

# MOTORIZED WATER SUPPLY AND PERCOLATION PROTECTION TECHNIQUE

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**Abstract-** Due to increasing Population day by day there has been increasing demands of Pure Water for every Household, especially in Urban Areas. As the number of Water Connections are increasing, Municipalities are finding it difficult to Manage and Control the Water Supply to every Household. Also because of this complicated network of Pipes, it's very hard to prevent and locate Water Leakage. More Number of Water Connections complicates the Pipe Network and it is nearly impossible to manage such kind of Network Manually. This Paper provides an alternative approach by Automatically Monitoring as well as Controlling the Water Flow to every Household from Main Reservoir to different Houses. Our Paper also focuses on preventing the Water Leakage which can help in maintaining adequate amount of Water. We have also shown the Construction and Working of the proposed model with corresponding Circuit and Block Diagrams along with Assembly Code for Microcontroller.

**Keywords-** 8051 Microcontroller, Relay Switches, Water Level Sensor, IC 785, DC Water Pump

## I. INTRODUCTION

Researchers indicate that World War 3 will be fought for Water Resources, even Studies suggests that India may face Water Crisis by 2050. For that there is an urgent need to save remaining Water Sources and distribution of Water plays a vital role in this. Conventional Methods can only handle a limited number of Storage Tanks to fill from main reservoirs. New Technique mentioned in this Paper can handle a large number of Households for Water to be Distributed equally. In Our Project, Water is flown through main tank to three different beakers which act

as Storage Tanks in 3 different Households. The Flow of Water is Controlled and managed by the brain of this system which is the 8051 Microcontroller using DC Water Pumps for each beaker Water Level Sensor is used in all three beakers to indicate 4 different Water Levels. When the Water is filled up to the Highest Level, the Microcontroller gets the Signal and the Valves of the Pumps are closed to stop the Water Flow. LCD Display connected to the Microcontroller give real time updates regarding Water Level and Pressure and helps in Monitoring Water Flow. Also, PH and Turbidity Sensors can be used to check the quality of Water at real time. Temperature Sensors are also available in Markets which are compatible with all kinds of Microcontrollers. But Aim of this Project is on the Monitoring and Controlling aspects.

## II. EXISTING PROBLEM

Conventional Technique relies on Human Effort more than Machine Work. In this System, the Person Responsible at the Water Station will open the valve for a certain amount of time. After a certain period of time, the same Operator will close the valve to stop the Water Flow. As the user knows that he/she will receive water no matter if his Storage Tank is full, he tends to misuse Extra Water by throwing it away in need of Fresh Water. Another Case arises when User's Tank is not full and yet Water Supply is stopped because of the end of Time. As the Water Connections in a Locality Increases, (particularly in Urban Areas) it becomes a tedious job for the operator to remember all the valves to open and close for a particular area. Also, as there is no Monitoring System available, Water may be wasted when the Tank gets full. Proper Management is Required.

### III. METHODOLOGY

The Project is designed by keeping in mind the economic feasibility of implementing it. For Instance, instead of using PLC we have used 8051 Microcontroller which is a cost-effective alternative. Also, instead of using a Pre-build Water Level Sensor from the Market, we have made that of our own using Copper Wired and it works on the basic Principle as Water is a very Good Conductor of Electricity. When the Water comes in contact with the Copper Wire, the circuit is completed giving signal to the Microcontroller about the Predefined Water Level which is also monitored in real time via LCD Display.

Microcontroller acts as the main CPU of this System which is connected with the Main Power Supply, Relay Switches, and the three Water Pumps used for the distribution of Water to their respective Storage Tanks. LCD Display is also connected to the Microcontroller for real-time updates.

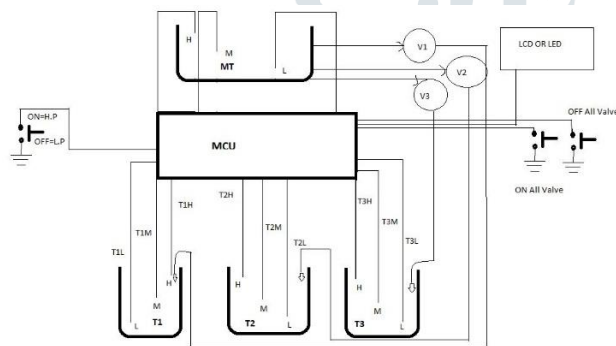


Fig. 1: Block Diagram of Water Supply

Abbreviation: MT=Main Tank, T1=Tank 1, H=High, M=Medium, L=Low,

This System have been made by making Four different Modules and Combining them after.

- First One being the most important of all **The Processing Unit**. It consists of 8051 Microcontroller, LCD Display, Transistors, Capacitors, Resistors, LEDs, diodes, Crystal Oscillator and obviously wires. Function of this unit is to Give Commands to all other Units and their respective components to work together according to a predefined set of algorithms. This Algorithm works on a Logic that If Main Tank is Empty then Motor wont start to save electricity and if Storage Tank is Full, Motor will Stop to save Water.
- Second Unit is **The Control Unit** which consists of Relay Switches and Push Buttons which can be used to manually alter the predefined set of algorithms set in Processing Unit and let the user decide which Respective

Pump to start or stop. It gives the User Manual Power over Automatic Supply.

- Third Unit is **The Supply Unit** which gives the all important electrical supply to all other units for the Project to work. This Unit consists of 12V Transformers and IC 785.
- The Last but not the least is **The Storage Unit** which consists of Main Tank and Three Storage Tanks with their respective DC water Pumps. It is the most Practical Unit as all the focus is here while Demonstration.

#### 8051 Microcontroller

8051 microcontroller is sorted out by Intel in 1981. It is a 8-bit microcontroller. It is worked with 40 pins DIP (twofold inline gathering), 4kb of ROM putting away and 128 bytes of RAM storing up, 2 16-bit timekeepers. It includes are four parallel 8-bit ports, which are programmable also as addressable as shown by the basic. An on-chip profitable stone oscillator is intertwined in the microcontroller having pearl rehash of 12 MHz Permit us at present to examine the structure of 8051 Microcontroller.

In the running with outline, the framework transport relates all the help gadgets to the CPU. The framework transport includes a 8-bit information transport, a 16-bit address transport and transport control signals. Every single other gadget like program memory, ports, information memory, progressive interface, meddle with control, timekeepers, and the CPU are all interfaced together through the structure transport.

#### Solenoid Valve

A solenoid valve is an electromechanical contraption in which the solenoid utilizes an electric stream to make an appealing field and along these lines work an instrument which manages the opening of liquid stream in a valve.

Solenoid valves separate in the qualities of the electric stream they use, the nature of the engaging field they produce, the instrument they use to manage the liquid, and the sort and attributes of liquid they control. The fragment shifts from straight activity, plunger-type actuators to turned armature actuators and rocker actuators. The valve can utilize a two-port structure to organize a stream or utilize a three or more port mean to switch streams between ports. Diverse solenoid valves can be gathered on a complex.

Solenoid valves are the most a critical piece of the time utilized control sections in fluidics. Their assignments are to stop, discharge, segment, pass on or blend liquids. They are found in different application zones. Solenoids offer smart and safe exchanging, high relentless quality, long association life, unprecedented

medium equivalence of the materials utilized, low control and smaller course of action.

### Transformer

A transformer is a static electrical gadget that exchanges electrical centrality between no under two circuits. A changing current in one spot of the transformer gains a moving engaging ground, which, as such, incites a differentiating electromotive authority over a second hover pivoted a relative core interest. Electrical noteworthiness can be exchanged between the two circles, without a metallic connection between the two circuits. Faraday's law of affirmation found in 1831 portrayed the impelled voltage influence in any hover by virtue of changing appealing advancement drifted by the turn.

Transformers are utilized for broadening or lessening the turning voltages in electric power applications, and for coupling the times of standard preparing circuits.

Since the headway of the fundamental unsurprising potential transformer in 1885, transformers have wound up being essential for the transmission, transport, and use of exchanging stream electric power.[3] A wide degree of transformer structures is learned about electronic and electric power applications. Transformers continue running in size from RF transformers not really a cubic centimeter in volume, to units estimating a couple of tons used to interconnect the power organize.

### Relay Switch

A hand-off is an electrically worked switch. Various trades utilize an electromagnet to unequivocally work a switch, yet other working standards are besides utilized, for example, strong state trades. Trades are utilized where it is basic to control a circuit by another low-control flag, or where a few circuits must be constrained by one standard. The chief moves were utilized in long separation convey circuits as enhancers: they emphasized the standard rolling in from one circuit and re-transmitted it on another circuit. Trades were utilized by and large in phone trades and early PCs to perform genuine activities.

A kind of trade that can deal with the high power required to unequivocally control an electric engine or particular loads is known as a contactor. Strong state trades control circuits with no moving parts, rather utilizing a semiconductor contraption to perform exchanging. Trades with adjusted working attributes and a bit of the time diverse working circles are utilized to shield electrical circuits from over-weight or blames; in present day electric power frameworks

these points of confinement are performed by bleeding edge instruments still called "defensive trades".

Engaging catching trades require one beat of hover capacity to move their contacts in a singular course, and another, diverted heartbeat to move them back. Rehashed beats from a similar information have no impact. Appealing trapping moves are valuable in applications where interfered with power ought not be able to change the contacts.

Engaging locking trades can have either single or twofold circles. On a solitary circle contraption, the hand-off will work one way when control is related with one farthest point, and will reset when the utmost is traded. On a twofold curve contraption, when spellbound voltage is related with the reset circle the contacts will progress. Cooling controlled charming lock trades have single turns that utilization directing diodes to disconnect among work and reset headings. It was utilized in long parcel convey circuits, emphasizing the pennant rolling in from one circuit and re-transmitting it to another.

### Water Level Sensor

Level sensors see the component of fluids and unmistakable liquids and fluidized solids, including slurries, granular materials, and powders that demonstrate an upper free surface. Substances that stream end up being on a very basic level dimension in their compartments (or other physical purposes of repression) due to gravity while most mass solids load at an edge of rest to a peak. The substance to be evaluated can be inside a holder or can be in its fundamental structure (e.g., a stream or a lake). The estimation can be either consistent or point respects. Steady estimation sensors measure level inside a destined range and pick the accurate extent of substance in a specific spot, while point-level sensors just show whether the substance is above or underneath the distinctive point. For the most part the last perceive levels that are an abundance of high or low.

## IV. CIRCUIT DIAGRAM WITH WORK FLOW

220V Regular AC Supply is given to the Step-Down Transformer which converts this into 12V for other Components to work properly. This 12V is first given to IC 7805 which converts this 12V into 5V making it suitable for the Microcontroller as all other components including 8051 Microcontroller works in 5V.



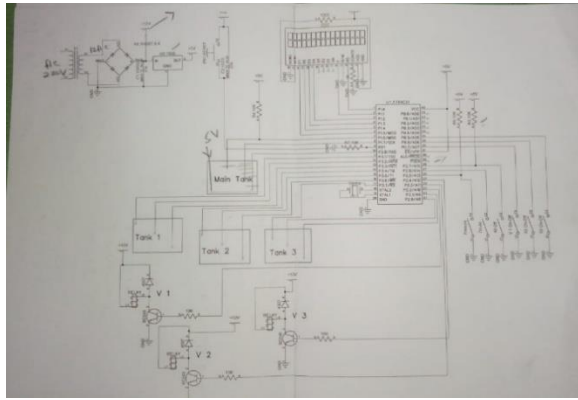


Fig. 2: Circuit Diagram of Water Supply

The Same 12V is also given to two other ICs (7805) which converts them into 9V and 6V respectively. This difference in Voltage helps in generating two different Pressure Levels for Water Flow. The same 12V is also given to Four LEDs attached with their 4 respective transistors that indicate if Motor 1, 2, 3 or all Motors are switched ON. 4 Relay Switches where one of the Relay is connected to the two ICs (that generating 6 and 9 volts) and this Relay is connected to another Push Button such that the operator can decide which Pressure Level he wants per his needs. As LCD Display is connected with the Microcontroller, all such information is displayed in real time suggesting which Water Pump is ON and at what Pressure Level, also it indicates the Water Level. The Other Three Relays are used to control the Valve of the three respective Water Pumps using 3 different Push Buttons. One Push Button is specially used in case if all Water Pumps are to be Switched ON at the same time. As for Automatic Control, Water Pump Automatically Switches ON and OFF according to the Water Level decided by the Water Level Sensor. It consists of 4 Markings, when water level is below the lowest marking, it indicates that there is no Water in the Main Tank and Motor is turned OFF. When Water Level crosses the lowest marking, Motor is turned ON if needed. After crossing the second marking it indicates that Water Level is to the Lowest Level. Similarly, third and fourth marking indicates the Water Level to be at Medium and Highest Level respectively. When Water Level crosses the Highest Level, it indicates that the Storage Tank is full and Motor is turned OFF of that particular tank. This System is not just cost effective but Smart on its own. Both the Circuit Diagram (On Paper as well as Real Image) is shown in the above figures.

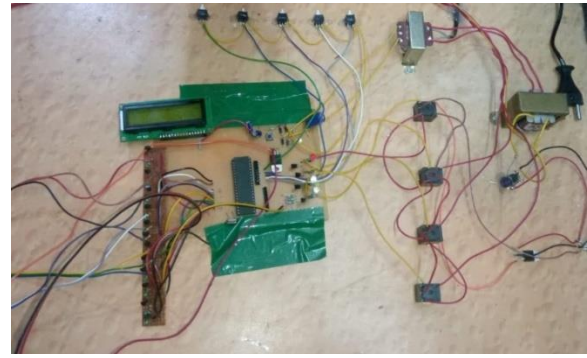


Fig. 3: Circuit Connections of Water Supply

## V. CONCLUSION

The System proposed in this Paper is not just Cost-Effective but more reliable source of Water Distribution System as compared to those of conventional ones. There are other solutions available which may be better than the proposed solution and may also have more features but the above system is made taking in context of low cost as well as the market which is India. Going for High-Cost options may not be a solution always when the same problem can be solved cheaply. Quantity of Water has been same from past billion years but the Quality has degraded time to time. With Increase in Population, there is an increase of thirst and to serve that it is important that Water is Distributed equally among all.

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