

# Proximity-based Water Dispenser

*Project Synopsis Submitted*

*to*

**MANIPAL ACADEMY OF HIGHER EDUCATION**

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**Objective:**

The main objective of this project is to develop an automatic water dispensing system that is based on proximity sensing. The system uses an LPC1768 microcontroller and an HC-SR04 ultrasonic sensor to detect the presence of an object, such as a cup, within a specified distance and automatically trigger the dispensing of water without requiring any manual operation. The project also includes a built-in feature to monitor and display the water level in the tank using another ultrasonic sensor. When the water level drops below a predefined threshold, the system alerts the user to refill the tank by displaying a message on an LCD screen.

**Scope:**

This proximity based solution to dispensing water aims to:

- Provide a hygienic, hands-free alternative for dispensing water, minimizing contact and contamination risks.
- Ensure efficient use of water by dispensing only when required and in a controlled manner.
- Incorporate a low-water-level detection system to ensure that the dispenser does not operate when the tank is empty, preventing damage to the pump and avoiding dry runs. This project can be used in public places, homes, or offices to enable hygienic and convenient water dispensing without physical contact.

**Project Description:**

The project integrates proximity detection and water level monitoring into a single automated system. The LPC1768 microcontroller serves as the core processing unit that handles input from the HC-SR04 ultrasonic sensor, controls the water pump via a relay, and provides user feedback through an LCD display.

- **Proximity Sensing and Water Dispensing:**

The HC-SR04 ultrasonic sensor is mounted near the water outlet. When the sensor detects an object, like a cup, within a predefined distance, the microcontroller interprets this signal as a request for water. The microcontroller then triggers a relay to power on the water pump, which dispenses water into the cup. Once the object moves away, the relay is deactivated, stopping the water flow.

- **Water Level Monitoring and Refilling Alerts:**

Another HC-SR04 ultrasonic sensor is utilized to measure and display the water level in the tank on an LCD screen. By positioning the sensor at the top of the water tank, it calculates the distance to the water surface. If the

distance indicates that the water level has fallen below a critical point, the system displays a "Refill Water Tank" message on the LCD screen. This ensures that the pump does not run dry, protecting the system and ensuring continuous availability of water.

- **System Operation:**

When powered on, the system continuously monitors for two things:

1. Proximity of an object to initiate water dispensing.
  2. Water level in the tank to ensure the system is not running when the tank is empty.
- If an object is detected within the sensor's set range, the relay is activated, turning on the water pump, and water is dispensed until the object is removed. Simultaneously, if the water level drops below the threshold, the system interrupts normal operation, prompting the user to refill the tank via the LCD display.

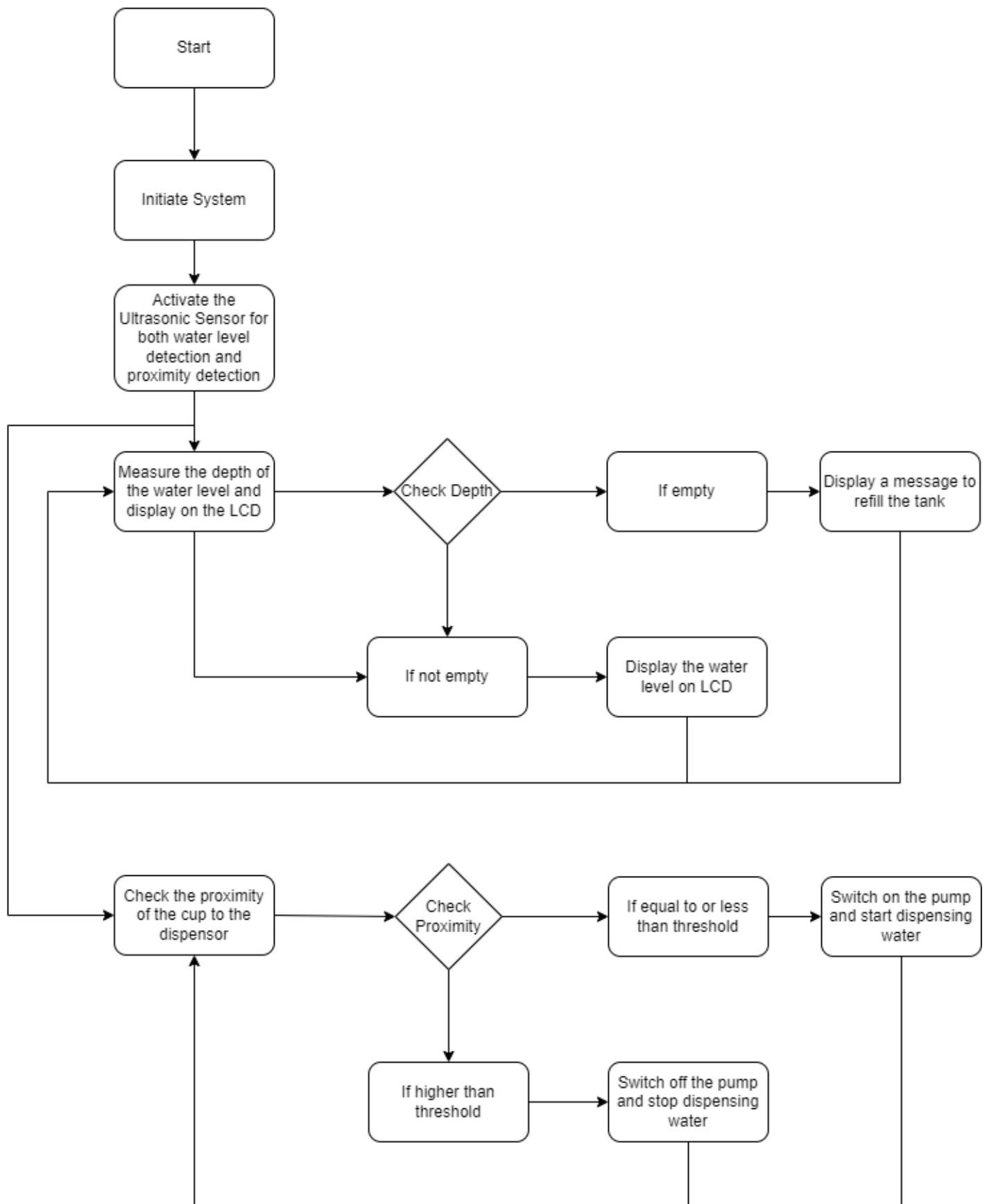
## **Hardware Requirements (Components Required)**

- LPC1768 Microcontroller
- HC-SR04 Ultrasonic Sensor x2
- Relay
- Water Pump
- LCD Display
- Power Supply
- Water Tank
- Connectors

## **Software Requirements:**

- Language: Embedded C
- IDE : Keil MicroVision
- Application: Flash Magic

## Methodology Diagram:



Hence this project effectively combines proximity sensing and automation to create a contactless, reliable, and efficient water dispensing system.

**Submitted by**

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