# Ultrasonic Distance Sensor – HC-SR04

The **Ultrasonic Distance Sensor HC-SR04** is one of the most widely used modules in robotics, electronics, and automation projects. Known for its **accuracy, low cost, and ease of use**, this sensor is the perfect tool for measuring distance and detecting objects without physical contact. Whether you're a **student, hobbyist, or engineer**, the HC-SR04 provides reliable performance for all kinds of distance measurement and obstacle detection applications.

Key Features

- **Operating Voltage:** 5V DC
- **Working Current:** 15mA
- **Measurement Range:** 2 cm to 400 cm (up to 4 meters)
- **Accuracy:** ±3 mm
- **Measuring Angle:** ~15°
- **Trigger Input Signal:** 10µs TTL pulse
- **Echo Output Signal:** TTL level, proportional to distance
- **Interface:** Standard 4-pin (VCC, Trig, Echo, GND)
- **Dimensions:** Compact and lightweight for easy integration
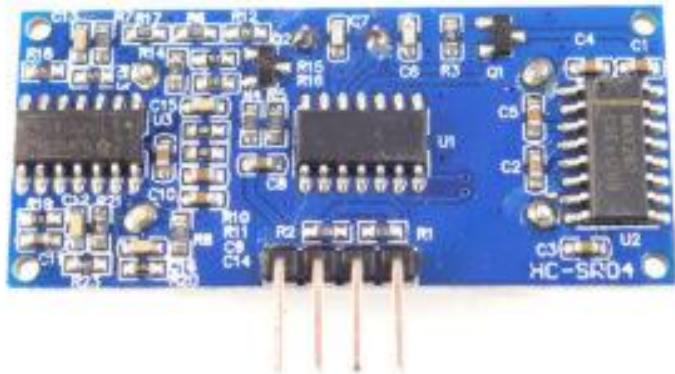
How It Works

The HC-SR04 uses **ultrasonic sound waves** to measure distance:

1. The **trigger pin** sends a short ultrasonic burst (40 kHz).
2. This sound wave reflects back after hitting an object.
3. The **echo pin** measures the time it takes for the signal to return.
4. The sensor calculates the distance based on the speed of sound.

This method makes it **highly accurate and reliable** for detecting objects, even in challenging environments.
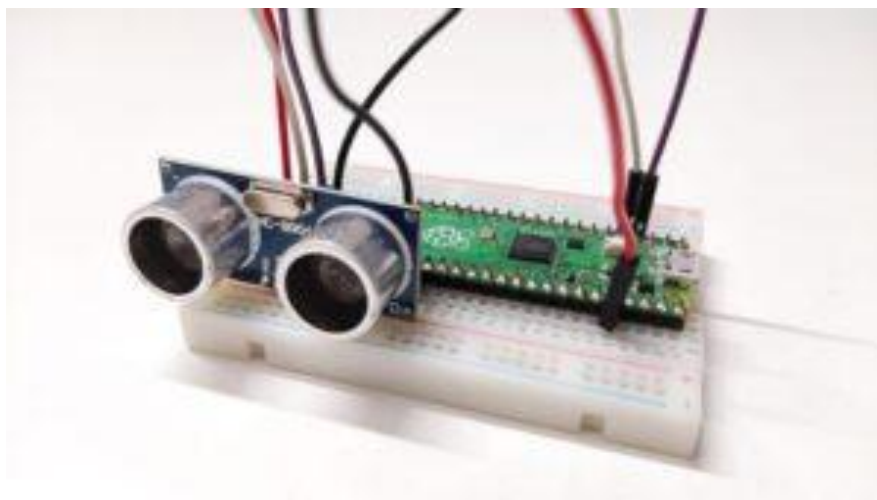
Benefits of the HC-SR04 Sensor

- **Non-contact measurement:** Detects objects without any physical interaction.
- **High accuracy:** Reliable distance readings with minimal error.
- **Easy to use:** Standard 4-pin interface works seamlessly with Arduino, Raspberry Pi, and other microcontrollers.
- **Wide measuring range:** From as close as 2 cm up to 400 cm.
- **Affordable solution:** Ideal for students, DIY makers, and professional projects.
- **Versatile applications:** Robotics, automation, obstacle avoidance, and more.

Applications

The **Ultrasonic Distance Sensor HC-SR04** is versatile and widely used in:

- **Robotics:** Obstacle detection and avoidance in autonomous robots.
- **Automation systems:** Object detection for industrial and security projects.
- **Smart parking systems:** Detects vehicles for parking management solutions.
- **Water level monitoring:** Measures liquid levels in tanks without direct contact.
- **DIY electronics projects:** Perfect for students and hobbyists experimenting with Arduino or Raspberry Pi.
- **Distance measurement tools:** Create your own range finder or measurement device.

Technical Specifications

- **Operating Voltage:** 5V DC
- **Operating Current:** 15 mA
- **Working Frequency:** 40 kHz
- **Maximum Range:** 400 cm (4 m)
- **Minimum Range:** 2 cm
- **Measuring Angle:** 15°
- **Resolution:** Approx. 3 mm
- **Interface Pins:** VCC, Trig, Echo, GND
- **Size:** 45mm x 20mm x 15mm

Why Choose the HC-SR04 Ultrasonic Sensor?

If you're looking for an **accurate, reliable, and budget-friendly distance sensor**, the **HC-SR04** is a top choice. It's one of the most popular sensors in the maker community because it's **easy to interface with Arduino and Raspberry Pi**, works over a **wide distance range**, and is durable enough for long-term use.

Whether you're a **university student working on robotics projects**, a **DIY hobbyist**, or an **engineer developing automation systems**, the HC-SR04 delivers excellent performance at an unbeatable price.

Conclusion

The **Ultrasonic Distance Sensor HC-SR04** is a **must-have sensor module** for anyone working with robotics, automation, or distance measurement projects. With its **wide measuring range,**

high accuracy, low cost, and easy integration, it's a perfect choice for students, hobbyists, and professionals alike. Whether you're building a **robot, smart device, or automation system**, this sensor provides the **precision and reliability** you need.

☞ Add the **HC-SR04 Ultrasonic Sensor** to your toolkit today and bring your projects to life with smart, accurate distance sensing!