Ultra-Sonic Sensor and Passive Infrared Sensor

Ultra Sonic Sensor

Sound waves are having specific frequencies or number of oscillations per second. Humans can detect sounds in a frequency range from about 20Hz to 20 KHz. However the frequency range normally employed in ultrasonic detection is 100 KHz to 50MHz. The velocity of ultrasound at a particular time and temperature is constant in a medium.

W = C/F (or) W = CT

Where

W = Wave length

C = Velocity of sound in a medium

F = Frequency of wave

T=Time Period

The most common methods of ultrasonic examination utilize either longitudinal waves or shear waves. The longitudinal wave is a compression wave in which the particle motion is in the same direction of the propagation wave. The shear wave is a wave motion in which the particle motion is perpendicular to the direction of propagation. Ultrasonic detection introduces high frequency sound waves into a test object to obtain information about the object without altering or damaging it in any way. Two values are measured in ultrasonic detection.

The amount of time, taking for the sound to travel through the medium and amplitude of the received signal. Based on velocity and time thickness can be calculated.

Passive Infrared Sensor

PIR sensor detects a human being moving around within approximately 10m from the sensor. This is an average value, as the actual detection range is between 5m and 12m.PIR are fundamentally made of a pyro electric sensor, which can detect levels of infrared radiation.

The PIR sensor IC consists of 3 pins- Vcc, Ground and Output. In presence of human IR radiations, the sensor detects the radiations and converts it directly to electrical pulses, which is fed to the inverter circuit. The inverter circuit consists of a transistor,which gets into saturation with application of high base current and eventually develops a low collector voltage. Thus the transistor output is low.

Circuit Diagram

