at line 46 of file test_wemosserver.cpp.

8.23.2.8 TEST() [8/10]

```
TEST (
            WemosServerTest ,
            Constructor_ValidHubIPAddress  )
```

Test WemosServerTest.Constructor_ValidHubIPAddress

- Test the constructor of WemosServer with valid hub IP addresses.
- Expect no exceptions to be thrown.

Definition at line 70 of file test_wemosserver.cpp.

8.23.2.9 TEST() [9/10]

```
TEST (
            WemosServerTest ,
            Constructor_ValidHubPort  )
```

Test the constructor with valid hub port numbers.

Test WemosServerTest.Constructor_ValidHubPort

Definition at line 99 of file test_wemosserver.cpp.

8.23.2.10 TEST() [10/10]

```
TEST (
            WemosServerTest ,
            Constructor_ValidPort  )
```

Test the constructor with valid port numbers.

Test WemosServerTest.Constructor_ValidPort

- Test the constructor of WemosServer with valid port numbers.
- Expect no exceptions to be thrown.

Definition at line 22 of file test_wemosserver.cpp.

8.24 test_wemosserver.cpp

Go to the documentation of this file.

```
00001
00010 #include <gtest/gtest.h>
00011
00012 #include "wemosserver.h"
00013
00022 TEST(WemosServerTest, Constructor_ValidPort) {
00023     EXPECT_NO_THROW(WemosServer server(5000, "10.0.0.1", 5000));
00024     EXPECT_NO_THROW(WemosServer server(6969, "10.0.0.1", 5000));
00025     EXPECT_NO_THROW(WemosServer server(65535, "10.0.0.1", 5000));
00026 }
00027
00035 TEST(WemosServerTest, Constructor_InvalidPort_Negative) {
00036     EXPECT_THROW(WemosServer server(-1, "10.0.0.1", 5000), std::invalid_argument);
00037 }
00038
00046 TEST(WemosServerTest, Constructor_InvalidPort_Zero) {
00047     EXPECT_THROW(WemosServer server(0, "10.0.0.1", 5000), std::invalid_argument);
00048 }
00049
00058 TEST(WemosServerTest, Constructor_InvalidPort_High) {
00059     EXPECT_THROW(WemosServer server(65536, "10.0.0.1", 5000), std::invalid_argument);
00060     EXPECT_THROW(WemosServer server(69696, "10.0.0.1", 5000), std::invalid_argument);
00061 }
00062
00070 TEST(WemosServerTest, Constructor_ValidHubIPAddress) {
00071     EXPECT_NO_THROW(WemosServer server(5000, "10.0.0.1", 5000));
00072     EXPECT_NO_THROW(WemosServer server(5000, "192.168.10.10", 5000));
00073 }
00074
00088 TEST(WemosServerTest, Constructor_InvalidHubIPAddress) {
00089     EXPECT_THROW(WemosServer server(5000, "", 5000), std::invalid_argument);
00090     EXPECT_THROW(WemosServer server(5000, "invalid_ip", 5000), std::invalid_argument);
00091     EXPECT_THROW(WemosServer server(5000, "256.256.256.256", 5000), std::invalid_argument);
00092 }
00093
00099 TEST(WemosServerTest, Constructor_ValidHubPort) {
00100     EXPECT_NO_THROW(WemosServer server(5000, "10.0.0.1", 5000));
00101     EXPECT_NO_THROW(WemosServer server(5000, "10.0.0.1", 6969));
00102     EXPECT_NO_THROW(WemosServer server(5000, "10.0.0.1", 65535));
00103 }
00104
00113 TEST(WemosServerTest, Constructor_InvalidHubPort_Negative) {
00114     EXPECT_THROW(WemosServer server(5000, "10.0.0.1", -1), std::invalid_argument);
00115 }
00116
00125 TEST(WemosServerTest, Constructor_InvalidHubPort_High) {
00126     EXPECT_THROW(WemosServer server(5000, "10.0.0.1", 65536), std::invalid_argument);
00127     EXPECT_THROW(WemosServer server(5000, "10.0.0.1", 69696), std::invalid_argument);
00128 }
00129
00138 TEST(WemosServerTest, Constructor_InvalidHubPort_Zero) {
00139     EXPECT_THROW(WemosServer server(5000, "10.0.0.1", 0), std::invalid_argument);
00140 }
```

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