Introduction

The BME688 AI environmental sensor is a cutting-edge MEMS device that integrates **temperature, humidity, barometric pressure, and VOC detection** into a compact unit. With ±0.5°C temperature, ±3% humidity, and ±0.6 hPa pressure accuracy, it supports I2C/SPI communication for real-time data collection and is compatible with Arduino, Raspberry Pi, ESP32/ESP8266, making it ideal for indoor air quality monitoring, smart home systems, industrial safety, and AI-driven environmental research.

| Relative humidity barometric pressure	Excellent temperature stability	Humidity	Gas sensing

AI-Driven Gas Analysis

The BME688 AI Environmental sensor supports advanced AI gas detection through Bosch's BME AI-Studio ad BSEC2-Arduino library, enabling users to train custom models for specific gas profiles. Unlike the BME680, it serves as a direct data source for AI algorithms, ideal for air quality systems, industrial leak detection, and environmental studies.
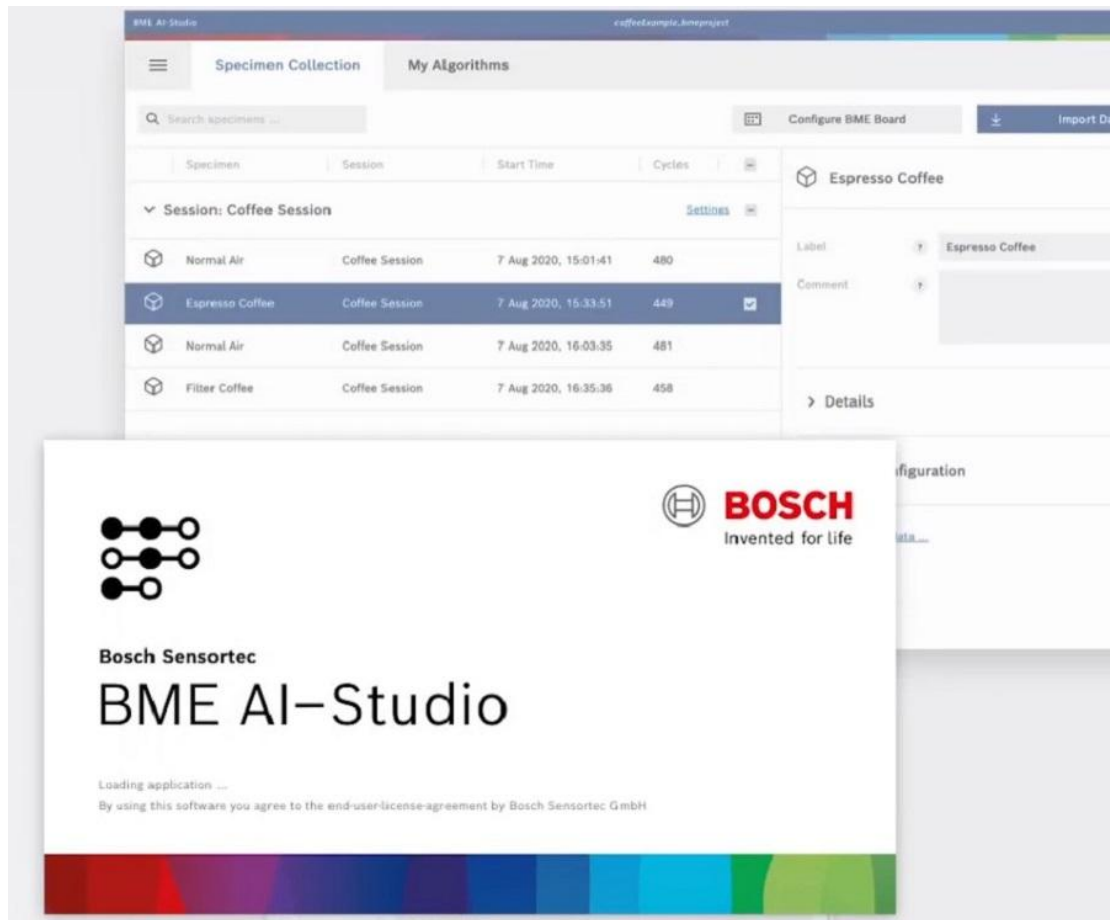
Highly Accurate Environmental Sensing

The BME688 AI Environmental sensor enhances the precision of temperature measurements, boasting an accuracy of ±0.5°C. These improvements render the sensor ideal for applications requiring highly accurate environmental data, including scientific experiments, climate research, and industrial environmental monitoring.

Advanced Air Quality Monitoring

The BME688 AI Environmental sensor excels in indoor air quality monitoring, detecting harmful VOCs and providing real-time data for smart homes. Its built-in heating layer ensures stable, accurate measurements by minimizing ambient interference.

Sensor Data IAQ Index	Air Quality
0 – 50	good[10]
51 – 100	average
101 – 150	little bad
151 – 200	bad
201 – 300	worse[2]
301 – 500	very bad

Applications

Indoor Air Quality Measurement: Detect VOCs and monitor air quality in homes and offices.

Weather Station: Provide accurate temperature, humidity, and pressure data for meteorological applications.

IoT: Integrate into smart devices for environmental monitoring.

Gas Leak Detection: Identify hazardous gas leaks in industrial settings.

Specification

Operating voltage: 3.3–5V DC (SPI only support 3.3V)

Operating current: 5mA (25mA when VOC measurement is enabled)

Output signal I2C/SPI Temperature Measurement Range: -40~+85°C

Temperature measurement accuracy: ±0.5°C (0–65°C)

Humidity measurement range: 0-100% R.H.

Humidity measurement accuracy: ±3% R.H. (20-80% R.H. @ 25°C)

Barometric pressure measurement range: 300-1100hPa

Barometric pressure measurement accuracy: ±0.6hPa (300-1100hPa@0~65°C)

Module size: 18×15.6 mm/0.71x0.61 inches

Documents

Product wiki

Pinout

Tutorial

Arduino library API list

Shipping List

Fermion: I2C BME688 Environmental Sensor x1

XH2.54-10pin Header x1