

Arduino A000066

Arduino Uno REV3 [A000066] User Manual

Model: A000066 | Brand: Arduino

1. INTRODUCTION AND OVERVIEW

The Arduino Uno REV3 is a popular open-source microcontroller board based on the ATmega328P. It is designed for ease of use, making it an excellent choice for beginners in electronics and programming, while also being powerful enough for advanced projects. This board serves as a fundamental tool for prototyping, educational purposes, and developing interactive objects and environments.

It features 14 digital input/output pins (6 of which can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.



Image 1.1: Angled view of the Arduino Uno REV3 board, showcasing its various components and pin headers.

2. PRODUCT FEATURES

The Arduino Uno REV3 offers a robust set of features for a wide range of applications:

- **ATmega328P Microcontroller:** Powered by the reliable ATmega328P, running at 16 MHz with 32KB of flash memory, 2KB SRAM, and 1KB EEPROM, offering ample resources for a wide range of basic to advanced electronics projects.
- **14 Digital I/O Pins & 6 Analog Inputs:** Features 14 digital I/O pins (6 of which support PWM output) and 6 analog inputs (10-bit resolution), providing flexible options for sensors, motors, and other external components.
- **USB Connectivity for Easy Programming:** The built-in USB port allows for direct programming and serial communication, enabling a simple connection to your computer for sketch uploading and debugging through the Arduino IDE.
- **Compatible with Arduino IDE:** Full compatibility with the Arduino IDE ensures easy access to a vast array of libraries, code examples, and community-driven projects, making the Uno a great choice for both beginners and experienced makers.
- **Widely Used in Education & Prototyping:** The Arduino Uno is a standard in educational environments, widely used for learning and teaching electronics and programming. It's perfect for prototyping, robotics, IoT projects, and more.

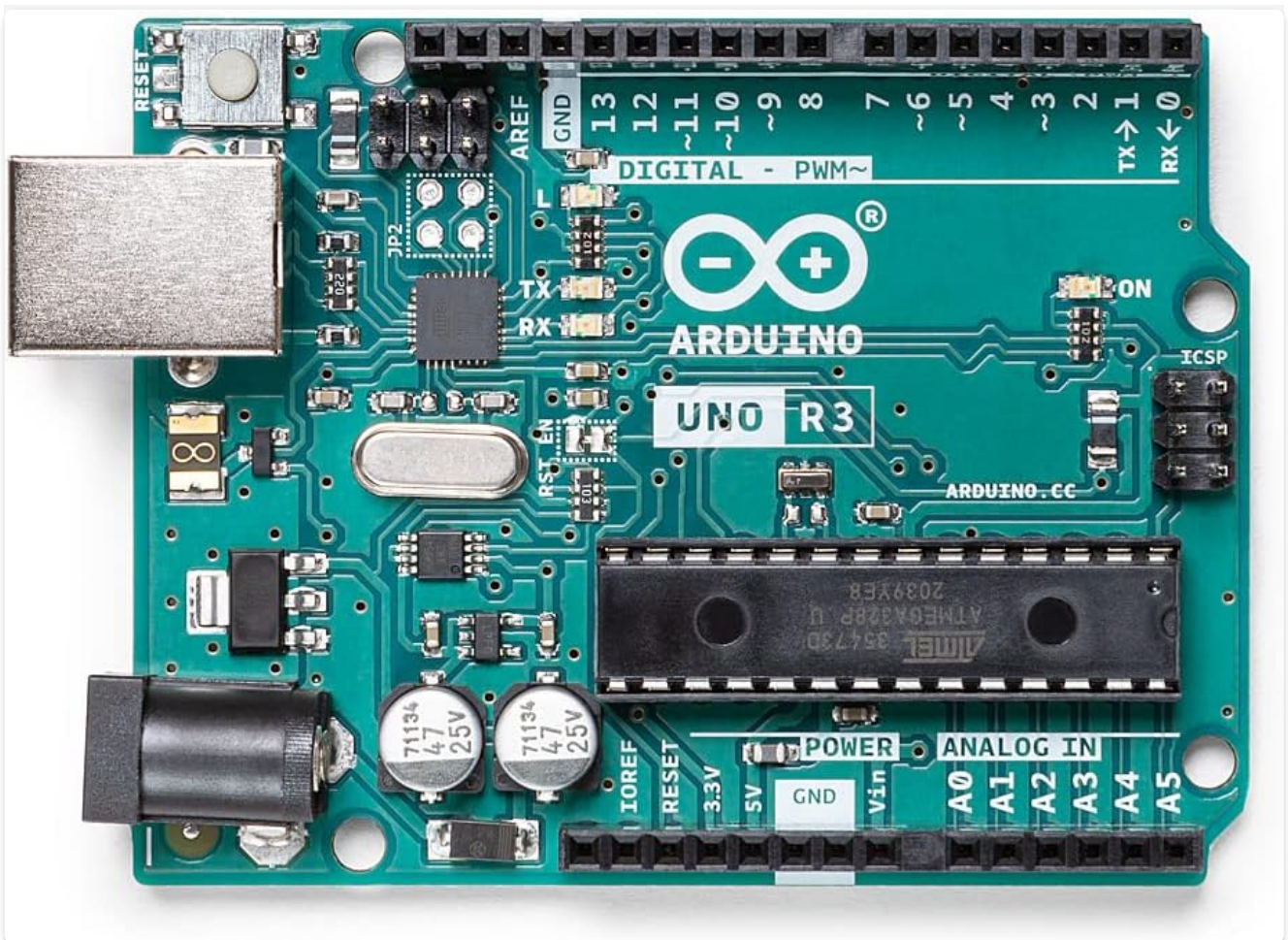


Image 2.1: Top-down view of the Arduino Uno REV3, highlighting the digital and analog pins, USB port, and power jack.

3. What's in the Box

Upon unboxing your Arduino Uno REV3, you should find the following components:

- One (1) Arduino Uno REV3 Microcontroller Board
- One (1) USB cable (for connecting to your computer)



Image 3.1: The Arduino Uno REV3 board being removed from its retail packaging.

4. SETUP

To begin using your Arduino Uno REV3, follow these steps:

1. **Install the Arduino IDE:** Download and install the latest version of the Arduino Integrated Development Environment (IDE) from the official Arduino website: www.arduino.cc/en/software. The IDE is essential for writing, compiling, and uploading code to your board.
2. **Connect the Arduino Board:** Connect your Arduino Uno REV3 to your computer using the provided USB cable. The board will draw power from the USB connection, and the 'ON' LED should illuminate. Your computer should automatically detect the board and install necessary drivers.
3. **Select Board and Port:** Open the Arduino IDE. Go to **Tools > Board** and select 'Arduino Uno'. Then, go to **Tools > Port** and select the serial port that corresponds to your Arduino board. This port will typically appear as 'COMX' on Windows or '/dev/tty.usbmodemXXXX' on macOS/Linux.
4. **Upload a Test Sketch:** To verify your setup, upload the 'Blink' example sketch. Go to **File > Examples > 01.Basics > Blink**. This sketch will make the onboard LED (connected to digital pin 13) blink on and off. Click the 'Upload' button (right arrow icon) in the IDE. If successful, the LED on your board will start blinking.

5. OPERATING INSTRUCTIONS

Operating the Arduino Uno involves writing and uploading 'sketches' (programs) using the Arduino IDE. These sketches control the microcontroller's behavior and its interaction with external components.

5.1. Basic Programming Concepts

- **Setup Function:** The `setup()` function runs once when the sketch starts after power-up or reset. It is used to initialize variables, pin modes, and start libraries.
- **Loop Function:** The `loop()` function executes repeatedly after the `setup()` function. It is the core of your program where the main logic resides.
- **Digital I/O:** Use `pinMode()` to set a pin as an INPUT or OUTPUT. Use `digitalWrite()` to set an OUTPUT pin HIGH (5V) or LOW (0V). Use `digitalRead()` to read the state of an INPUT pin.
- **Analog Input:** Use `analogRead()` to read the voltage on an analog input pin. The Uno has 10-bit resolution, meaning it can detect 1024 different voltage levels.
- **PWM Output:** Six digital pins (3, 5, 6, 9, 10, and 11) can provide Pulse Width Modulation (PWM) output using `analogWrite()`, simulating analog output for controlling brightness of LEDs or speed of motors.

5.2. Powering the Board

The Arduino Uno can be powered via the USB connection or an external power supply. The power source is automatically selected.

- **USB Power:** Connect the board to your computer's USB port. This is typically sufficient for most projects.
- **External Power Supply:** The board can be powered by an external 6-20V (recommended 7-12V) power supply connected to the power jack or the Vin pin.

For more detailed programming guides and project ideas, refer to the extensive documentation and community forums available on the official Arduino website.

6. MAINTENANCE

Proper care and maintenance will ensure the longevity and reliable operation of your Arduino Uno REV3 board.

- **Keep Dry:** Protect the board from moisture and humidity, which can cause short circuits and corrosion.
- **Avoid Static Discharge:** Handle the board by its edges to prevent electrostatic discharge (ESD), which can damage sensitive electronic components.
- **Proper Power Supply:** Always use a power supply within the recommended voltage range (7-12V for external power) to prevent damage to the board's voltage regulator.
- **Cleanliness:** Keep the board free from dust and debris. Use compressed air or a soft brush for cleaning if necessary.
- **Firmware Updates:** Occasionally, updates to the ATmega328P microcontroller's firmware might be available. These can typically be performed through the Arduino IDE or dedicated tools, following official Arduino guidelines.

7. TROUBLESHOOTING

If you encounter issues with your Arduino Uno REV3, consider the following common troubleshooting steps:

- **Board Not Recognized by Computer:**
 - Ensure the USB cable is securely connected to both the board and the computer. Try a different USB port or cable.
 - Verify that the necessary USB drivers are installed. The Arduino IDE usually installs them automatically, but manual installation might be required on some systems.

- Check Device Manager (Windows) or System Information (macOS) to see if the board is listed under Ports (COM & LPT) or USB devices.

- **Sketch Upload Errors:**

- Confirm that you have selected the correct board ('Arduino Uno') under **Tools > Board** in the Arduino IDE.
- Ensure the correct serial port is selected under **Tools > Port**.
- Check your code for syntax errors. The Arduino IDE will highlight errors in the console.
- Disconnect any components connected to digital pins 0 (RX) and 1 (TX) during upload, as they are used for serial communication.

- **Power Issues:**

- If using external power, ensure the power supply provides sufficient current and is within the recommended voltage range (7-12V).
- Check if the 'ON' LED on the board is illuminated. If not, there might be a power supply issue.

- **Unexpected Behavior:**

- Double-check your circuit connections. Loose wires or incorrect wiring are common causes of issues.
- Review your code logic. Use the Serial Monitor in the Arduino IDE to print debugging messages.

For more complex issues or specific project-related problems, the Arduino community forums (forum.arduino.cc) are an excellent resource for support and solutions.

8. SPECIFICATIONS

Feature	Specification
Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
Dimensions (LxWxH)	3.15 x 2.17 x 0.98 inches
Weight	1.12 ounces
Country of Origin	Italy

9. WARRANTY AND SUPPORT

Arduino products are known for their quality and reliability. For specific warranty information, please refer to the official Arduino website or the documentation provided with your purchase. Arduino provides extensive online resources and a vibrant community to assist users.

For technical support, detailed tutorials, project examples, and community forums, please visit the official Arduino website:

- **Official Arduino Website:** www.arduino.cc
- **Arduino Documentation:** docs.arduino.cc
- **Arduino Community Forum:** forum.arduino.cc

These resources offer a wealth of information, from getting started guides to advanced programming techniques and troubleshooting tips, supported by a global community of makers and developers.

Related Documents - A000066

	Tuto Arduino Uno: 45 Original Electronic Projects A comprehensive guide to Arduino Uno, featuring 45 original electronic projects. This tutorial covers essential concepts, required components, software setup, and practical projects ranging from basic LED blinking to more advanced applications like ultrasonic sensors and artificial intelligence.
	Arduino UNO R3 Product Reference Manual Comprehensive product reference manual for the Arduino UNO R3 microcontroller board, detailing its features, specifications, operation, and compliance information.
	Arduino Arduino Arduino
	Arduino Uno: 45 Projects for Beginners and Experts Explore 45 practical and tested Arduino projects for beginners and experts, covering sensors, motors, internet connectivity, and wireless control. Learn by doing with clear explanations and step-by-step guides.
	Learn About Arduino and Install the Arduino IDE: A Step-by-Step Guide This guide provides an introduction to the Arduino open-source electronics platform, its hardware components, and a detailed, step-by-step tutorial for installing the Arduino Integrated Development Environment (IDE) on Windows, macOS, and Linux systems. Learn how to set up your development environment for interactive projects.
	Arduino Documentation: A Comprehensive Guide to Arduino Boards, Software, and Components Explore the world of Arduino with this detailed documentation covering Arduino boards like UNO, Nano, and Mini, along with essential software, programming techniques, and a wide array of electronic components for creating interactive projects. Ideal for beginners and experienced makers.