PROJECT PROPOSAL

Automatic Water Pump Controller

(ICT 305 2.0 EMBEDDED SYSTEMS)

AS2022902
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AUTOMATIC WATERPUMP CONTROLLER

Project Title

Automatic Water Pump Controller

Objective

To design and build a simple and cost-effective circuit that automatically turns the water pump ON when the overhead water tank is low and OFF when the tank is full. The system will also show the water level using LED indicators.

Background

In many households and buildings, water tanks are manually monitored. This often leads to two problems: water overflowing or the motor running dry. This project solves both by using an automatic system. The pump is turned ON only when needed and turned OFF when the tank is full. This not only saves water and electricity but also avoids human error. A 12V DC power supply and a NAND gate IC (CD4011) make this project affordable and energy-efficient.

System Overview

The system is divided into two sections:

1. **Pump Controller Circuit:**
    - Uses 3 transistors (T1, T2, T3), NAND gates, and relays.
    - Probe **A** = Low level, Probe **B** = Full level, Probe **C** = Base level (connected to 12V DC).
    - Motor turns ON when water level drops below **A** and turns OFF when it reaches **B**.
    - Relays RL1 and RL2 control the logic and motor.
2. **Water Level Indicator Circuit:**
    - Uses 5 transistors and 5 LEDs.
    - As water level increases, more LEDs glow:
        - LED1: Minimum level
        - LED2: ¼ level
        - LED3: ½ level
        - LED4: ¾ level
        - LED5: Full tank

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Key Features

- Automatic control of pump based on water level.
- Visual display using LEDs for tank level monitoring.
- Low power consumption (uses 12V DC).
- Uses commonly available components.
- Compact and waterproof design.
- Safe operation with proper insulation and grounding.

Expected Outcome

- A working circuit that automatically starts and stops the motor.
- LED-based water level indicator.
- A reliable and user-friendly system that saves water and electricity.
- Easy to install in households or small buildings.

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Materials Required

Component	Quantity
CD4011 NAND Gate IC	1
BC547 Transistors	7
12V DC Power Supply	1
Relay (5V/12V) RL1 & RL2	2
LEDs	5
Resistors (1kΩ, 10kΩ etc.)	As needed
Probes (Metal rods)	3
PCB / Breadboard	1
Connecting wires	As needed
Waterproof plastic case	1
Screws, nuts, insulation	As needed

Timeline

Week	Task Description
1	Research the concept, collect circuit diagrams, prepare component list
2	Buy components, prepare the probes, and build the pump control section on breadboard
3	Build the LED level indicator circuit and test with water levels
4	Combine both sections into one complete circuit. Begin enclosure setup
5	Final testing, circuit mounting, and documentation preparation

Conclusion

This project provides a simple and effective solution to control a water pump automatically. It is energy-saving, reduces manual work, and prevents overflow or dry motor damage. Using common components like NAND gates, transistors, and relays, the system can be made at a low cost and used in homes, schools, and apartments. It is a useful project that combines electronics and real-life application.

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