

PORTABLE ULTRASONIC RANGE METER

ABSTRACT:

Portable Ultrasonic Range Meter is a device designed to measure distance of a targeted object in a non-contact fashion by using ultrasonic sound waves. Sound is a phenomenon that is a result of vibration of materials. It works on the principle similar to SONAR or RADAR. Sound is characterized as a mechanical wave that carries mechanical energy. The sound energy travels by causing disturbance in the medium (may be solid, liquid or gas) it is travelling and this is called propagation of sound waves. Under normal conditions, the velocity of the sound is 330m/s. In this technique, a high frequency sound wave is transmitted by a transmitter and the reflected echo from a target is captured by a receiver. As the velocity of the sound wave is known, by measuring the time of travel, the distance between the source and the target can be calculated. Ultrasonic sensors produce sound waves with frequencies higher than the audible range (20Hz to 20 KHz). Ultrasonic sensors produce sound waves with frequencies higher than the audible range (20Hz to 20 KHz) i.e. greater than 20 KHz.

The project was fabricated by using Arduino Uno, an ultrasonic sensor (HC-SR04), an LCD display (16X2 Dimensions) and a POT (10 K ohm). The project is designed and simulated using Proteus Software and the CAD Model on AutoCAD Software.

Ultrasonic sensor is the main module in the range meter circuit. An ultrasonic sensor consists of an ultrasound transmitter and a receiver. The transmitter sends a sonic burst of 8 pulses at 40 KHz frequency. The signal hits the target and the echo is received by the receiver module. By measuring the time between the events of sending the pulse and receiving the echo, the distance can be calculated.

The objective of this project is to replace old traditional range detectors with heavy and bulky circuits, and it can be used in humidifiers, sonar, medical ultrasonography, burglar alarms and non-destructive testing.