

AUTOMATIC WATER LEVEL CONTROLLER

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1) ABSTRACT

Water is very precious for living beings and scarcity of the same is gradually increasing. Most of the cities in the country and that of the world are facing this problem. Hence, it is of utmost importance to preserve and save water. In many houses there exists unnecessary wastage of water due to overflow from overhead tanks etc. **Automatic Water Level Controller** can provide a solution to this problem.

2) INTRODUCTION

The **Automatic Water Level Controller** is a solution to the problem of water scarcity. In this project a microcontroller is used and it is an **Arduino Uno**. The project also consist of various components such as LEDs to indicate if the water is has reached a fix point or not. A servo motor has been used in the project . An ultrasonic distance sensor has been used here to measure the distance and a potentiometer has been used to give analog input to the sensor.

3) FEATURES

1. It is easy to install
2. It easy to use
3. Low maintenance required
4. It functions automatically
5. It saves energy by automatically turning off the motor when the tank is full.

4) REQUIREMENTS

4.1) HIGH LEVEL REQUIREMENT

Test ID	Description
HL01	There shall be a ultrasonic distance sensor
HL02	There shall be a motor
HL03	There shall be LEDs to indicate the water level
HL04	There shall be a potentiometer to use as analog input for sensor

4.2) LOW LEVEL REQUIREMENT

Test ID	Description
LL01	According to the level of water the sensor shall detect the distance from the water and send it to the microcontroller.
LL02	When the water level reaches the maximum fix point, the motor turn off automatically and when the water level is below the fix point, motor starts.
LL03	The two LEDs (Green & Red) shall indicate if the water level is has cross the maximum fix point or not.
LL04	The potentiometer that has been used in place of water level, should send the signal to the sensor.

5) SWOT ANALYSIS

STRENGTHS

- This system can be used to save and preserve water.

WEAKNESSES

- It has limited uses only.

OPPORTUNITIES

- The components are easily available and easy to install. The system can be used in any household whenever needed.

THREATS

- Development in this field is slow.

6) 5W's & 1H**WHO**

- People will use this system.

WHAT

- It is a system which saves and preserve water.

WHEN

- Whenever the water level drops below a certain level, the Automatic Water Controller switch the motor on and shuts the motor off when rises well above a fixed level.

WHERE

- It can be install in homes, hotels, hospitals, public places, etc.

WHY

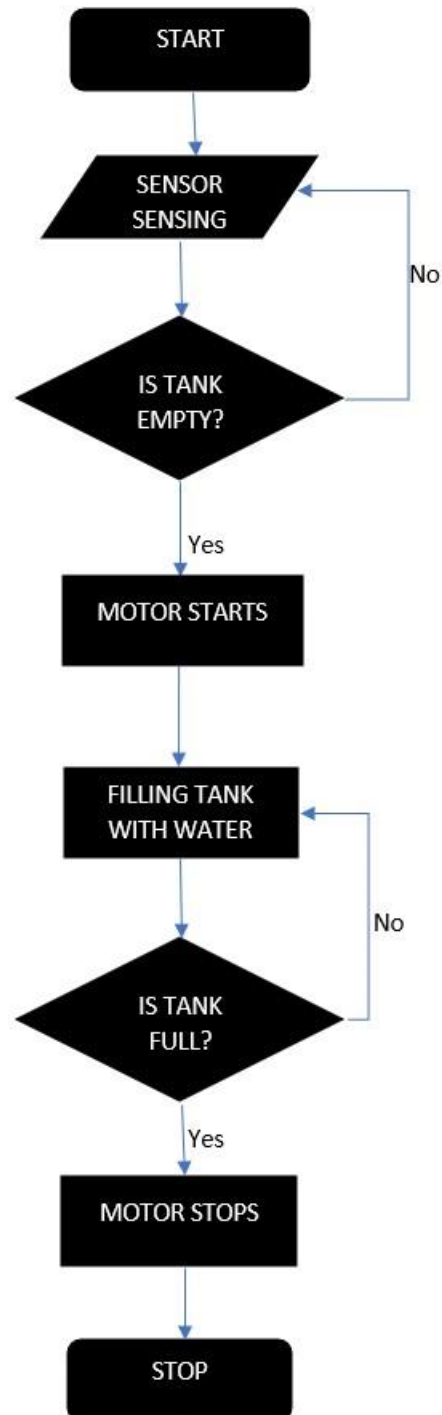
- To save and preserve water.

HOW

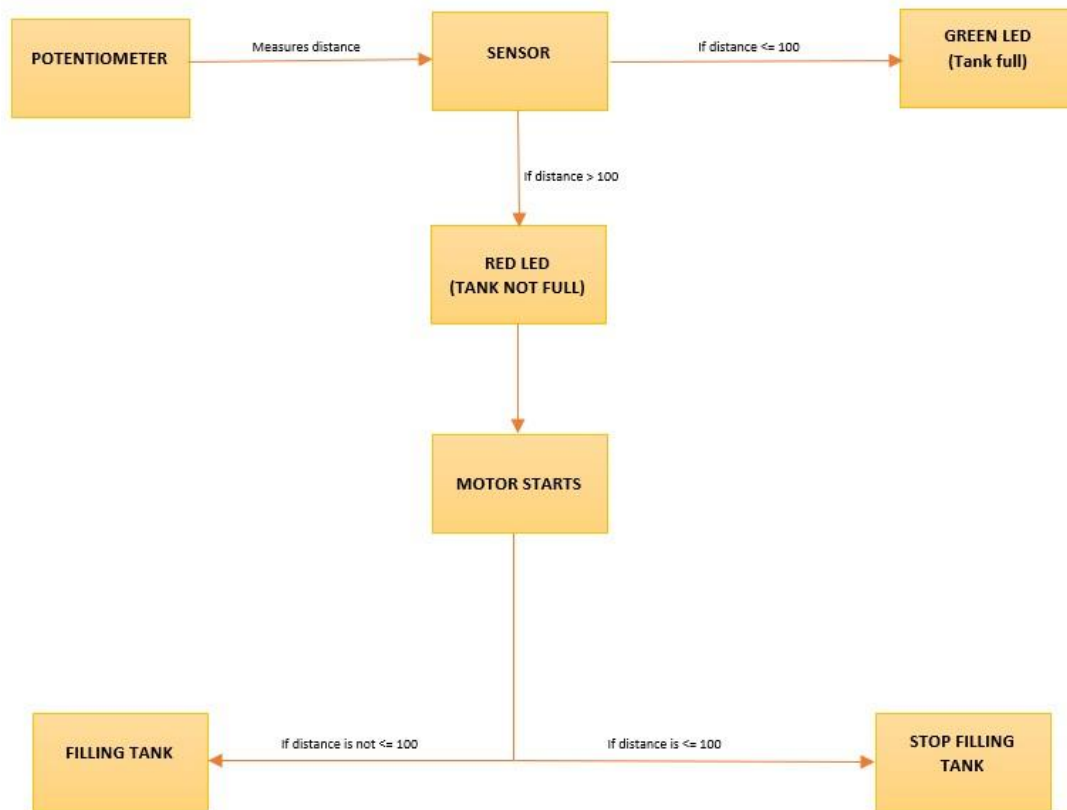
- This is a system which automatically control a motor to ensure a constant reserve of water.

7) ARCHITECTURE

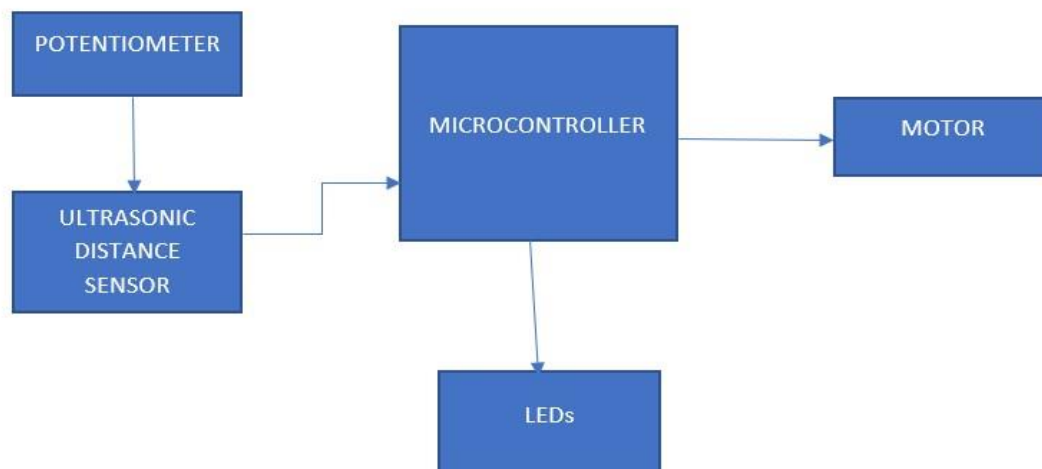
7.1) BEHAVIOURAL DIAGRAM



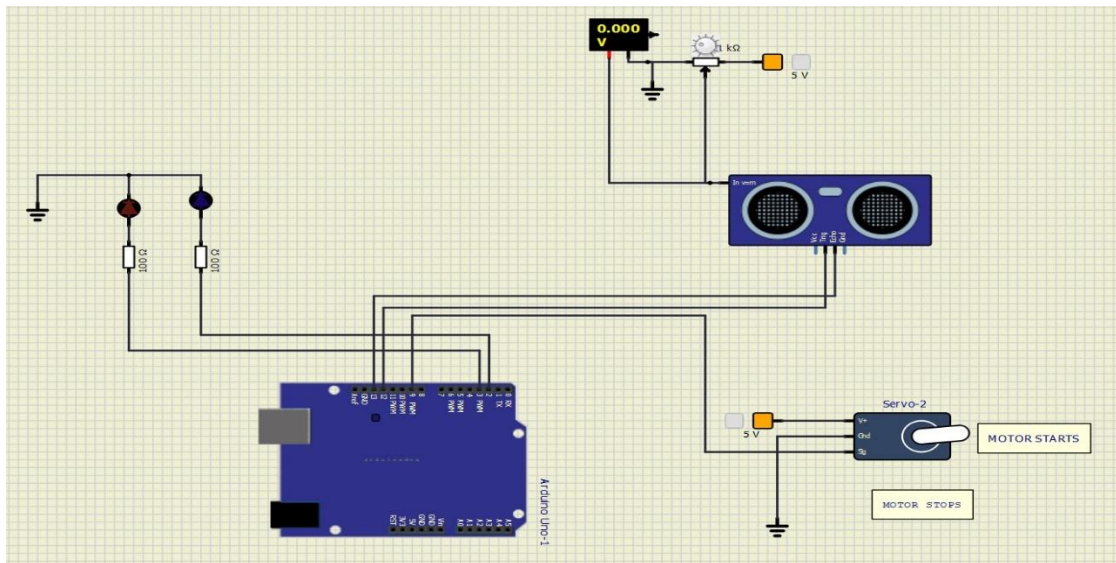
7.2) STRUCTURAL DIAGRAM



7.3) BLOCK DIAGRAM



7.4) CIRCUIT DESIGN



8) COMPONENTS

1. MICROCONTROLLER

A microcontroller is needed to perform all the important operations so that the projector works fine.

2. SERVO MOTOR

It is use to control the flow of water.

3. ULTRASONIC DISTANCE SENSOR

It is used to sense the distance between itself and the surface of water.

4. LEDs

LEDs are used to indicate the water level. If the water has crossed the upper limit, green LED will glow. If the water goes below the lower limit, red light will glow. .

5. POTENTIOMETER

It is used in place of water to give the sensor the analog input by adjusting it

6. VOLTAGE SOURCE

It is used to give power to the motor and potentiometer.

7. GROUND

Grounding is used to protect the equipment's

9) TEST PLANS

9.1) HIGH LEVEL TEST PLAN

Test ID	Description	Input	Expected Output	Actual Output	Pass/Fail
01	Ultrasonic distance sensor	Voltage from potentiometer	Generate pulses	Generate pulses	Pass
02	Motor should start	PWM Signal	Motor starts	Motor starts	
03	Red Led	Current from microcontroller	Do not glows	Do not glows	Pass
04	Green Led	Current from microcontroller	Glows	Glows	Pass
05	Potentiometer	5V	1.100V	1.100V	Pass

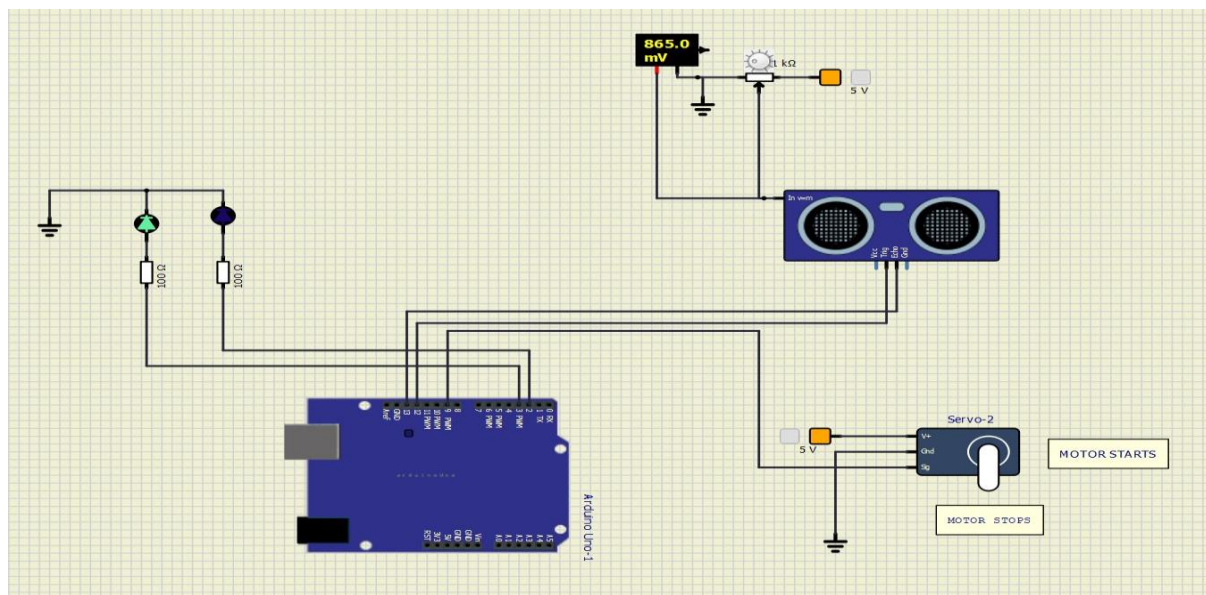
9.2) LOW LEVEL TEST PLAN

Test ID	Description	Input	Expected Output	Actual Output	Pass/Fail
01	Ultrasonic distance sensor below fix point	Voltage from potentiometer = 700mV	Generate pulses	Generate pulses	Pass
02	Ultrasonic distance sensor above fix point	Voltage from potentiometer = 1.085V	Generate pulses	Generate pulses	Pass
03	Motor above fix point when potentiometer output is 1.085V	PWM Signal	Motor starts	Motor starts	Pass
04	Motor below fix point when potentiometer output is 865mV	PWM Signal	Motor stops	Motor stops	Pass

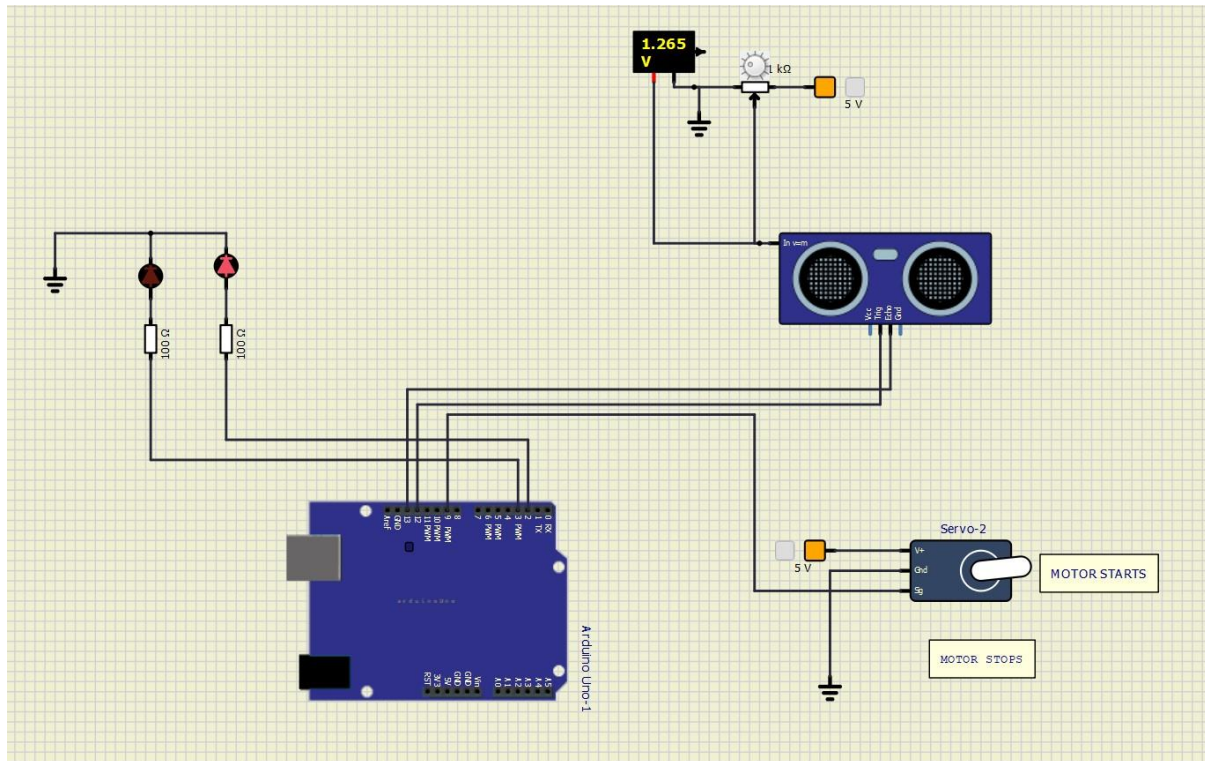
05	Red Led should not glow below fix point when potentiometer output is 700mV	Current from microcontroller	Do not glows	Do not glows	Pass
06	Red Led should glow above fix point when potentiometer output is 1.100V	Current from microcontroller	Glow	Glow	Pass
07	Green Led should not glow above fix point when potentiometer output is 1.100V	Current from microcontroller	Do not glows	Do not glows	Pass
08	Green Led should glow below fix point when potentiometer output is 865mV	Current from microcontroller	Glow	Glow	Pass
09	Potentiometer	5V	1.100V	1.100V	Pass
10	Potentiometer	5V	680mV	680mV	Pass

10) RESULTS

WHEN $V \leq 1.000V$, GREEN LED GLOWS AND MOTOR STOPS



WHEN $V > 1.000V$, RED LED GLOWS AND MOTOR STARTS



11) APPLICATIONS

1. It can be used in water tanks to control water level.
2. It can be used in factories, commercial complexes, apartments, homes, etc.
3. Oil tank level control.
4. Sea level monitoring.
5. Irrigation control.

12) REFERENCES

- 1) B. N. Getu and H. A. Attia, "Automatic water level sensor and controller system," 2016 5th International Conference on Electronic Devices, Systems and Applications (ICEDSA), 2016, pp. 1-4, doi: 10.1109/ICEDSA.2016.7818550.
- 2) Hudedmani, Mallikarjun & N, Nagaraj & J, Shrikanth & sha, Ali & G, Pramod. (2018). Flexible Automatic Water Level Controller and Indicator.