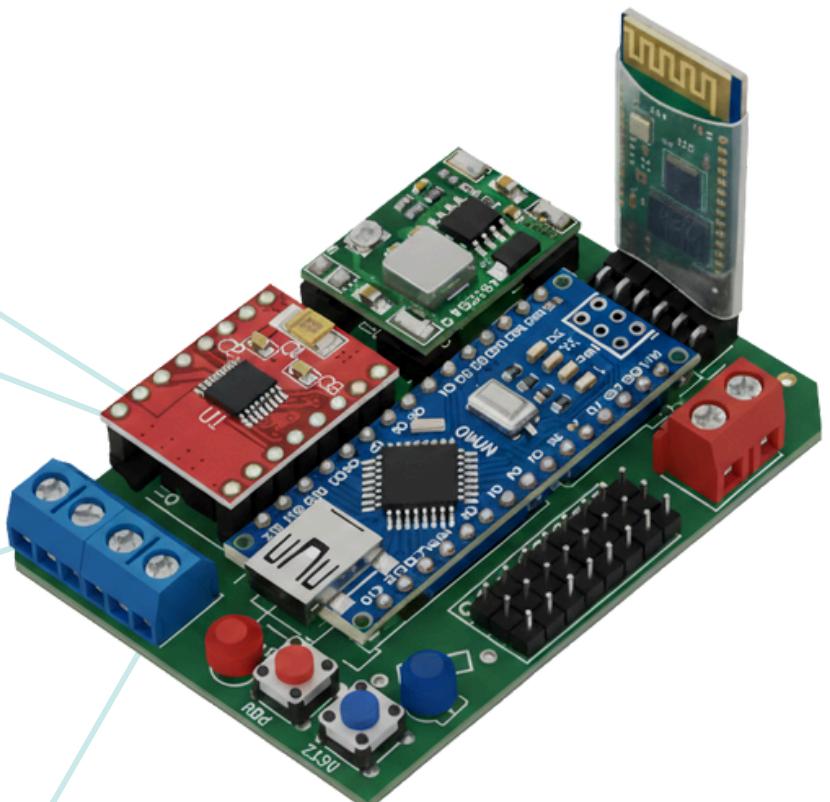


# NOVA DYNAMICS

**ONECHIP NANO SHIELD**



# USER MANUAL

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@nova\_dynamics\_

# INTRODUCTION

The ONECHIP Nano Shield is a compact, all-in-one Arduino Nano expansion board developed by Nova Dynamics. It simplifies motor control, sensor interfacing, and wireless communication for robotics and embedded projects.

Whether you're a student, hobbyist, or educator, this shield provides a quick and reliable platform for experimenting with automation, IoT, and robotics. This manual guides you through features, connections, and usage with sample projects and workshops.



NOVA DYNAMICS

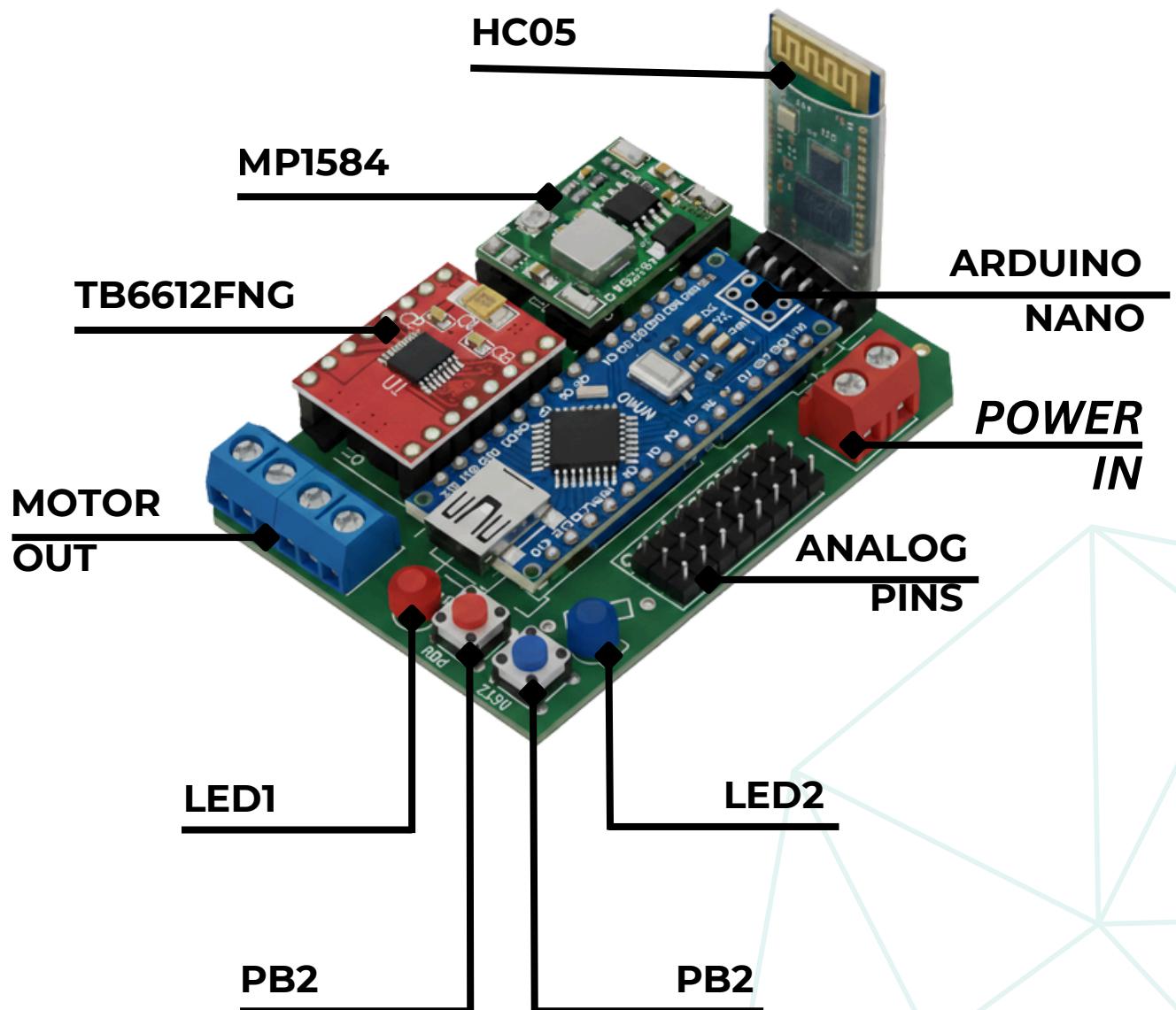
# **TECHNICAL SPECIFICATIONS**

## **ONECHIP NANO SHIELD consists of:**

- Microcontroller: Arduino Nano
- Motor Driver: TB6612FNG Dual DC Motor Driver
- Bluetooth Module: HC-05
- Buck Converter: MP1584
- Buttons: 2 Onboard Push Buttons
- LEDs: 2 Onboard LEDs
- Power Switch: 1 On/Off Toggle
- Available pins: 8 Analog + 2 Digital
- Input Voltage: 6–12V DC
- Output Voltage: 5V

Applications: Robotics, Automation, IoT

# PINOUT AND LAYOUT OVERVIEW

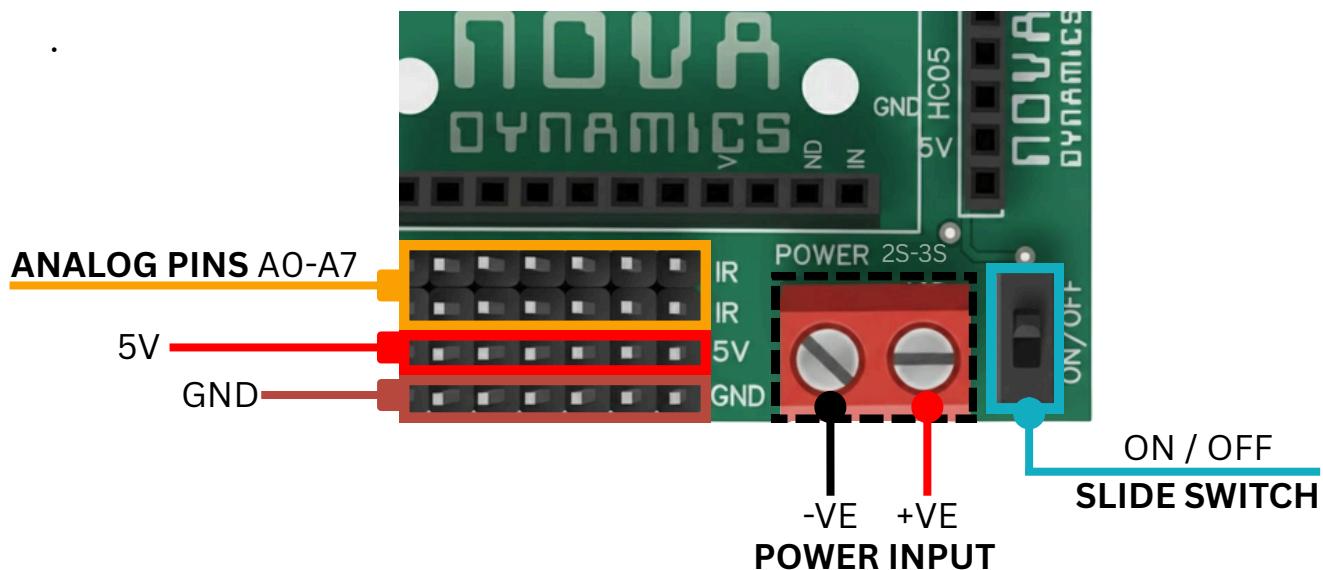


# PIN MAPPING

ARDUINO NANO PINS	COMPONENT	PIN
D0	HC05	Tx
D1	HC05	Rx
D2	PB2	-
D3	PB1	-
<b>D4 &amp; D5</b>	<b>FREE</b>	-
D6	TB6612FNG	M2S
D7	TB6612FNG	M2A
D8	TB6612FNG	M2B
D9	TB6612FNG	M1A
D10	TB6612FNG	M1B
D11	TB6612FNG	M1S
D12	LED 1	-
D13	LED 2	-
<b>A0-A7</b>	<b>FREE</b>	-

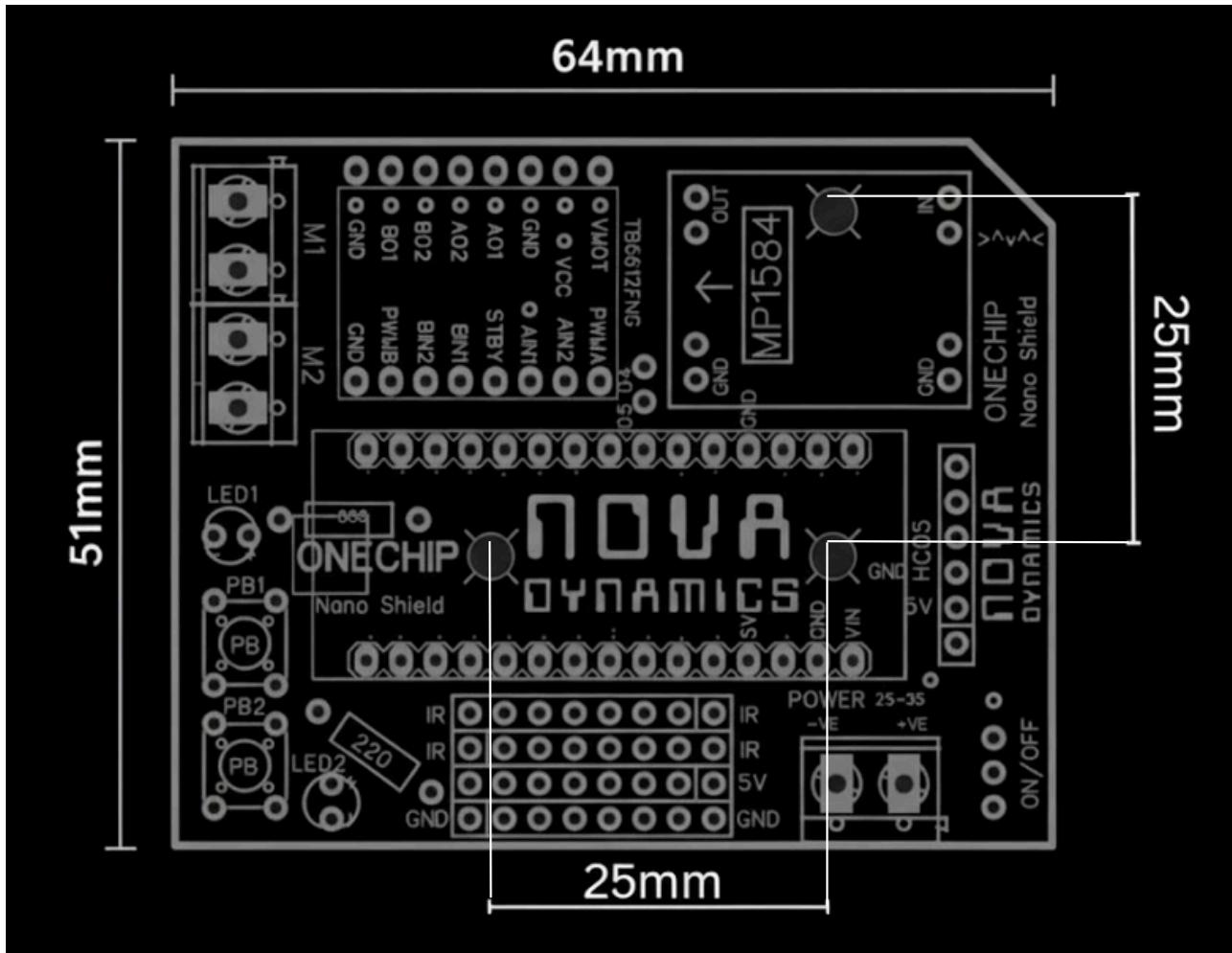
# POWER CONNECTIVITY

- Use a 6–12V DC input to power the shield.
- A 2S or 3S Li-ion battery pack is recommended for stable and efficient operation.
- The onboard MP1584 buck converter provides a regulated 5V supply to all components.
- Adjust the potentiometer on the buck converter to output exactly 5V before connecting sensors or modules.



- Power the motors only through the external 12V input — never from the USB connection.
- The USB port should be used only for programming or low-power testing.
- Check polarity carefully before connecting any external power source

# PHYSICAL DIMENSIONS



- Outer dimensions are 64 mm x 51 mm
- Mounting Holes form an isosceles right-angled triangle with a side of 25mm
- For more detailed dimensions check github

# **COMPONENT DESCRIPTION**

## **MOTOR DRIVER**

- The TB6612FNG motor driver is a compact dual H-bridge driver that controls two DC motors independently with forward, reverse, and PWM-based speed control. It operates efficiently with minimal heat and provides up to 1.2A continuous current per channel, making it ideal for battery-powered robots and motor control projects.

## **BLUETOOTH MODULE**

- The HC-05 Bluetooth module enables easy wireless serial communication between microcontrollers and Bluetooth-enabled devices like smartphones or PCs. It supports both master and slave modes, is simple to configure using AT commands, and is widely used for wireless robot control and IoT applications.

## **BUCK CONVERTOR**

- The MP1584 buck converter is a high-efficiency DC-DC step-down converter that reduces higher input voltages to a stable, adjustable output with up to 3A current capacity. Compact and reliable, it's commonly used to power 5V or 3.3V circuits in robotics and embedded systems.

# **EXAMPLE CODES AND GITHUB LINKS**

**You can use this shield for:-**

- Line Follower Robot
- Bluetooth Controlled Car
- Obstacle Avoidance Robot
- Maze Solving Robot
- Simple Projects (with wireless control)

Basic tutorial code can be found at our **github** about

- LED
- PUSHBUTTON
- MOTORS
- BLUETOOTH
- ULTRASONIC
- IR ARRAY

# **TROUBLESHOOTING & SAFETY**

## **Troubleshooting Tips**

- No Power / Board Not Turning On:
  - Check the power polarity and make sure the input voltage is between 6–12V DC.
- Verify the MP1584 output is set to 5V using a multimeter.
- Motors Not Running:
  - Confirm motor wires are connected properly to the MOTOR OUT terminals.
  - Make sure the external power (12V) is connected; motors will not run on USB power.
  - Check if PWM pins or control pins from the Arduino are correctly programmed.
  - Inspect the TB6612FNG for overheating.
- Bluetooth (HC-05) Not Pairing:
  - Ensure the module's LED is blinking (indicating power).
  - Check Bluetooth visibility on your device.
  - Verify TX/RX pins are correctly connected (cross RX↔TX).
- LEDs Not Working : Check the Arduino code for correct digital pin mapping.

- MP1584 Overheating or Output Unstable:
  - Reduce input voltage if using near 12V with high current.
  - Double-check the output voltage and load current.

## Safety Guidelines:

- Always set the buck converter output to 5V before powering any components.
- Never power the motors via USB — use the dedicated power input.
- Double-check polarity before connecting batteries or DC supplies.
- Do not exceed 12V input or 3A load current on the buck converter.
- Avoid short circuits by keeping metal tools or wires away from the board when powered.
- Use a common ground when connecting external modules or sensors.
- Disconnect power while uploading code or wiring new components.
- If any component gets unusually hot, immediately disconnect power and inspect connections.
- Store and operate the board in a dry, static-free environment.

## WORKSHOP BROCHURE

Experience the future of innovation with Nova Dynamics—a passionate team of engineers dedicated to making robotics, electronics, and automation accessible to everyone. Our hands-on workshops introduce students to Arduino, sensors, actuators, 3D printing, PCB fundamentals, mechatronics, and real-world robotics applications through practical, beginner-friendly learning. With step-by-step guidance, interactive sessions, and real project building, we empower young minds to explore, create, and understand the technologies shaping tomorrow. Join us and unlock the engineer within—where learning meets innovation, and ideas turn into reality.

## CONTACT US

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