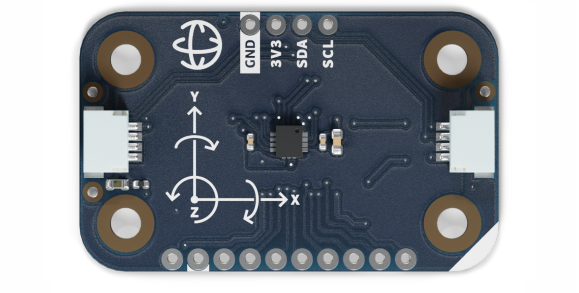
Product Reference Manual
SKU: ABX00101



Description

The Modulino® Movement, featuring the LSM6DSOXTR sensor, measures acceleration and rotation providing comprehensive data for motion detection applications. It's ideal for projects involving gesture recognition, pedometers, and vibration monitoring.

Target Areas

Maker, beginner, education

Contents

1 Application Examples

Below are some project ideas focused on the Modulino® Movement module and its built-in LSM6DSOXTR sensor:

- **Gesture Recognition:** Harness the 6-axis motion data (accelerometer + gyroscope) to detect custom gestures. You can create interactive controls for games, user interfaces, or home automation—triggering actions when certain patterns (e.g., wrist flicks or device shakes) are recognized.
- **Step Counter or Pedometer:** Use the accelerometer data to count steps accurately in wearable or fitness-related projects. Log daily movements or design health-oriented applications that notify users of their activity progress.
- **Vibration Monitoring:** Monitor vibrations in appliances, machinery, or vehicles using the sensor's high-sensitivity accelerometer. Detect anomalies, implement predictive maintenance strategies, or create alert systems for sudden impact or shock events.
- **Orientation and Tilt Control:** Measure real-time orientation in space. Ideal for creating tilt-based controls in interactive art installations, DIY game controllers, or robotics projects that respond to angular displacement.
- **IMU-based Stabilization:** Leverage both gyroscope and accelerometer data for advanced applications like robotics or drones, where real-time inertial measurements are used to maintain stability and smooth motion control.

2 Features

- Incorporates the LSM6DSOXTR sensor to measure acceleration and rotation.
- Communicates via I2C (Qwiic connector) or SPI (optional).
- Powered by 3.3 V from the Qwiic/I2C bus; supports 1.71 V–3.6 V sensor supply range.
- Designed with an additional 1×10 header for advanced signals and a cuttable jumper to isolate VDDIO if needed.
- Ideal for motion-detection and wearable applications (gesture recognition, pedometers, vibration monitoring).

2.1 Contents

SKU	Name	Purpose	Quantity
ABX00101	Modulino® Movement	Measure acceleration and rotation	1
	I2C Qwiic cable	Compatible with the Qwiic standard	1

3 Related Products

- *SKU: ASX00027* - Arduino® Sensor Kit
- *SKU: K000007* - Arduino® Starter Kit
- *SKU: AKX00026* - Arduino® Oplà IoT Kit

4 Rating

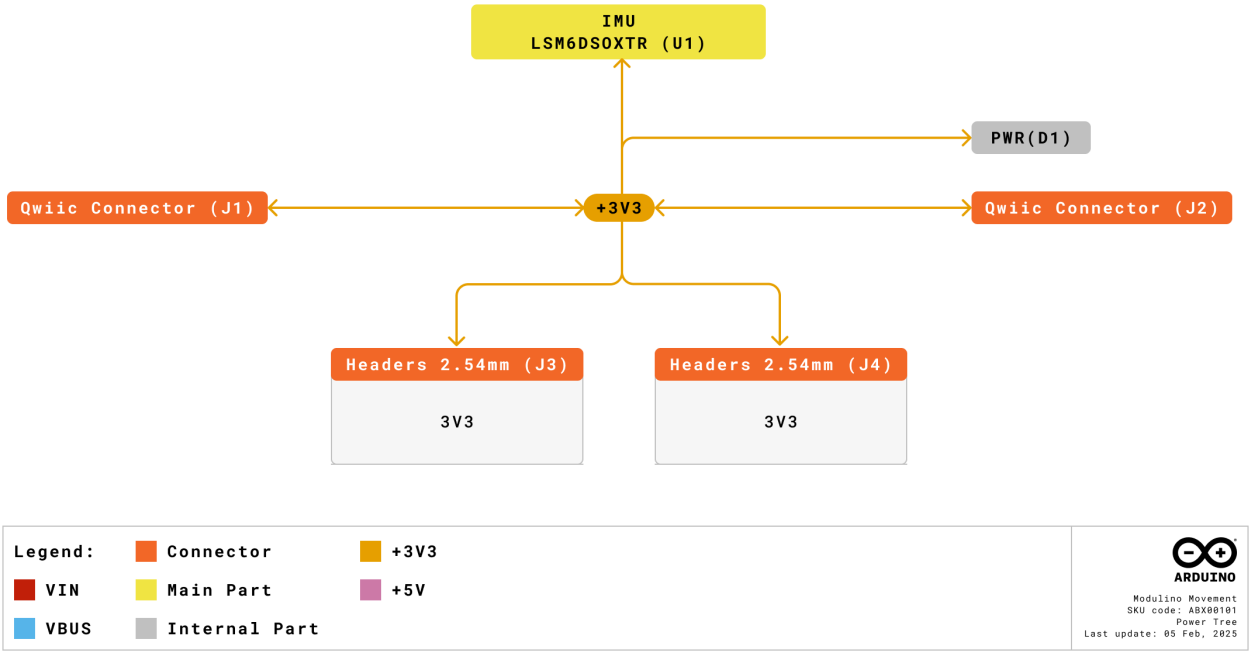
4.1 Recommended Operating Conditions

-Sensor supply range: 1.71 V – 3.6 V -Powered at 3.3 V through the Qwiic interface (in accordance with the Qwiic standard) -Operating temperature: –40 °C to +85 °C

Typical current consumption: Accelerometer: ~170 µA Gyroscope: ~0.55 mA

5 Power Tree

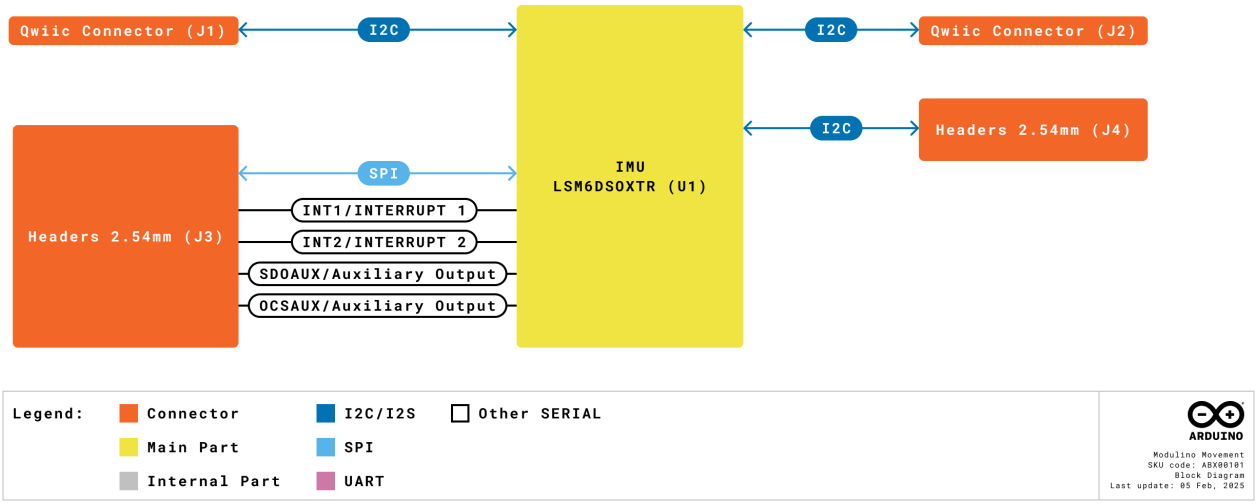
The power tree for the modulino can be consulted below:



Modulino® Movement Power Tree

6 Block Diagram

This module is designed to be placed on an I2C bus, allowing the on-board LSM6DSOXTR sensor to communicate with a host microcontroller via I2C or, optionally, SPI.



Modulino® Movement block diagram

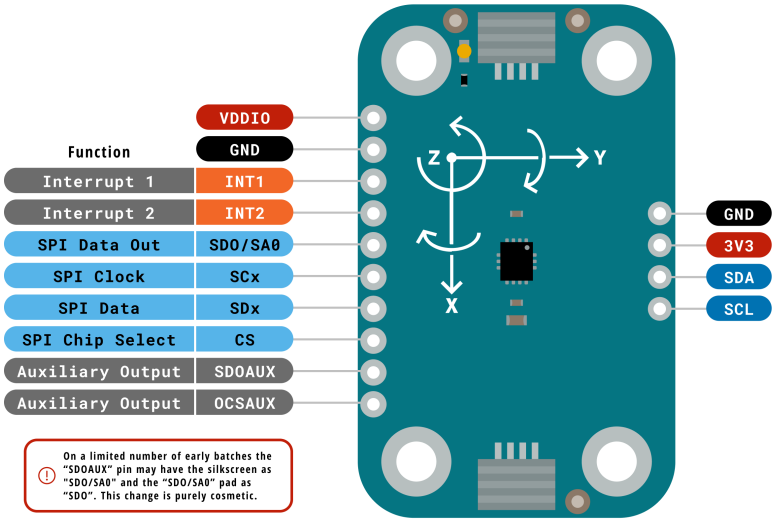
7 Functional Overview

The Modulino® Movement node uses the LSM6DSOXTR sensor for 3-axis acceleration and 3-axis gyroscopic measurements. It can detect motion, orientation. Data is accessed through I2C (via the Qwiic connector at 3.3 V) or SPI (through the additional header).

7.1 Technical Specifications

Specification	Details
Sensor	LSM6DSOXTR
Supply Voltage	Min: 1.71 V, Max: 3.6 V
Power Consumption	Accel: 170 µA, Gyro: 0.55 mA
Range (Gyro)	±125 dps to ±2000 dps
Accuracy	Accel: ±20 mg, Gyro: ±1 dps
Resolution	Accel: 0.061 mg/LSB to 0.488 mg/LSB; Gyro: 4.375 mdps/LSB to 70 mdps/LSB
Communication	SPI, I2C, MIPI I3CSM

7.2 Pinout



Pinout Overview

Qwiic / I2C (1×4 Header)

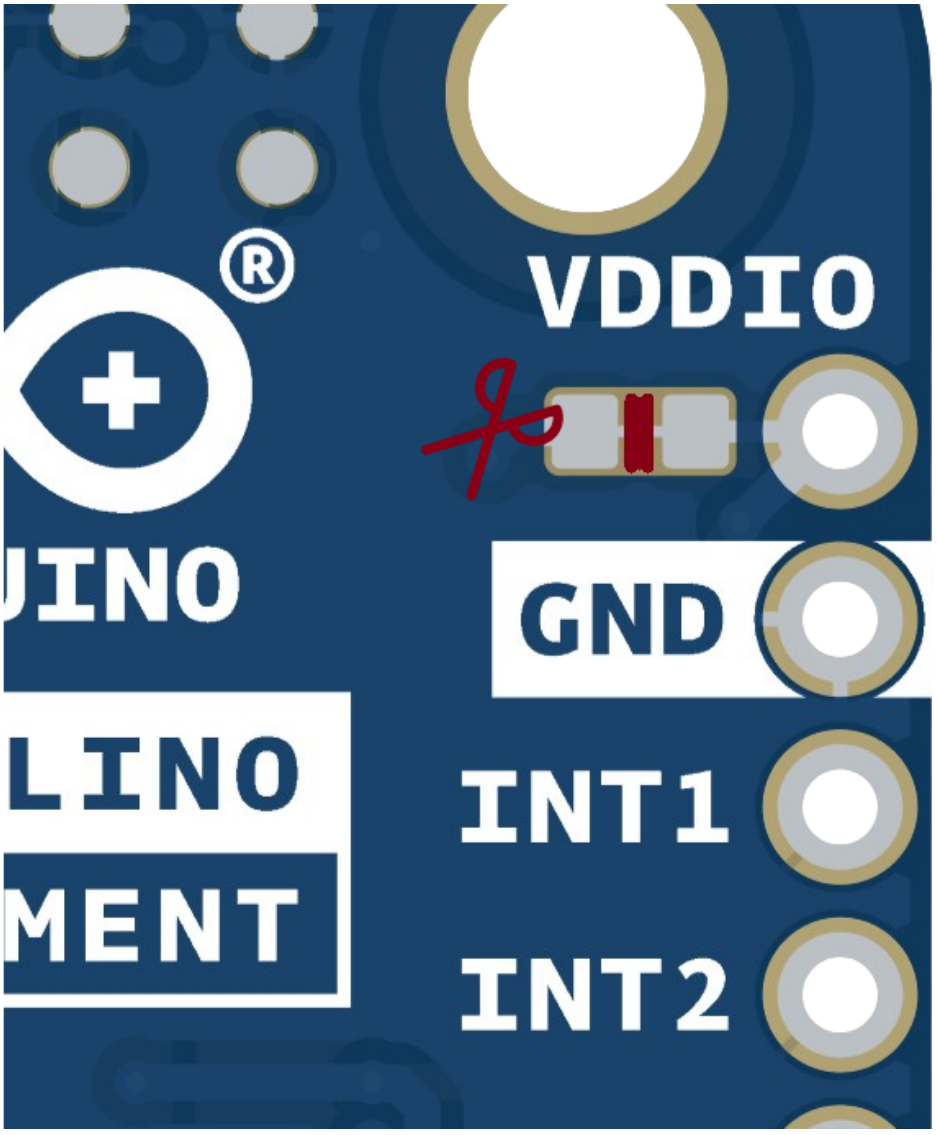
Pin	Function
GND	Ground
3.3 V	Power Supply (3.3 V)
SDA	I2C Data
SCL	I2C Clock

These pads and the Qwiic connectors share the same I2C bus. You can optionally solder header pins here.

Additional 1×10 Header (LSM6DSOXTR Signals)

Pin	Function
VDDIO	3.3 V (cuttable jumper)
GND	Ground
INT1	Interrupt 1 (Sensor)
INT2	Interrupt 2 (Sensor)
SDO/SA0	SPI Data Out / I2C Address
SDX	SPI Data X
SCX	SPI Clock X
CS	SPI Chip Select
SDOAUX	Auxiliary Output
OCSAUX	Auxiliary Output

Note: By cutting its solder jumper, you can isolate **VDDIO** from 3.3 V if needed.

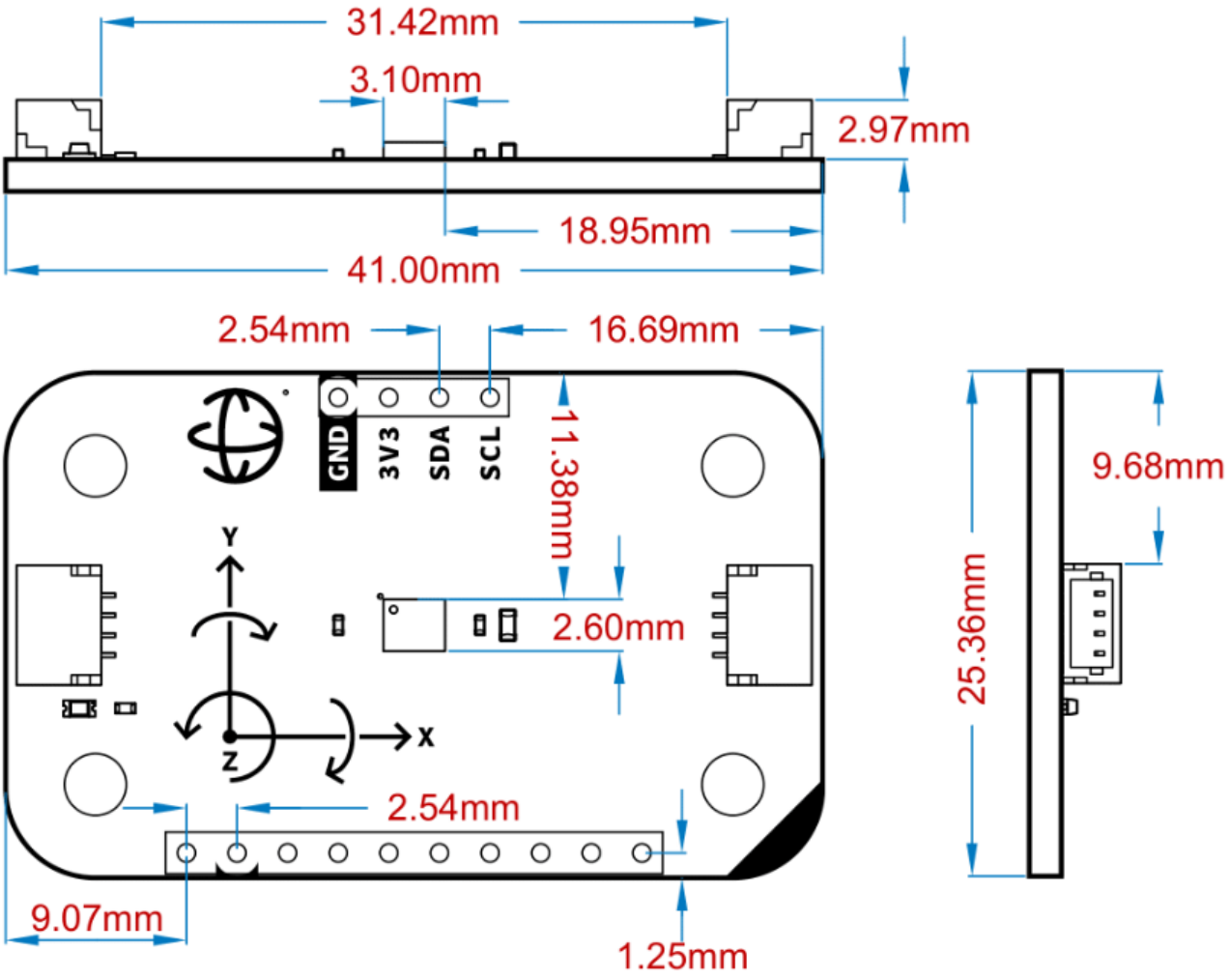


Optional jumper

7.3 Power Specifications

- **Nominal operating voltage:** 3.3 V via Qwiic
- **Sensor voltage range:** 1.71 V–3.6 V

7.4 Mechanical Information



Modulino® Movement Mechanical Information

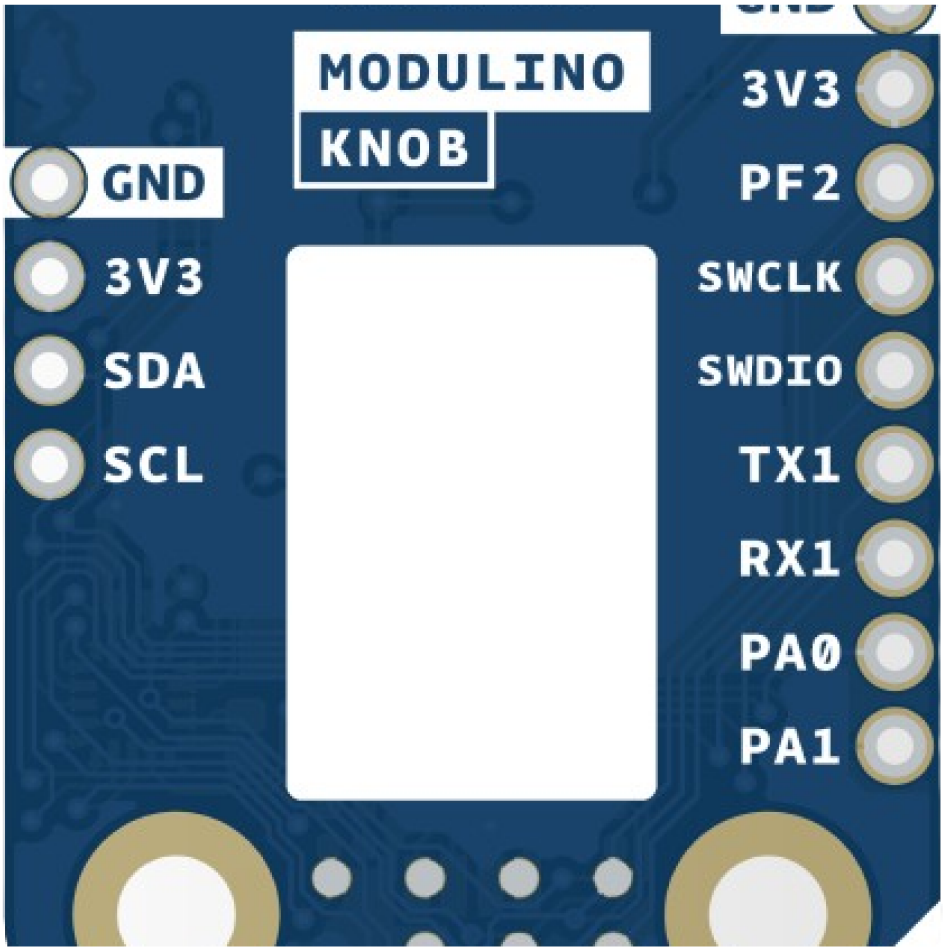
- Board dimensions: 41 mm × 25.36 mm
- Thickness: 1.6 mm (±0.2 mm)
- Four mounting holes (Ø 3.2 mm)
  - Hole spacing: 16 mm vertically, 32 mm horizontally

7.5 I2C Address Reference

Board Silk Name	Sensor	Modulino I2C Address (HEX)	Editable Addresses (HEX)	Hardware I2C Address (HEX)
MODULINO MOVEMENT	LSM6DSOXTR	0x6A	0x6A, 0x6B (via solder jumper)	0x6A & 0x7E

Note:

- By default, you use **0x6A** in your code.
- The “Hardware I2C Address” might appear when scanning the bus.
- You can flip the address to **0x6B** by bridging or cutting the relevant solder jumper.
- A white rectangle on the bottom silk allows you to note a custom address.

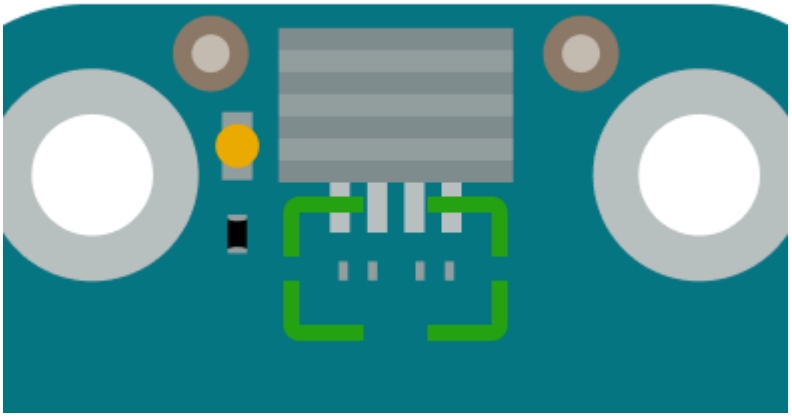


Blank silk for identification

7.5.1 Pull-up Resistors

The module has pads for optional I2C pull-up mounting in both data lines. No resistors are mounted by default but in case the resistors are need 4.7 K resistors in an SMD 0402 format are recommended.

These are positioned near the Qwiic connector on the power LED side.



Generic pull-up resistor position

8 Device Operation

The Modulino® Movement node acts as an I2C target device on the Qwiic bus. Simply connect it via a Qwiic cable to the 3.3 V I2C interface of your microcontroller. If desired, SPI signals can be used instead via the additional header.

8.1 Getting Started

Use any standard Arduino workflow—desktop IDE or Arduino Cloud Editor. Libraries are available to simplify reading the LSM6DSOXTR sensor outputs (acceleration, gyroscope). Ensure your controller and this node share the same 3.3 V reference when using the Qwiic connection.

Company Information

Company name	Arduino SRL
Company Address	Via Andrea Appiani, 25 - 20900 MONZA (Italy)

Reference Documentation

Ref	Link
Arduino IDE (Desktop)	https://www.arduino.cc/en/Main/Software
Arduino Courses	https://www.arduino.cc/education/courses
Arduino Documentation	https://docs.arduino.cc/
Arduino IDE (Cloud)	https://create.arduino.cc/editor
Cloud IDE Getting Started	https://docs.arduino.cc/cloud/web-editor/tutorials/getting-started/getting-started-web-editor
Project Hub	https://projecthub.arduino.cc/
Library Reference	https://github.com/arduino-libraries/
Online Store	https://store.arduino.cc/

Revision History

Date	Revision	Changes
11/07/2024	1	First release