Water Level Indication and Alarm Circuit

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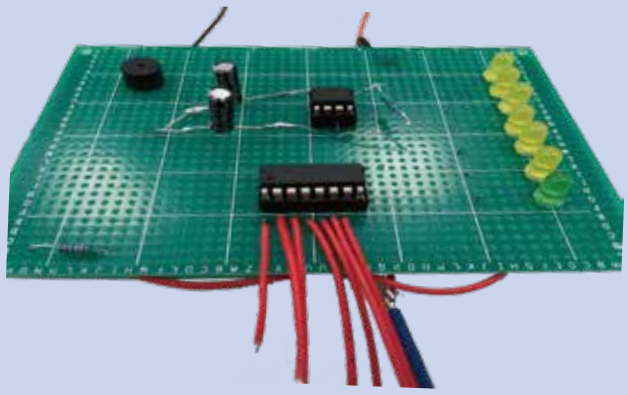
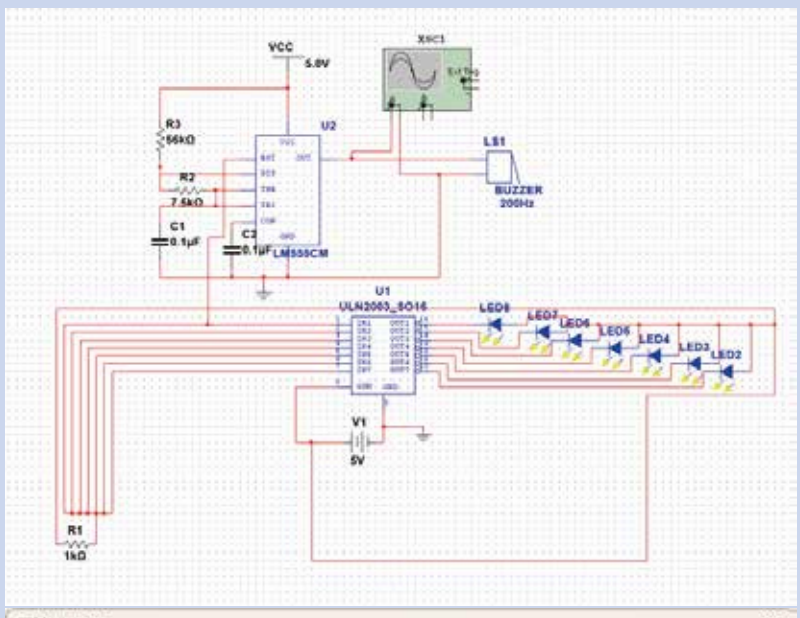
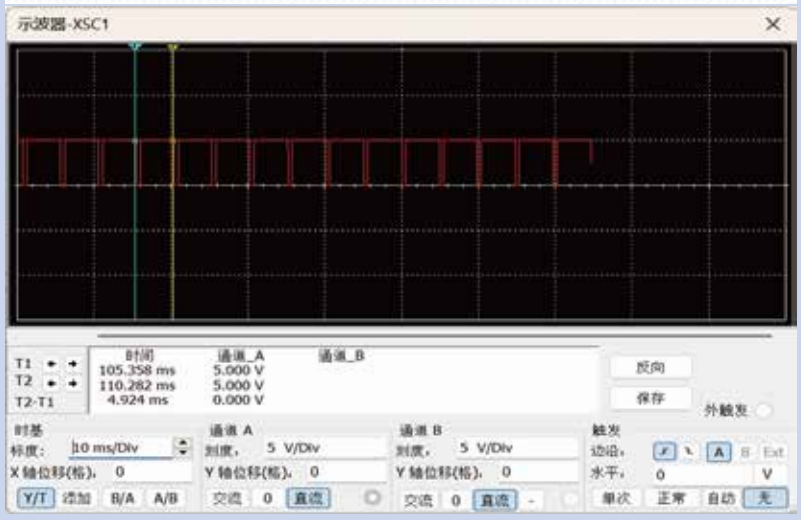


Introdution

We created a water level alarm using ULN2003 and LM555C chips. Wires detect water levels, lighting LEDs sequentially. A buzzer alerts when water is at maximum level.

Schematics&Simulations





Design Ideas

When the water level gradually rises, it can indicate the current water level height by lighting the LED lamp one by one; When the water level reaches the highest level, it can also sound an alarm through a buzzer.

Elements

UNL 2003N:

Signal reception
Control output

LM555C:

Astable mode
Frequency control
Square wave

Passive Buzzer:

Bee~

LEDs:

Let there be light, and there was light

0.1uF Capacitance x2

7.5kΩ resistance

56 kΩ resistance

Implementation Processes

This project uses the unsteady mode of LM555C to generate square wave signals. The frequency of the square wave signal can be controlled by external resistors and capacitors.By changing the values of resistors R1, R2, and C1, the frequency of the output signal at the OUT terminal can be adjusted. The frequency can be calculated by the following formula:

$$f = \frac{1}{\ln(2) \times [C_1(R_1 + 2R_2)]}$$

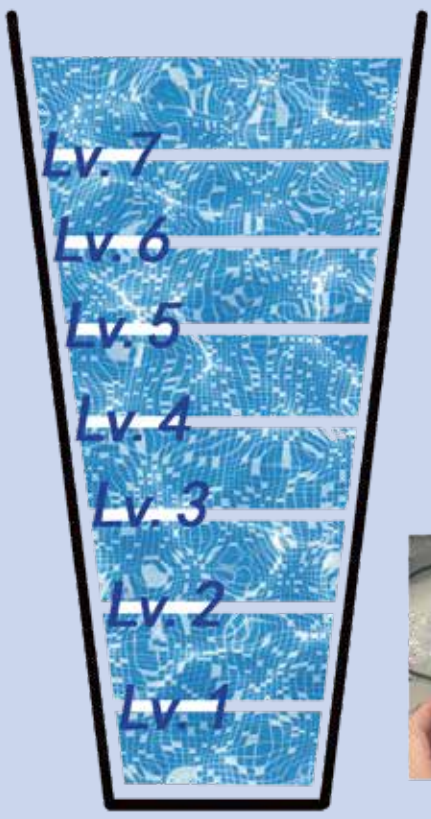
$$= \frac{1}{\ln(2) \times [0.1 \times 10^{-6} \times (56 \times 10^3 + 2 \times 7.5 \times 10^3)]} \approx 203.2\ Hz$$

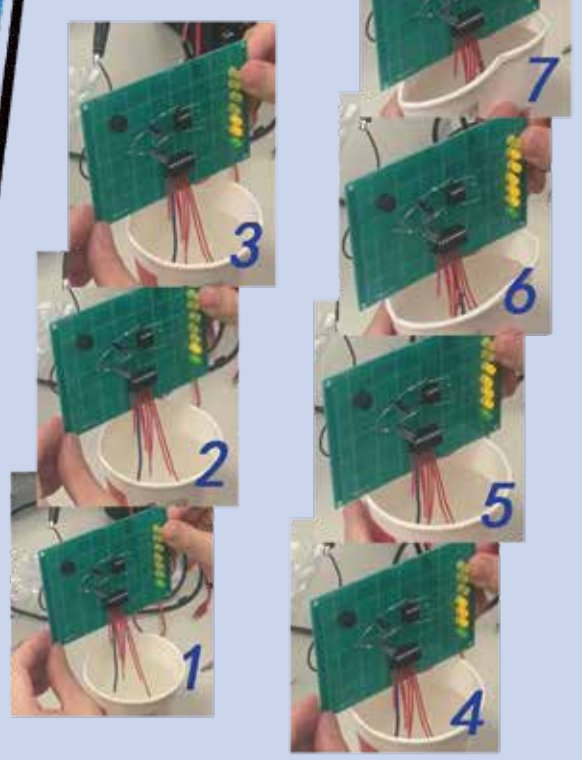
Results&Summary

We successfully implemented a simple automatic water level alarm device. In the early stage, we used Multisim to design a feasible circuit, and after simulation, it achieved the expected effect. In the later stage of actual circuit construction, we solved the problems encountered and adjusted the size of the capacitors and resistors to make the circuit work as expected. Finally, we used a water cup for simulation testing and successfully achieved the gradual lighting of LEDs representing different water level heights as the water level rises; when the highest water level is reached, the buzzer also starts working.

During the debugging process, we encountered many difficulties and are grateful for the help p rovided by the teachers and teaching assistants. From this project, we learned the standard circuit design process, which is to first build the circuit through simulation software, verify its feasibility, then solder the real circuit, test the actual effect, and solve problems. During the debugging process, we found that using a voltmeter to measure the voltage at each node and comparing the measured voltage with the simulation results can effectively locate problems; using a breadboard to build a simple circuit can conveniently and quickly try different schemes, thereby assisting in adjusting the parameters of components such as capacitors and resistors.

Photos





Video

BiliBili

Github