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**SYNOPSIS FOR
ARDUINO & ULTRASONIC SENSOR BASED DISTANCE
MEASUREMENT**

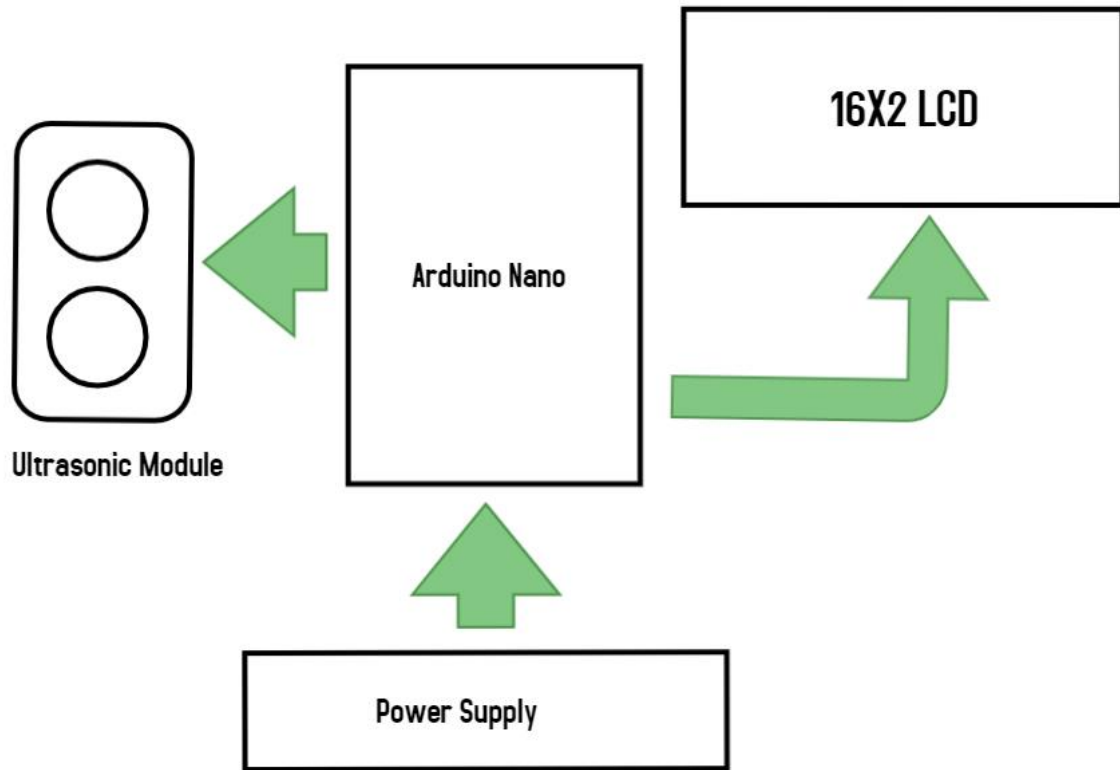


INTRODUCTION

The techniques of distance measurement using ultrasonic in air include continuous wave and pulse echo technique. In the pulse echo method, a burst of pulses is sent through the transmission medium and is reflected by an object kept at specified distance. The time taken for the pulse to propagate from transmitter to receiver is proportional to the distance of object. For contact less measurement of distance, the device has to rely on the target to reflect the pulse back to itself. The target needs to have a proper orientation that is it needs to be perpendicular to the direction of propagation of the pulses. The amplitude of the received signal gets significantly attenuated and is a function of nature of the medium and the distance between the transmitter and target. The pulse echo or time-of-flight method of range measurement is subject to high levels of signal attenuation when used in an air medium, thus limiting its distance range.

Ultrasonic sensors are great tools to measure distance without actual contact and used at several places like water level measurement, distance measurement etc. This is an efficient way to measure small distances precisely. In this project we have used an **Ultrasonic Sensor** to determine the distance of an obstacle from the sensor. Basic principal of ultrasonic distance measurement is based on ECHO. When sound waves are transmitted in environment then waves are return back to origin as ECHO after striking on the obstacle. So we only need to calculate the travelling time of both sounds means outgoing time and returning time to origin after striking on the obstacle. As speed of the sound is known to us, after some calculation we can calculate the distance.

BLOCK DIAGRAM



COMPONENT REQUIRED

- Arduino Nano -1
- Ultrasonic Module- 1
- LCD 16 x 2 - 1
- Slide switch- 1
- DC socket & DC pin with battery cap- 1
- Resistor – 220ohm-2
- 5mm LED – 1
- Preset 10k - 1
- Handmade Branding less printed circuit board- 1
- DC Battery 9v
- Female header
- 7805

SOFTWARE REQUIREMENT

- Arduino IDE
- Express PCB
- Fritzing

CONCLUSION

The microcontroller with LCD makes it user friendly and can be embedded in a single unit. The circuit has been implemented on bread board and tested for its functionality by varying the distance between the transducer and the target. The target surface needs to be perpendicular to the impinging ultrasound waves. The power level of the signal is too low for long range measurement.

FUTURE WORK

- The range can be considerably increased by using high power drive circuit.
- Using temperature compensation, it can be used over wide temperature range.
- The resolution of the measurement can be improved by incorporating phase shift method along with time of flight method.
- Can be used as parking assistance system in vehicles with high power ultrasonic transmitter.
- The 40 kHz signal can be generated using microcontroller itself which will reduce hardware.



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