

DESIGN AND BUILD INFILTRATION WELL CONTROL SYSTEM USING ULTRASONIC SENSORS AND LCD

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ABSTRACT

The sump pump system is an important component in air management in industrial and residential areas, which functions to remove air from the pit or storage space to prevent coverage and damage to equipment. In this study, an automatic sump pump pit control system was designed and built using an ultrasonic sensor as an air level gauge and an LCD as an information display medium. The HC-SR04 ultrasonic sensor is used to detect the distance of the air surface from the sensor installation point, then the data is processed by the Arduino Uno microcontroller to determine the pump condition. The system uses a hysteresis control method to regulate the pump to turn on when the air level reaches the upper limit (level on) and turn off when the water drops to the lower limit (level off), thereby reducing excessive pump life cycles. Information on air level, pump status, and system conditions are displayed in real-time on a 20x4 LCD. Test results show that the system is able to measure air level with an average error of ± 1 cm and control the pump automatically according to a predetermined threshold. With this design, the system is able to work independently, minimize manual intervention, and increase the efficiency of water management in the sump pit.

Keywords: sump pump, ultrasonic sensor, LCD, Arduino, automatic control.