AN INTERNET OF THINGS BASED SMART AQUA SYSTEM FOR REGIONAL ENVIRONMENTAL MONITORING

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Abstract: **Sustainability of available water resource in many reason of the word is now a dominant issue. This problem is quietly related to poor water allocation, inefficient use, and lack of adequate and integrated water management. Water is commonly used for agriculture, industry, and domestic consumption. Therefore, efficient use and water monitoring are potential constraint for home water management system. In Our project an Ultrasonic sensor is the basic component for the water level indicator. Our Project is helps to indicate the level of water available in the tank. We can see all the level of the water contained in a tank or in any other vessels. An Ultrasonic sensor (transistor circuit) detects the present level of the water in the tank and feeds it to the Arduino board and the Arduino generates a corresponding output text which in then displayed on the LCD display. If the water level is low, then the display notifying that the water level is low and automatically switches ON the motor. If the water level is full, then the display notifying that the Water levels is full and automatically switch off the motor. At the same time water can distributed to the home, it based on the motor outlet valve. Every home have separate flow sensor. The sensors will sense the flow of water to each pipe which ultimately tells the usage of water at home.**

Keywords: IOT, Water resources, scarcity, Water management, limiting use, statistics

I. INTRODUCTION

Being the second populous country in the world, India has an overall population of 1.12 billion living in an area of more than 3 million square kilometers. Even though the last decade has shown improvements in fulfilling; the basic necessities like food (including water), shelter and clothing to people; extremely rural habitations and villages still lack clean water. Recent survey shows that the water scarcity in India will worsen as the overall population is expected to increase to 2 billion by year 2050.

Nearly the third quarterly portion of the earth which estimates up to 71% portion of it is covered with water. But out of which only 0.08% fresh water is available for human purposes and for living beings 1. The main sources of fresh water available for living purposes and for human use is the surface water available as a result of rainfall which also recharges the lakes, different water resources like aquifers. Water scarcity is the problem faced by the living creatures throughout the history and whose intensity has increased during the last centenary . It's estimated by next decade approximately 25% of the population of earth will live in perpetual scarcity of water. It's a well-known fact that physical factors affect the availability of water which is the culmination of the rainfall received by that area due to number of geographical reasons, but it is also well documented fact that human intervention is also affecting this factors which leads to unseasonal as well as in abnormal proportion of water fall and as a results the priorities of the available water changes drastically. Management of water gains importance to combat the problem of scarcity. This work focuses on a solution for 'Water management' in urban areas with the help of IoT. Water is precious and the supply needs to be regulated. Water demand is exponentially growing high with the increase in population of the urban areas. To maintain the supply demand ration proper, It is important to have systems to prevent any water loss.New management strategies need to be implemented in order to avoid setbacks and to fill up the lacuna which generally occurs during the distribution of water for various purposes in the allocation of water resources. With this thought, the project focuses, explicitly, on monitoring the usage of water. As monitoring will help further for controlling and distributing the water resource evenly according to the region and availability of resource as per area.

II. RELATED WORKS

Water is need of life. In co-operative society, office and likewise system require water supply every day. Such system management of water supply using dynamic IP based Embedded Web server (EWS) is presented in this paper. In current era of networking, to maintain EWS with static Internet Protocol (IP) is costly and difficult to manage. Novel approach of assign dynamic IP to board is developed and tested for different dynamic IPs.[1], Sensors placed in the tank which continuously informs the water level at the current time. This information will be updated on the cloud and using an android application, user can visualize the water level on a Smartphone anywhere that is connected to Internet[2], to reduce time and avoiding the wastage of water. So this problem can be overcome by developing an android application which works on GSM technology[3], the automation in the water distribution and management with technical device. The level of the water will be sensed by the water level sensor. Depending on the level of the water in the tank, the speed of the water will be varied. The supply of water to different areas are automated through the use of GSM and these mobile controlled water distribution result accurate meter reading and bill payment.[4]

III. PROPOSED METHODOLOGY

The work focused in this project is using Arduino, for measuring the water flow from the pipe which divides the Flow of water to every parts of block, will get sense using flow meter using solenoid .This data that is flow rate which is nothing but the usage of water rating in hours/liter, will be sent to cloud through IOT (Internet of things) space. Then in return getting this data from cloud to web page, the webpage which can be used by the user or the head of corporation for monitoring and controlling the supply of water. In this project, 3 water flow meter is used, one for getting the total water calculation in main tank and other two for the calculation of water usage by two houses through the main tank. The solenoid valve is also used to restrict the flow of water when the water usage exceeds the limit.

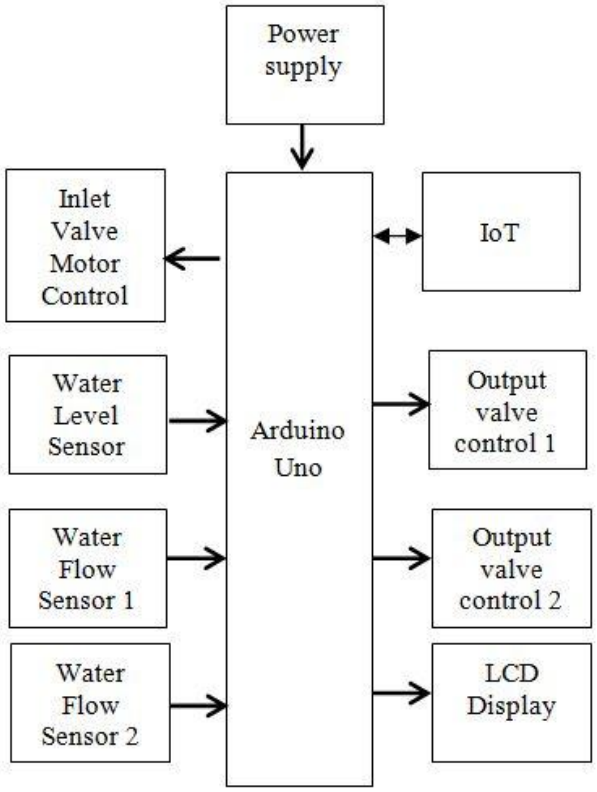


Figure: Proposed System Block Diagram

ADVANTAGES OF OUR PROPOSED SYSTEM

- It does not require more man power for proposed system.
- It does not takes more time for execution of process, it uses GSM module for data sending.
- In less cost proposed system is required with less man power.
- Water leakage is detected with accuracy. Also pipeline leakage is detected.

IV. HARDWARE REQUIREMENT

ARDUINO UNO

The Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

Figure: Arduino Uno

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdate boards see the Arduino index of boards.

WATER FLOW SENSOR

Water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor.

Figure: Water flow sensor

When water flows through the rotor, rotor rolls. Its speed changes with different rate of flow. The hall-effect sensor outputs the corresponding pulse signal. The provided sensors are well-manufactured from the topmost grade components and the latest technology under the supervision of our dexterous professionals.

Digital flow sensors units are ideal for use in water conservation systems, storage tanks, water recycling home applications, irrigation systems and much more. The sensors are solidly constructed and provide a digital pulse each time an amount of water passes through the pipe. The output can be easily connected to a microcontroller for monitoring water usage and calculating the amount of water remaining in a tank etc. this flow sensor is suitable for a standard 1/4" pipe and can be easily inserted into a standard piping system. The unit is constructed of long-life polymer and is suitable for

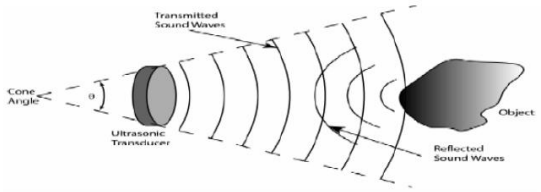
outdoor mounting. These units are ideal for use in environmentally friendly household water management systems.

FEATURES

- High electric level: less than 4.5 VDC(input voltage 5 VDC)
- Low electric level: higher than 0.5 VDC(input voltage 5 VDC)
- Pulse output protection: 50+/-10 %
- Pulse number: 450 pulses/litter.

ULTRASONIC SENSOR

Ultrasonic sensors are commonly used for a wide variety of noncontact presence, proximity, or distance measuring applications. These devices typically transmit ultrasonic sound toward a target, which reflects the sound back to the sensor. The system then measures the time for the echo to return to the sensor and computes the distance to the target using the speed of sound in the medium. The wide varieties of sensors currently on the market differ from one another in their mounting configurations, environmental sealing, and electronic features. Acoustically, they operate at different frequencies and have different radiation patterns.



It is usually not difficult to select a sensor that best meets the environmental and mechanical requirements for a particular application, or to evaluate the electronic features available with different models. The principle of working of an ultrasonic sensor is easy. The sensor transmits ultrasonic sound waves and waits for reflected sound waves. After receiving reflected sound wave or usually named echo, sensor detects the distance in different ways. Triggered the sensor and then wait for echo pulse. Measuring echo pulse width is important for us because 30 µs means us 1 cm.

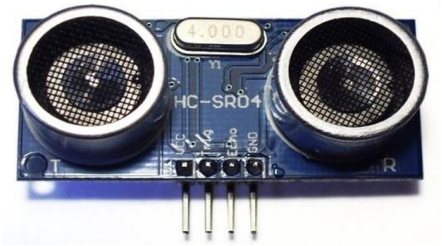
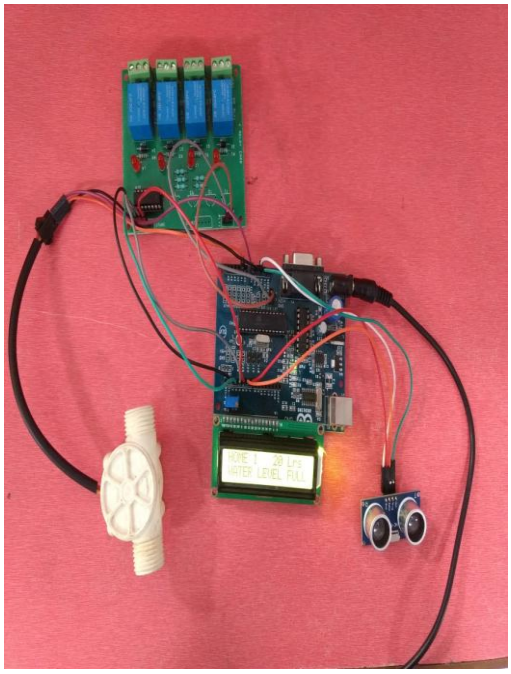


Figure: Ultrasonic sensor HC-SR04 module

RELAY

Relay is an electromagnetic device which is used to isolate two circuits electrically and connect them magnetically. They are very useful devices and allow one circuit to switch another one while they are completely separate. They are often used to interface an electronic circuit (working at a low voltage) to an electrical circuit which works at very high voltage. For example, a relay can make a 5V DC battery circuit to switch a 230V AC mains circuit. Thus a small sensor circuit can drive a valve control.

V. IMPLEMENTATION RESULTS



VI. CONCLUSION

By this project, it can be hoped that as stated in the aim of this project that using this setup we can measure the accurate water usage efficiently. And as living beings are facing the problems of inefficiently the usage of water, humans can minimize the wastage by optimizing the usage of water in an opulent manner. The technology used in designing has development board and the sensors, which is sui generis and efficient. If humans succeeded in saving at least 2 gallons of water per day per person, then for the population of 1.252 billion of India, humans can save 2.504 billion gallons of water per day ideally.

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