

IOT BASED FLOW MEASUREMENT AND CONTROL

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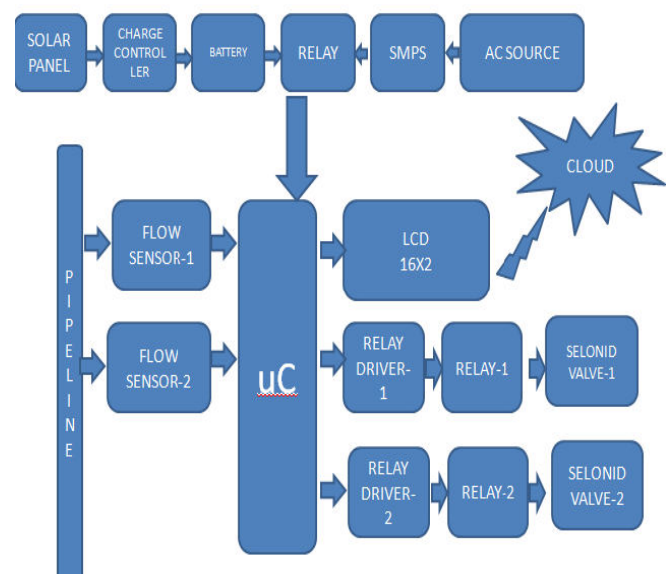
Abstract – As the population is increasing day by day, urban residential areas have also increased because of this reason water has become a critical problem which affects the problem of water distribution, wastage of water, water consumption and interrupted water supply also water saving. People are found complaining that they don't have a sufficient amount for their daily needs. So to overcome water supply related problems and make system efficient there is a need of proper monitoring and controlling system. This system presents the design for water flow measurement and control approach based on IOT which focuses on continuous and real-time monitoring of water supply that enables proper and uniform distribution flow rate abnormality in the distribution line. This system proposes the conceptual design of a closed-loop mated equally water distribution system for residential buildings flats collages etc. Flow sensors are fixed in the inlet of the pipe to every user. When the system is turned on it may be decided which amount of water utilized by each user is monitored and controlled by using a microcontroller. This is done by counting the pulses from all channels continuously. Depending upon the availability of water in the reserve tanks, the maximum amount of water which is the threshold value will be set for individual users. The valve can turn on/off by the solenoid valve unit to stop the water supply whenever the flow rate exceeds a predefined threshold. There is a computer in the system to keep track of the usage of water by individual users in real-time and will be handled by the admin to simultaneously manage the users accordingly.

Key Words: IOT, Water distribution system, Electronic flow meter, Arduino, Wi-Fi, Water level sensor, Solenoid valve.

I. INTRODUCTION

Water is one of the most important resources for all the lives on earth. In that, some people do not get a sufficient amount of water because of unequal distribution. So, it should be supplied properly as well as carefully and at the right time to fulfill the daily activities. The primary objective is to design and develop a low cost, easy to use, profitable and efficient technique to make appropriate water distribution by continuous monitoring and also controlling it from a central server so as to solve water-related complications. This paper gives an idea to provide water in a proper sequential manner. In order to implement a water distribution system in an appropriate channelized manner to the end-users, the control room of each user should be

provided with a microcontroller to regulate and control the required quantity of water in proper time intervals. The system checks total water level stored in the tank and it is divided into the number of houses. The electrically solenoid valve will be shut down automatically when the limit reaches the determined threshold value. With the help of the internal predefined limit in the system, the flow of water through the valve is controlled. The Wi-Fi module is used for wireless communication so that messages can be sent to the user according to the water used. There is confidence that through this system the water is managed efficiently and is provided according to the demand and unnecessary wastage of water is avoided by real-time monitoring. The flow sensors will keep the sense of the amount of water flowing through each pipeline of the requested user and will automatically shut off the valve when the threshold is reached. During the distribution of water rate of flow is measured so that equal distribution is done. This whole data is sent from Wi-Fi to the mobile. The flow of distribution water both will be monitored which can be displayed anywhere using the internet. Hence, the proposed system helps in managing water supply efficiently according to availability i.e. also under scarce conditions.



BLOCK DIAGRAM

WATER FLOW SENSOR



The water flow sensor consists of a plastic valve from which water can pass it. A water rotor along with a Hall Effect sensor is present to sense and measure the water flow. When water flows through the valve it rotates the rotor. By this, the change can be observed in the speed of the motor. This change is calculated as output as a pulse signal by the Hall Effect sensor and get back to the signal microcontroller. Thus, the rate of flow of water can be measured.

The main working principle behind the working of this sensor is the Hall Effect. According to this principle, in this sensor, a voltage difference is induced in the conductor due to the rotation of the rotor. This induced voltage difference is transverse to the electric current. When the moving fan is rotated due to the flow of water, it rotates the rotor which induces the voltage. This induced voltage is measured by the hall effect sensor and displayed on the LCD display. The water flow sensor can be used with hot waters, cold waters, warm waters, clean water, and dirty water also. These sensors are available in different diameters, with different flow rate ranges.

SOLENOID VALVE



The solenoid valve is controlling equipment controlled by electromagnetism. It is an automatic basic element to control the flow rate of liquid. It belongs to the actuator but does not limit to the hydraulic pressure and pneumatic control.

In the industrial control system, the solenoid valve is used to regulate the direction, flow rate, speed and other parameters of the medium to liquid saving proposed.

The solenoid valve can co-ordinate with different circuits to realize the control precision and flexibility being a guaranteed system. The solenoid valve is designed by the solenoid coil and magnetic core. It is the valve body containing several holes. When the coil is getting through or cut off with power, the operation of the magnetic core will result in that the fluid passes through the valve body and is cut off so as to reach the goal of changing the fluid direction. The electromagnetic component of the solenoid valve is constituted by the fixed iron core, movable iron core, coil and so on and it is operated by 12 volts dc. The valve body of solenoid constituted by the slide valve core, slide valve harness and spring base. The solenoid coil is installed on the output valve directly outlet while the valve body is enclosed in the sealed pipe, so as to constitute a simple and compact combination.

HOW TO USE CLOUD

This system is using Wi-Fi module (Esp8266) to send the sensor data to the cloud. All the sensors are connected with Wi-Fi module. Wi-Fi module needs the internet. So here Mobile data or Wi-Fi is the access point for the internet. And after all this, data is sent to the cloud.

ADVANTAGES

- It gives uniform distribution regardless of water quota within the pipelines.
- Limits water consumption as per requirements.
- This method required comparatively less number of cut-off valves.
- Controls water supply in real-time.
- Automated supply ensures that water is not wasted by the people and hence promoting water conservation
- System is provided with an electrical solenoid valve for proper water supply and hence no human intervention.
- Due to this project the people will be awareness to save water.

CONCLUSION

The proposed system helps to measure and control the consumption of water when it reaches the predefined limit. Automatic water distribution and control focuses on various entities such as proper supply, no wastage, efficient usage, no overconsumption, and equal distribution. In this paper, a prototype water distribution and control system using IoT is presented. For this, some sensors are used. The collected data from all the sensors are used for analysis purposes for better solutions to water problems. The data is sent to the cloud server via Wi-Fi module ESP8266. So this application will be the best challenger in real-time monitoring & control system and use to solve all the water-related problems.

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