BNO055 SMART SENSOR

BNO055 Sensor User Manual

Purpose of the Document

The purpose of this document is to explain the BNO055 smart sensor board. This document contains the features of BNO055 sensor board and how to use its accelerometer, gyroscope, magnetometer.

Document History

Version	Author	Date	Description
A	5G HUB	11.23.2021	Initial Document

Table of Contents

1 Package Contents

1.1 BNO055 Sensor board

- BNO055 sensor board

1.2 Download

Arduino sketches for the BNO055 can be downloaded from the following website:
https://github.com/5ghub/5G-NB-IoT/tree/master/KitSketches

To use the board with Arduino IDE and starts running Arduino projects and sketches, install the following software:

Install Arduino IDE for Windows from the following website:
https://www.arduino.cc/en/Main/Software

Download and install Arduino library (**5G-NB-IoT_Arduino.zip**) here:
https://github.com/5ghub/5G-NB-IoT

2 Introduction

The BNO055 smart sensor board is a compact board that provides a triaxial 14-bit accelerometer, an accurate close-loop triaxial 16-bit gyroscope, a triaxial geomagnetic sensor and a 32-bit microcontroller running the BSX3.0 Fusion software. By integrating sensors and sensor fusion in a single device, the BNO055 makes integration easy, avoids complex multivendor solutions and thus simplifies innovations such as novel applications for IoT hardware. The BNO055 is the perfect choice for AR, immersive gaming, personal health and fitness, indoor navigation and any other application requiring context awareness. It is ideally suited for demanding applications such as augmented reality, navigation, gaming, robotics, or industrial applications.

3 Data Output

The BNO055 can output the following sensor data:

- **Absolute Orientation** (Euler Vector, 100Hz)
  Three axis orientation data based on a 360° sphere
- **Absolute Orientation** (Quaterion, 100Hz)
  Four-point quaternion output for more accurate data manipulation
- **Angular Velocity Vector** (100Hz)
  Three axis of 'rotation speed' in rad/s
- **Acceleration Vector** (100Hz)
  Three axis of acceleration (gravity + linear motion) in m/s^2
- **Magnetic Field Strength Vector** (20Hz)
  Three axis of magnetic field sensing in micro-Tesla (uT)
- **Linear Acceleration Vector** (100Hz)
  Three axis of linear acceleration data (acceleration minus gravity) in m/s^2
- **Gravity Vector** (100Hz)
  Three axis of gravitational acceleration (minus any movement) in m/s^2
- **Temperature** (1Hz)
  Ambient temperature in degrees Celsius

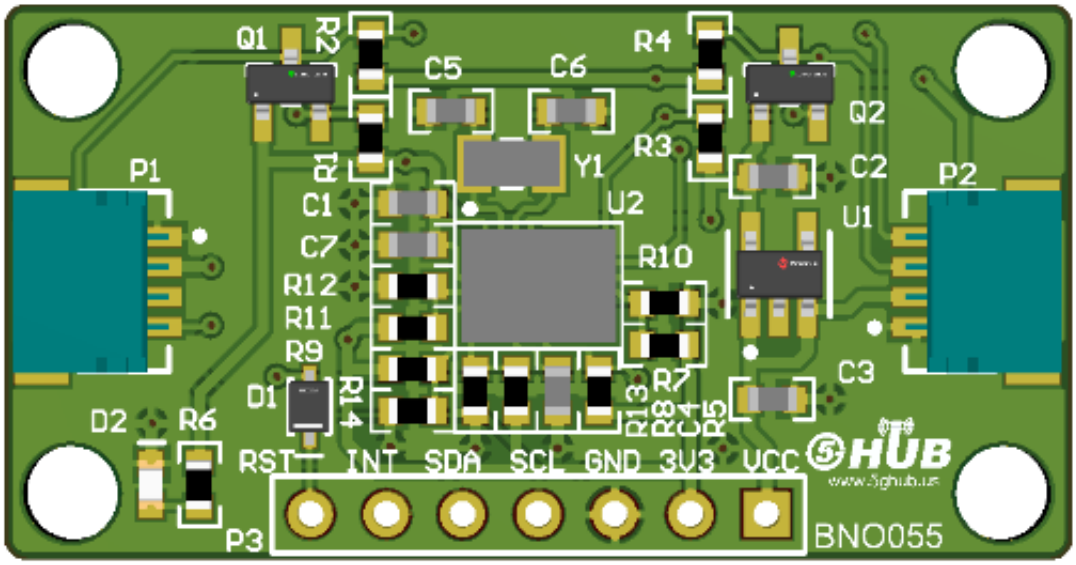
4 Feature Highlights

- Integrates accelerometer, gyroscope, geomagnetic sensors and a 32-bit microcontroller running the BSX3.0 Fusion software.
- Supports I2C interface
- Supports QWIIC interface for I2C
- Acceleration ranges ±2g/±4g/±8g/±16g
- Gyroscope ranges 125°/s to 2000°/s
- Magnetic field range typical ±1300 uT, ±2500 uT

5 Typical Applications

- Navigation
- Robotics
- Fitness & Well-being
- Augmented reality
- Context awareness
- Tablets and ultra-books
- Gaming and toys
- Internet of things

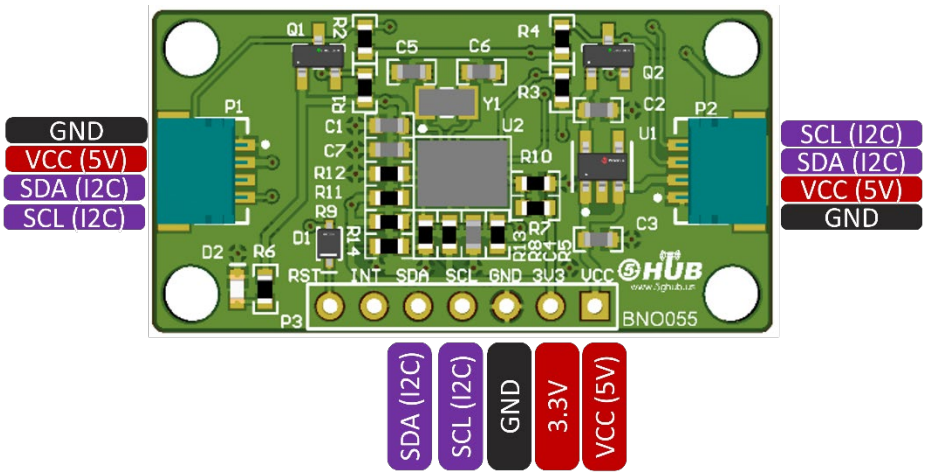
6 Hardware Board and Case Diagram



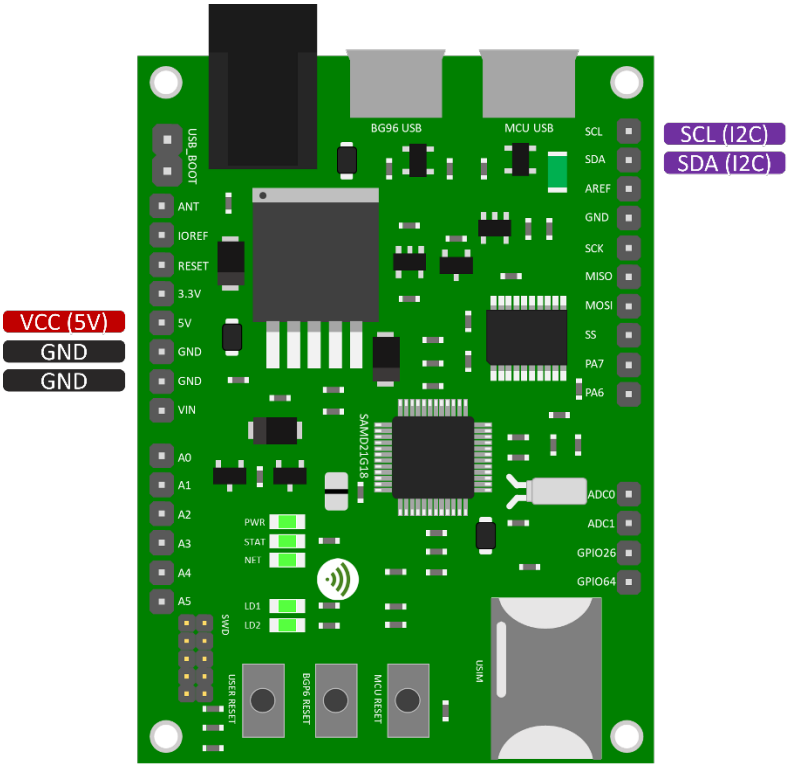
Pin #	Feature	Description
1	VCC	Input voltage (3.6V-5V)
2	3V3	Output 3.3V
3	GND	Ground
4	SCL	SCK for I2C/SPI
5	SDA	SDA for I2C/SPI
6	INT	Interrupt from BNO055
7	RST	Rest signal

7 Connecting using the I2C

I2C uses only two wires; **SCL** and **SDA.** The sensor board can be interfaced using these two wires only as depicted in this figure. Make sure to connect VCC and GND of the board to a source of 5V and GND.



If used with the NB-IOT board as below, connect the **SCL, SDA, GND, VCC** lines in the two boards together.



8 Working with Arduino

The sensor board can work with the 5G NB-IoT board or any other Arduino board. Simply connect VCC and GND to the sensor board and wire the two I2C wires between the Arduino board and sensor board. Run Arduino sketch, and you will see all readings from the BNO055 sensor module.

The following shows the Arduino sketch for BNO055 sensor board running and displaying temperature, Gyroscope, Magnetometer, Accelerometer readings.