

# Implementation Of Water Consumption and Contamination Detection System Using Arduino

VEERAYYA JAVVAJI<sup>1\*</sup>, K.VENKATA LATESH<sup>2</sup>, K.MOUNIKA<sup>2</sup>, SARADA MUSALA<sup>3</sup>

<sup>1</sup>Department of Electronics and Communcation Engineering, Research scholar,Vignan foundation for Science & Technology, Vadlamudi, Guntur (District),Andhra Pradesh, India – 522213

<sup>2</sup>Department of Electronics and Communcation Engineering,Vignan's LARA Institute of Technology & Science, Vadlamudi, Guntur (District),Andhra Pradesh, India – 522213

<sup>3</sup>Department of Electronics and Communcation Engineering,Vignan foundation for Science & Technology, Vadlamudi, Guntur (District),Andhra Pradesh, India – 522213

\*Corresponding Author

Email: veerayya52 @gmail.com

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## ABSTRACT

Drinking water is a limited natural resource that should be utilized in an effective way for sustainability. Not only utilization but also monitoring the quality of water is equally important to avoid many diseases caused because of water pollution. In this paper, we propose a system that monitors the quality of water along with restricting household water consumption. We design a system that automatically controls the water consumption using a solenoidal valve and water quality using PH sensor and turbidity sensor using Arduino. The result is a reduction of manpower and continuous monitoring is possible.

**Keywords:** Arduino, water pollution, water contamination

## 1. Introduction

The proposed system is divided into two parts. One is about water consumption and the other one is about water contamination detection. About water consumption is our project portrays about a proper water distribution with timing. In our project first we will conduct a survey about water utilization per each house. Later based on the survey, we will supply water to the houses in the respective time slot within the capacity of each house. If the capacity exceeds, then our system will automatically stop the functioning of the water supply. During this process if any chemicals detected in the water then the system stops functioning and it will display an warning SMS. We are using Arduino as controller and solenoid valve for on and off operation of water pipelines. If our project is implemented everywhere, wastage of water also reduced because of a desired timings and calculated water levels. The other side of the paper is water contamination detection. so, in this paper we proposed a system that it detects changes in the concentration of the water based on the pH value by using water gravity pH sensors. Based on the changes occur in pH value it decides water is pure or impure. If it is impure then this system will immediately display an warning SMS. Because of this project we try to protect some of the lives of humans from some harmful viral diseases.

## 2. Literature Survey

The literature survey gives information about the projects that are done earlier. This literature survey gives various perspectives regarding the project.

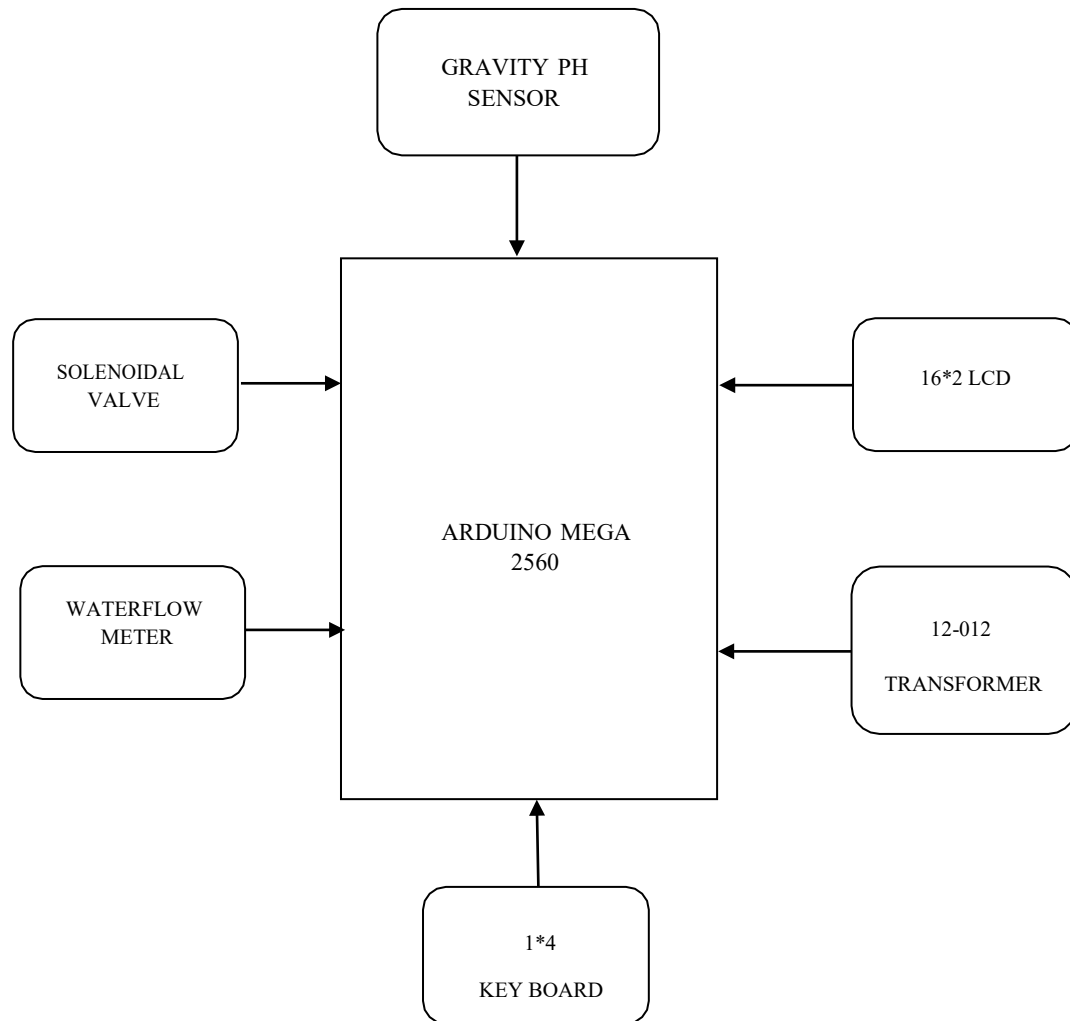
- Kashid, S. G., &Pardeshi, S. A. (2014). "A survey of water distribution system and new approach to intelligent water distribution system". 2014 First International Conference on Networks & Soft Computing(ICNSC2014).
- Taru, Y. K., &Karwankar, A. (2017). "Water monitoring system using arduino with labview". 2017 International Conference on ComputingMethodologies and Communication (ICCMC).
- "A GSM based Water Quality Monitoring System Using Arduino" P.Manivasagam Department of ECE, Sri Vidya College of Engineering & Technology Virudhunagar, Tamil Nadu, India.

## 3. Proposed System

The proposed system is divided into two parts. One is about water consumption and the other one is about water contamination detection. About water consumption is our paper portrays about a proper water distribution with timing. In our paper first we will conduct a survey about water utilization per each house. Later based on the survey, we will supply water to the houses in the respective time slot within

the capacity of each house. If the capacity exceeds, then our system will automatically stop the functioning of the water supply. During this process

if any chemicals detected in the water then the system stops functioning and it will display an warning SMS.



**Fig.3: Block diagram of proposed system**

### 3.1. Arduino Mega

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

- Microcontroller ATmega 2560 (8bit)
- Power Supply 7-12V
- Digital I/O Pins 54
- Analog I/O Pins 16
- Total Digital I/O 70 (Digital + Analog)
- Clock Speed (16MHZ)

### 3.2. Solenoidal Valve

- A Solenoidal Valve is an electrically controlled valve.
- Solenoidal valves are simple and effective electrically operated valves to control the flow of

liquid, gas or stream. Their tasks are to shut off, release, dose, distribute, or mix fluids based upon the input Voltage.

### 3.3. Water Flow Meter

- A water flow meter is an instrument capable of measuring the amount of water passing through a pipe.

### 3.4. Gravity PH Sensor

- The Gravity ph sensor is specifically designed to measure the ph of the solution and reflect the acidity or alkalinity.
- It is commonly used in various applications such as aquaculture and environmental water testing.

### 3.5. 12-0-12 Transformer

12-0-12 5Amp Center Tapped Step Down Transformer is a general purpose chassis mounting

mains transformer. Transformer has 230V primary winding and center tapped secondary winding. The transformer has flying colored insulated connecting leads ( Approx 100 mm long ). The Transformer act as step down transformer reducing AC - 230V to AC - 12V. The Transformer gives outputs of 12V, 12V and 0V. The Transformer's construction is written below with details of Solid Core and Winding. The transformer is a static electrical device that transfers energy by inductive coupling between its winding circuits. A varying current in the primary winding creates a varying magnetic flux in the transformer's core and thus a varying magnetic flux through the secondary winding. This varying magnetic flux induces a varying electromotive force (E.M.F) or voltage in the secondary winding. The transformer has cores made of high permeability silicon steel. The steel has a permeability many times that of free

space and the core thus serves to greatly reduce the magnetizing current and confine the flux to a path which closely couples the winding.

### 3.6. LCD Display

- A liquid-crystal display (LCD) is a flat-panel display .
- It prints only ASCII Characters.
- A 16X2 LCD display is used to which includes 2 rows and can produce 16 characters.

### 4. Experimental Results

Arduino is used as a control unit to consume water efficiently and to detect chemicals in the water. We use Solenoidal Valve to allow the flow of water in a particular direction based on respective time slots. The time slots is provided by using 1\*4 Keyboard.



Fig 4.1 : Image for setting Timer

How the sufficient capacity of water provided to the house is done by using Water Flowmeter. Water

Flowmeter measures the rate at which the water flow measures volume of water.

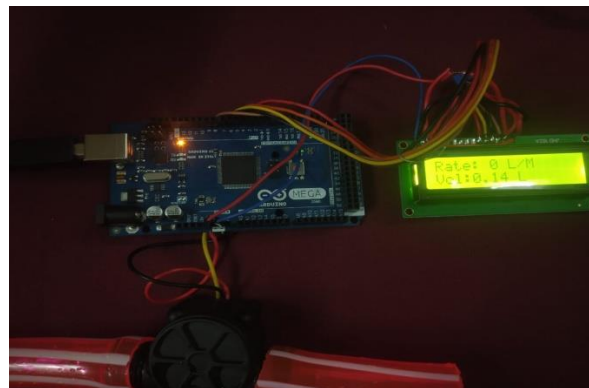


Fig 4.2 : Water Flowmeter Output Image



Fig 4.3: Display of Normal Water Detected

Chemical detection action in water is done by using Gravity pH sensor. The pH value of normal water is 6.5 – 7.0. So the system will find the pH value within the range it displays a message good water that means this water is used for drinking purpose.

If any chemicals detected in the water i.e pH value changes. So, this water is not used for drinking water. Here in this case the system displays a message bad water detected.



Fig 4.4: Display of Polluted water detected

## 5. Conclusion

The idea of this paper is to reduce consumption of water and detection of chemicals in water. This system is more efficient compared to the existing systems because of its own advantages. The sensors used in this prototype are tuned to operate according to the surrounding environment of it. But same system with the hardware enhancement can make it to the real world..

## 6. Future Scope

In future there is a chance to buy even water also so in that case this paper is very helpful. If this paper is implemented everywhere water consumption is drastically reduces compared to existing systems. In this paper the system detects the chemicals present in water also because of that we can save some of the lives of humans.

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