Ultrasonic Sensor

An **Ultrasonic Sensor** is an electronic device that measures **distance** by using **sound waves** (ultrasound).

- It sends out sound waves at a frequency **higher than human hearing** (above 20 kHz).

- These waves **bounce back** if they hit an object.

- The sensor calculates the **time taken** for the echo to return and converts it into distance.

- The sensor has **two main parts**:

- **Trigger (Transmitter)** → sends out ultrasonic sound waves.

- **Echo (Receiver)** → receives the reflected sound waves.

- Steps:

- Microcontroller sends a short pulse to the **Trigger pin**.

- The transmitter emits an ultrasonic burst.

- The burst hits an object and reflects back.

- Receiver detects the echo and measures **time taken**.

- Distance is calculated using:

$$\text{Distance} = \frac{\text{Speed of Sound} \times \text{Time}}{2}$$

Connection Image: