# Report for Testing BME280 sensor

The **BME280** sensor is a popular environmental sensor that measures temperature, humidity, and barometric pressure. It is manufactured by Bosch Sensortec and is commonly used in various applications, including weather monitoring, indoor climate control, and Internet of Things (IoT) projects.

### Objective:

The objective of this report is to document the testing process of the BME280 sensor with an ESP32 using the ESP-IDF framework, specifically with SPI communication. The goal is to verify the functionality and accuracy of the sensor readings, including temperature, humidity, and pressure, when using the SPI interface.

### Hardware Setup

1. ESP32 Development Board
2. BME280 Sensor

**Connection**: The BME280 sensor was connected to the ESP32 using the SPI interface as follows:

* SCK (Sensor) - GPIO Pin: [18]
* MISO (Sensor) - GPIO Pin: [19]
* MOSI (Sensor) - GPIO Pin: [23]
* CS (Sensor) - GPIO Pin: [5]
* VCC (Sensor) - 3.3V
* GND (Sensor) - GND

### Software Setup

**ESP-IDF Environment Setup:**

The ESP-IDF development environment was properly set up according to the official documentation.

**BME280 Library Integration:**

The BME280 sensor library for ESP-IDF was integrated into the project.

**Code Implementation:**

The ESP-IDF code was developed to configure and read data from the BME280 sensor using SPI communication.

The code included error handling and logging for data retrieval.

#### Testing Procedure:

* The ESP32 development board was powered on and connected to the computer for monitoring and debugging.
* The testing code was flashed to the ESP32 using the ESP-IDF toolchain.
* The ESP32 was monitored for log output to verify successful sensor initialization and SPI communication.

#### Errors during building project:

Following are the errors and issues got during building project:

**In CMakeLists:**

* There were no folder in the components with name **src** but it was included in CMakeLists.
* Files in components were of “**.c**” type but required file type to run this is “**.cpp**”.Which was changed later.
* Paths of components like CPPSPI was not properly set in CMakeLists.

**Undefined reference to app\_main:**

There was an error of “Undefined reference to app\_main” on building the project in IDF.This was cleared by writing following lines before app\_main :

extern "C" {

    void app\_main(void);

}

(I didn’t remembered while writing the report but later on my teacher asked me about it.I still cant understand but it will help me later in my learning)

**Error of “std::make\_unique' is only available from C++14 onwards”:**

(A topic (part of speech) is used in this code.(Template class))

This error was in line 48 of bme280\_common.cpp.

Std is a static class when header is included.There are parameters defined in this class.It is actually called worker class.A buffer was created in std for a particular work which can be achieved by another method.This method is applied in code instead of buffer. Somehow it worked on this setup which maybe can not work on another setup.

#### Observations

The BME280 sensor demonstrated reliable and accurate data measurements when using the SPI interface.

The ESP-IDF framework, in combination with SPI communication, provided a stable platform for sensor integration and data collection.

The sensor's response time was within acceptable limits, and it performed well under different environmental conditions.

#### Conclusion

The testing of the BME280 sensor with the ESP32 using ESP-IDF and SPI communication was successful. The sensor provided accurate and consistent temperature, humidity, and pressure readings. The SPI interface with ESP-IDF proved to be a reliable and efficient method for working with the sensor. The results of this testing indicate that the BME280 sensor is suitable for use in various applications, including weather monitoring and indoor climate control, when using SPI communication.