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AUTOMATIC WATER TANK FILLING SYSTEM

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Abstract : This paper introduces Scarcity of water is one of the biggest issues revolving across the globe and water crisis is reaching the alarming level day by day. So, water conservation in one or the other way is gaining a significant importance. Mostly, now a days in urban as well as in rural areas water tank system is available. The biggest disadvantage of this system is the overflow of water from overhead tank and overrunning of water pump. Hence, in this work, it is tried to design an automatic water tank level and pump control system, which ensures several benefits. The sensor devices used in our system detects and controls the water level in the overhead tank and even in the pump. As per the level of water present in the overhead tank, the sensor senses the levels and sends different signals to the Arduino and the signals are used for switching ON and OFF the motor pump as per requirements. The Arduino will control the pump by preventing it from dry running. A buzzer is attached to the circuit, which will ring when the water reaches the critical level in the overhead tank.

Keywords: NODEMCUESP8266, Arduino IDE, Water pump, Relay Module, Ultra-Sonic Sensor...

I. INTRODUCTION

Water scarcity is one of the major problems facing some cities of the world and wastage during transmission has been identified as a major problem. In this paper a Microcontroller Based Automatic Control for Water Pumping Machine and Level Indicator (MBACWPMLI) has been designed, constructed and tested. The MBACWPML I uses the reflection of sound (echo) to give the indication of water level in a storage tank and also the automatic control of the water pumping machine. The MBACWPMLI uses ultrasonic sensor installed at the top of a tank to send and receive sound waves, and the time taken is converted to distance by the microcontroller to give corresponding digital outputs which turns ON LEDs that indicate the level of water in the storage tank. The microcontroller also gives digital output to turn ON the water pump (when the water in the tank is at a preset minimum level of 0.27 meters) or turn OFF the water pump (when the water goes above the chosen maximum level of 0.05 meters). The MBACWPMLI when tested turned ON or OFF the water pump at the preset minimum and maximum level and the required LEDs were also turned ON at the corresponding water level.

II. LITERATURE SURVEY

[1] **Arduino Projects for Amateur Radio** This book provides practical examples of projects that use Arduino to control devices. Although it primarily focuses on amateur radio, it includes useful information about interfacing sensors and creating automated systems using microcontrollers, which can be directly applied to designing an automatic water tank filling system.

[2] **Practical Electronics for Inventors** While not solely focused on automatic water tank systems, this book provides a solid foundation in electronics, including microcontrollers, sensors, and relays. It is a great resource for those who want to build microcontroller-based automation systems like automatic water tank filling systems.

[3] **Arduino for Engineers** A range of practical projects that involve Arduino, including automation tasks. It provides a good understanding of how to integrate sensors, relays, and pumps into a control system, which can be applied to automatic water tank filling systems.

[4] **Embedded Systems** Real-Time Interfacing to ARM Cortex-M Microcontrollers by Jonathan w. van This book focuses on embedded systems and real-time interfacing with ARM-based microcontrollers. The knowledge in this book is highly relevant for designing control systems that include water tank monitoring and automation, using sensors and actuators.

[5] **Exploring Arduino** A comprehensive guide to Arduino-based projects, including water control systems. The book provides step-by-step guidance on how to use Arduino to automate tasks such as controlling pumps, monitoring water levels, and integrating sensors into the design of an automatic water tank filling system.

[6] **Microcontroller Theory and Applications** This book provides in-depth knowledge about microcontrollers and their applications, with a particular focus on the HC12 and S12 microcontroller families. It includes practical examples that can be adapted to create an automatic water tank filling system.

III. Methodology

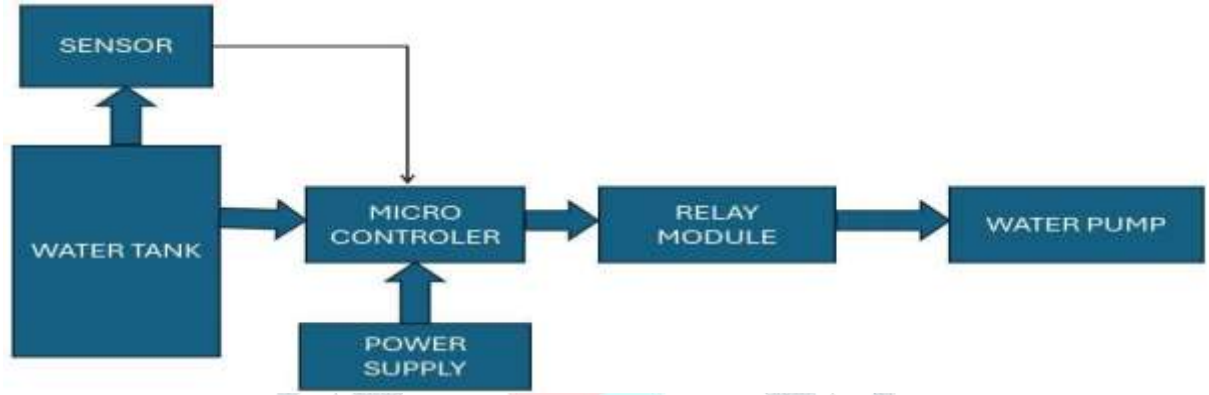

Figure 1

1. HC-SR04 SENSOR (ULTRA SONIC SENSOR) TO MICRO CONTROLLER

- connect sensor trig pin to micro controller d1 pin.
- connect sensor echo pin to micro controller d2 pin.
- connect sensor vcc, pin to power supply (3.3v).
- connect sensor ground pin to micro controller ground pin.

2.RELAY MODULE TO MICRO CONTROLLER

- The two connectors (with three sockets each) on the left side of the relay module connect high voltage.
- The pins on the right side (low-voltage) connect to the micro controller.

3.RELAY MODLE TO WATER PUMP

- Here, relay module act as switch ,when water level is low relay module in on condition and water is pumped to tank.
- Else, water pump is in off condition , because of relay module is in off.

A.BLOCK DIAGRAM

Figure 1 Represents the block diagram of Automatic Water Tank Filling System and components used like Micro-Controller or ESP98266NODE MCU, Ultra-Sonic Sensor, Relay Module.

B.WORKING

The automatic water tank filling system using Ultra sonic sensors, NodeMCU, Relay Module and water pump, Ultra Sonic Sensor is fixed at top of water tank, sensor is connected to the NodeMCU, and NodeMCU is connected Relay Module the Relay Module is conncted to DC Water pump. When water level low Ultra Sonic Sensor sends signal to NodeMCU, then NodeMCU send signal to Relay Module and Relay module send signal to water pump , water is pumped to water tank. Here water pump is connected to water source, else water pump is off condition , there no transmission of signal to further. Ultra Sonic sensor measure the water level in water tank by calculating the distance between the sensor and water surface level . A Nodemcu reads the data from the Ultra sonic sensor , process the data, and controls relay module. Here relay module act as a switch to control water pump based on signals from the nodemcu, and then water pump will pump the water to water tank. The ultra sonic sensor sends out ultrasonic waves and measures the time it takes for the echo to return after the hitting the water surface. Nodemcu compares the current water level with predefined threshold , if water level is below threshold, the Nodemcu activates relay module to turn on pump, if the water level is higher than threshold , then Nodemcu deactivate the relay module to turn off the water pump. The relay module act as an electronic switch to control water pump, when the relay module is activated the pump start filling the water in water tank , when deactivated the pump will stop filling water tank , here we should use an appropriate power supply for Nodemcu and pump.

C.FLOWCHART

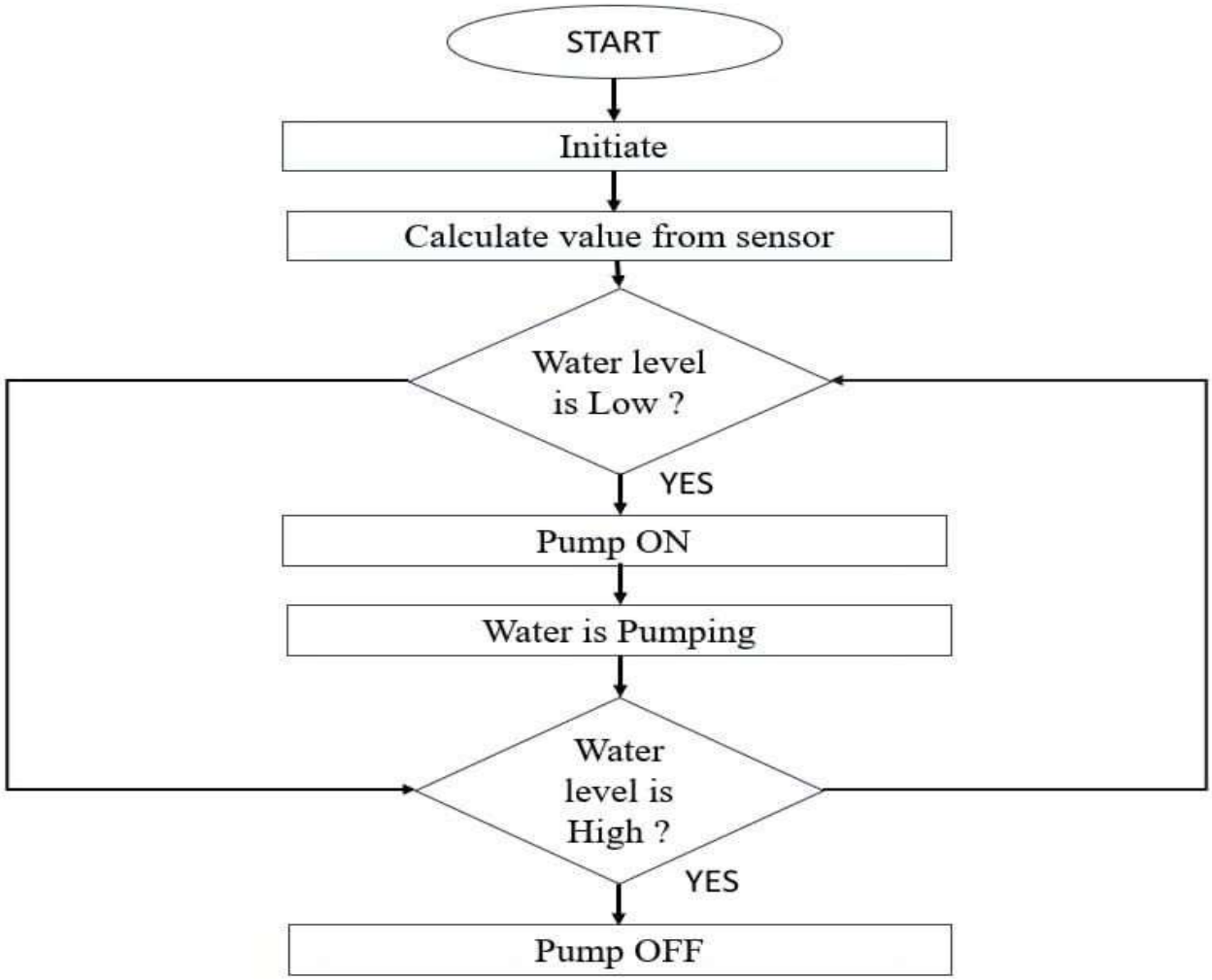

Figure 2

IV. RESULTS

Prototype of automatic water tank filling system

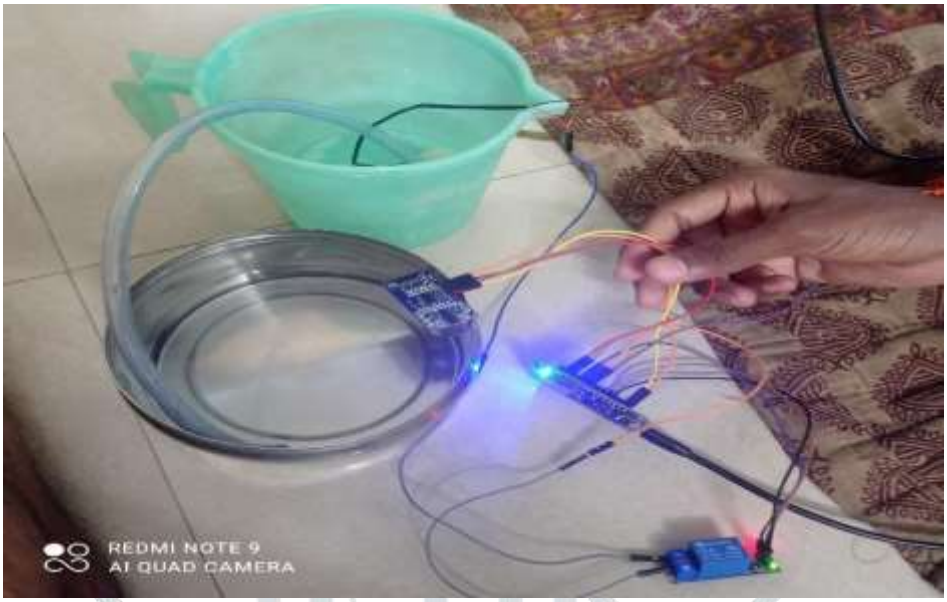

Figure 3: Testings of automatic water tank filling system

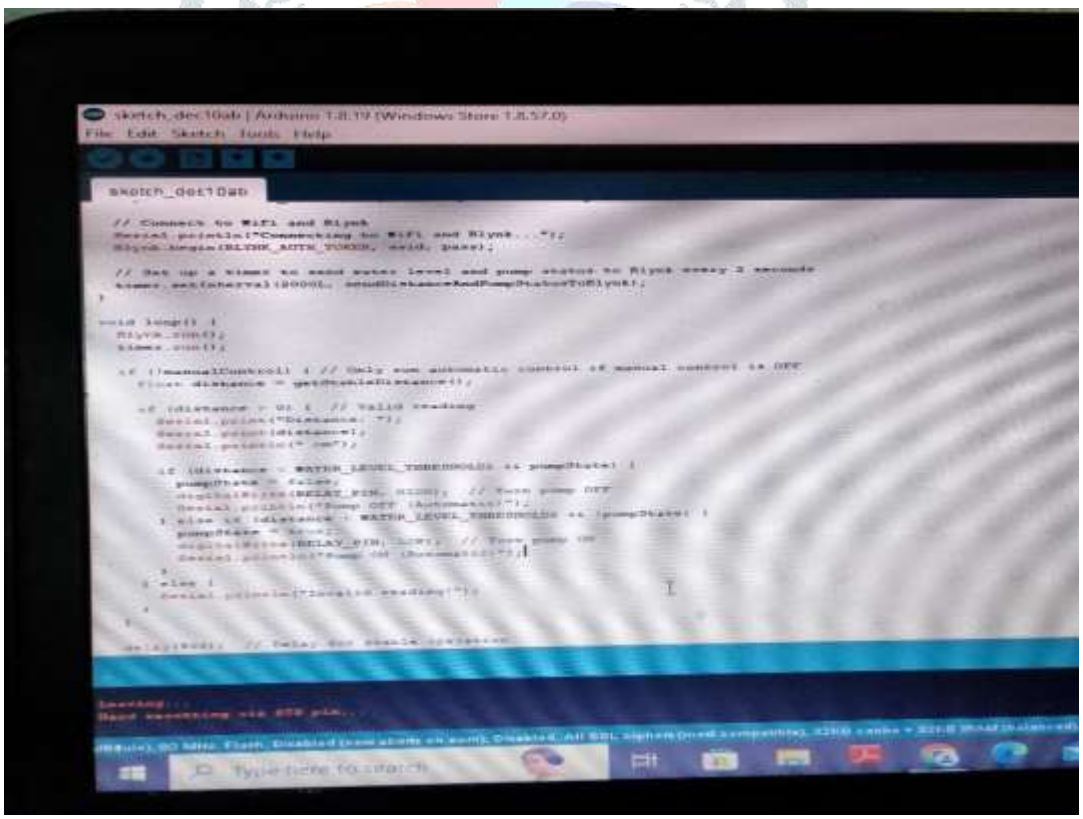

Figure 4 : code for automatic water tank filling system

V. APPLICATIONS

- Buildings
- Houses
- Retail and Shopping Malls
- Offices

VI. REFERENCE

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