Ultrasonic Fluid Level Measuring Device

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Abstract—Accurate measurement of fluid level is very vital both in industrial and consumer market. Ultrasonic technology is one of the solutions used by the industry. However, an optimized balance between cost and features are a must for almost all target applications. The ultrasonic level measurement is used mainly when a non-contact measurement is required. Precise measurement of low-range distance (level) is the main objective for this project. This device can measure level in the range of 0.02m to 4m with an accuracy of 1cm. This measuring system is based on ultrasonic sound utilizing an Atmega328P low-power microcontroller. The system transmits a burst of ultrasonic sound waves towards the subject and then receives the corresponding echo. An HC-SR04 ultrasonic Module is used to both generate and detect the ultrasound required for level computation. The time taken for the ultrasonic burst to travel the distance from the system to the subject and back to the system is accurately measured. This level is displayed on an alphanumeric LCD with an accuracy of ± 2.5cm. The minimum depth that this system can measure is 2cm and is limited by the transmitter's transducer settling-time. The maximum height that can be measured is 4 meters. The amplitude of the echo depends on the reflecting material, shape, and size. Sound-absorbing targets such as carpets and reflecting surfaces less than two square feet in area reflect poorly. The maximum measurable range is lower for such subjects. If the amplitude of the echo received by the system is so low that it is not detectable by the ultrasonic module, the system goes out of range. This is indicated by displaying the error message OOR (Out-of-Range) on the LCD.

***Keywords*: Depth-measurement, ultrasonic, transmitter, echo, sensors.**