Automatic Water Distribution System Using IOT Along With Advance Energy Generation And Storing Technology

Paritosh Khanwe[1], Sahil Kasekar[2], Dhananjay Raut[3], Virendra Zade[4], Pranay Golait[5],

Prof. Rita Pawde[6],

[1-5]Final Year, Department of Electronics and Telecommunication, NIT Polytechnic, Nagpur, India.

[6]Head, Department of Electronics and Telecommunication, NIT Polytechnic, Nagpur, India.

Abstract: Every automatic water distribution system (AWDS) fails partially or completely at some point or points during its lifetime. Measurement of reliability for a AWDS under various failure conditions is necessary. Numerous techniques have been developed for estimating AWDS reliability. It was found that types of failure (mechanical, hydraulic, and water quality failure) and techniques of reliability analysis are mixed together inappropriately. Water is the basic need of all living organism and human mankind, without water living is impossible. In recent days the rapid population growth causes insufficiency and wastage of drinking water which leads to scarcity of water and uneven distribution of drinking water. Next issue is that the supplied water is sucked more by individual home unit using suction pump which leads shortage of water to the remaining houses in the locality. In this paper a system has been mode led to overcome the above stated problems. The main aim of this paper is to distribute only required amount of water needed, thus ensuring there is no wastage and block in supply of water. In order to implement the proposed system each home unit must be provided with water flow sensor and water flow switch which is controlled by arduino mega board. Flow sensor generates series of electric pulse through which water utilize by the user, flow rate and the amount of water supplied can be calculated.

Keywords: Arduino Mega, Water flow sensor, Valve, Water flow switch, LCD.

I. INTRODUCTION

Water needs for daily needs are very important, not least in coastal villages and around ports, the quality of the water in the coastal shore doesn't support the needs of the people even if there is a dry season it becomes increasingly difficult to get fresh water. Some cases such as in India with increasing population are one additional factor besides the problem of inefficient water management Many previous studies have been conducted regarding the issue of fresh water which discusses changes in urban fresh water structure, the problem of fresh water distribution is also done by some water savings by doing water recycle for agricultural needs by upholding The solution to some problems in terms of inefficient water management is to regulate the distribution of fresh water distribution with a microcontroller, with previously we tried designing and simulating a water distribution system with the concept of the Internet of Things. One of the devices that can be used to make the IoT system is Arduino, our research is the system will be using a solenoid valve which functions as a valve to open and close the flow of water flowing in the pipe and water flow sensor which functions to calculate th mount of flowing water flow connected to Arduino.

The monitoring and distribution with water resources for this enterprises can prevent the view of unequal water distribution. And overcome the problem that facing society related to water supply with its supply issues.This system will provide automatic water distribution technique which can overcome the problem related to supply water and manpower required to switch on/off the valve of particular area.

II. PROPOSED METHODOLOGY

Our system has been modeled to overcome the above stated problems. The main aim of this project is to distribute only required amount of water needed, thus ensuring there is no wastage and block in supply of water. In order to implement the proposed system each home unit must be provided with water flow sensor and water flow switch which is controlled by Arduino mega board. Flow sensor generates series of electric pulse through which water utilize by the user, flow rate and the amount of water supplied can be calculated. Along with this arrangements a valve and relay is provided, which controls the supply of water from main tank.
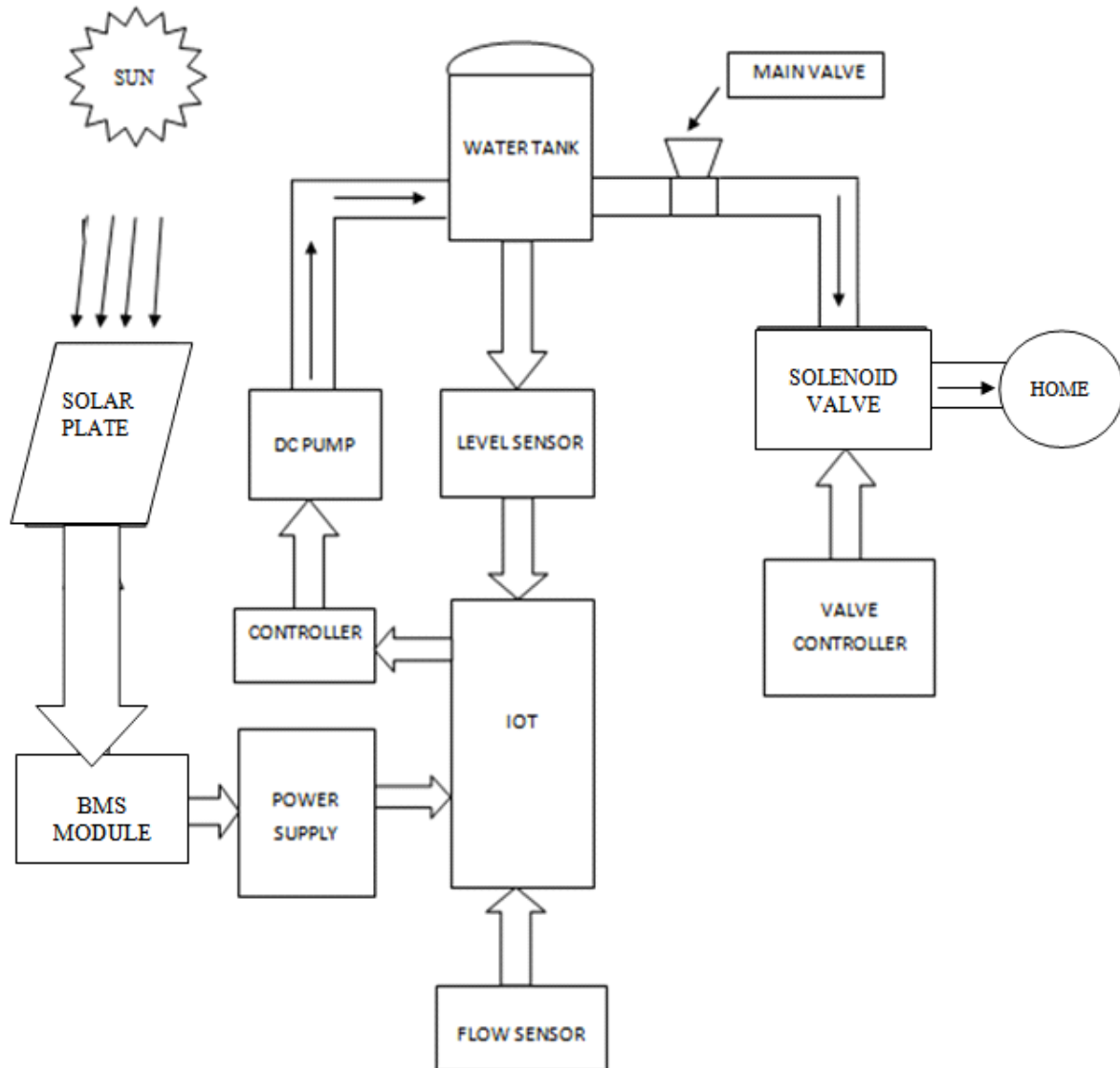
III. HARWARE IMPLEMENTATION AND WORKING

Fig. 1 BLOCK DIAGRAM OF PRPOSED SYSTEM.

The mega2560 is a microcontroller board based on ATmega2560 which is chosen as a CPU instead of arduino UNO to meet the requirements of the proposed system. It consists of 54digital input and output pins in which(15 can be used for pulse width modulation output)16 analog input pins, 4 UART'S, 16MHZ crystal oscillator, USB connection, power jack, an In Circuit Serial Programming header and reset button are present. Out of this 3pins is used for communication purpose and it is interface with flow sensors, 9 pins from digital side is interfaced with LCD display and 2pins are used for ground and 5v power supply.

Flow sensor plays a vital role next to arduino mega board in automated water system. The water rotor in the flow sensor rotates when the water flows through it and its speed changes with different rate of flow. Out of the three wires in the flow sensor,black wire is connected to ground, yellow wire is connected to LCD for displaying values and red wire is connected to arduino mega communication pin.

The water flow switch sends an electrical signal at specific flow rate. Flow switch operate only at 230v power supply. Out of two wires, one is connected directly to power supply and another wire is connected to relay for controlling the

low power signal Valve is used to control or regulate the flow of liquid by the mechanism of opening or closing. Valve is used in case of any breakage occur in the water flowing pipeline it can easily be rectified without wastage of water.

Valves are perfectly secured and once it is closed they never allow the water to flow through it. Relays are used to control a circuit by a separate low power signal or where in several circuits must be controlled by one signal and it utilizes an electromagnet to mechanically operate a switch. Individual relays are used for each flow switch.

A 16*4 LCD is utilized for displaying the values of the sensors and other discrepancies which, consist of 16 characters with 4 rows chip on board alphanumeric display. Out of these 16pins the LED+ and LED-pin are connected to power supply; three digital pins are used and is interfaced with Arduino mega digital pins. VCC is connected to power supply.

IV. COMPONENT USED

A) IOT:-
On the monitoring and controlling of **water distribution** using **IOT** based model. The developed **system** consist of different **IoT** devices like **water** pressure sensor, ultrasonic sensor, solid state relay switch, motorized electric **water** valve, Raspberry PI, GSM module and Arduino UNO micro-controller. This paper focused
The Internet of Things (IoT) is a dynamic wireless network infrastructure that integrates various communication technologies and solutions to enable the interaction between people and things/objects .

B) Flow Sensor:-
Flow sensor plays a vital role next to Arduino mega board in automated water system. The water rotor in the flow sensor rotates when the water flows through it and its speed changes with different rate of flow. Out of the three wires in the flow sensor, black wire is connected to ground, yellow wire is connected to LCD for displaying values and red wire is connected to Arduino mega communication pin..

C)Flow Switch:-
The water flow switch sends an electrical signal at specific flow rate. Flow switch operate only at 230v power supply. Out of two wires, one is connected directly to power supply and another wire is connected to relay for controlling the low   power   signal.

D) Solenoid Valve:-
Valve is used to control or regulate the flow of liquid by the mechanism of opening or closing. Valve is used in case of any breakage occur in the water flowing pipeline it can easily be rectified without wastage of water. Valves are perfectly   secured   and   once   it   is   closed   they   never   allow   the   water   to   flow   through   it.

E) Relay:-
Relays are used to control a circuit by a separate low power signal or where in several circuits must be controlled by one signal and it utilizes an electromagnet to mechanically operate a switch. Individual relays are used for each flow switch.

F) LCD:-
A 16*4 LCD is utilized for displaying the values of the sensors and other discrepancies which, consist of 16 characters with 4 rows chip on board alphanumeric display. Out of these 16pins the LED+ and LED- pin are connected to power supply; three digital pins are used and is Interfaced with Arduino mega digital pins. VCC is connected to power supply. LCD displays the amount of usage of water to each home unit individually.

G) SOLAR PLATE :-
A **solar panel,** or **photo-voltaic (PV) module**, is an assembly of photo-voltaic cells mounted in a framework for installation. Solar panels use sunlight as a source of energy to generate direct current electricity. A collection of PV modules is called a PV panel, and a system of panels is an array. Arrays of a photovoltaic system supply solar electricity to electrical equipment.

H) Lithium-Ion Battery :-
Photovoltaic modules use light energy (photons) from the Sun to generate electricity through the photovoltaic effect. Most modules use wafer-based crystalline silicon cells or thin-film cells. The structural (load carrying) member of a

module can be either the top layer or the back layer. Cells must be protected from mechanical damage and moisture. Most modules are rigid, but semi-flexible ones based on thin-film cells are also available. The cells are usually connected electrically in series, one to another to the desired voltage, and then in parallel to increase current. The power (watts) of the module is the mathematical product of the voltage (volts) and the current (amps) of the module.

I) PCB :-
A **printed circuit board** (**PCB**) mechanically supports and electrically connects electronic components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate. Components are generally soldered onto the PCB to both electrically connect and mechanically fasten them to it. Printed circuit boards are used in all but the simplest electronic products. They are also used in some electrical products, such as passive switch boxes.

J) TRANSISTOR:-
A **transistor** is a semiconductor device used to amplify or switch electronic signals and electrical power. Transistors are one of the basic building blocks of modern electronics.[1] It is composed of semiconductor material usually with at least three terminals for connection to an external circuit. A voltage or current applied to one pair of the transistor's terminals controls the current through another pair of terminals. Because the controlled (output) power can be higher than the controlling (input) power, a transistor can amplify a signal.

K) DIODE :-
A **diode** is a two-terminal electronic component that conducts current primarily in one direction (asymmetric conductance); it has low (ideally zero) resistance in one direction, and high (ideally infinite) resistance in the other. A diode vacuum tube or **thermionic diode** is a vacuum tube with two electrodes, a heated cathode and a plate, in which electrons can flow in only one direction, from cathode to plate. A **semiconductor diode**, the most commonly used type today, is a crystalline piece of semiconductor material with a p HYPERLINK "https://en.wikipedia.org/wiki/P%E2%80%93n_junction"– HYPERLINK "https://en.wikipedia.org/wiki/P%E2%80%93n_junction"n junction connected to two electrical terminals. Semiconductor diodes were the first semiconductor electronic devices.

L) LED:-
A **light-emitting diode** (**LED**) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor.

M) RESISTOR : -
A **resistor** is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat, may be used as part of motor controls, in power distribution systems, or as test loads for generators.

N) IC 7805:-
All voltage sources cannot able to give fixed output due to fluctuations in the circuit. For getting constant and steady output, the voltage regulators are implemented. The integrated circuits which are used for the regulation of voltage are termed as voltage regulator ICs. Here, we can discuss the IC 7805.The **voltage regulator IC 7805** is actually a member of the 78xx series of voltage regulator ICs. It is a fixed linear voltage regulator. The xx present in 78xx represents the value of the fixed output voltage that the particular IC provides. For 7805 IC, it is +5V DC regulated power supply.

O) CAPACITOR :-
A **capacitor** is a device that stores electrical energy in an electric field. It is a passive electronic component with two terminals. The effect of a capacitor is known as capacitance. While some capacitance exists between any two electrical conductors in proximity in a circuit, a capacitor is a component designed to add capacitance to a circuit. The capacitor was originally known as a **condenser** or **condensator**. This name and its cognates are still widely used in many languages, but rarely in English, one notable exception being condenser microphones, also called capacitor microphones.

V. HARDWARE IMPLEMENTATION

Fig. 2 Hardware Implemenatation.

VI. ADVANTAGES

1. Maintain proper timing issues.
2. Reduce energy requirement.
3. More Convenient.
4. Reduce Area Requirement Due to underground pipeline.
5. May reduce water billing rate.
6. Reduce Man Interaction to on or off the valve.
7. water purification level can be controlled at the constant level.

VII. CONCLUSION

Conclusion Based on the results of the study it can be concluded that the simulation of the fresh water distribution system runs well even though there are several plug-in tools that are not yet available in proteus software such as solenoid valve and waterflow sensor, but that can be handle with replaced by engineering software through C++ where the logic can be stop and resume counting the water flow. This simulation can be a support system in helping various parties in the process or mechanism of distributing fresh water evenly and automatically. Based on the characteristics of the sensor running, the solenoid will close the water flow when the usage conditions have exceeded the maximum limit that passes through the waterflow sensor.

REFERENCES

[1] Hegde, Adarsh, et al. "Automated Water flow Control System."National Conference on Product Design (NCPD 2016). 2016.
[2] Bhawarkar, N. B., et al. "Literature Review for Automated Water Supply with Monitoring the Performance System." (2014).
[3] Vinothini, E., and N. Suganya. "Automated Water Distribution and Performance Monitoring System."International Journal of Engineering and Innovative Technology (IJEIT) Volume3 (2014).

[4] Sharath, V. C., et al. "Smart aqua meter."Advances in Electronics, Computers and Communications (ICAECC), 2014 International Conference on. IEEE, 2014.

[5]   Rajeswari, V., L. Padma Suresh, and Y. Rajeshwari. "Water storage and distribution system for pharmaceuticals using PLC and SCADA."Circuits, Power and Computing Technologies (ICCPCT), 2013 International Conference on. IEEE, 2013

[6]   Batista, N. C., et al. "Photovoltaic and wind energy systems monitoring and building/home energy management using ZigBee devices within a smart grid."Energy49 (2013): 306-315.

[7]   Ashok, GaikwadSonali. "water anti-theft and quality monitoring system by using PLC and SCADA."International Journal of Electrical and Electronics Engineering Research3.2 (2013): 355-364

[8]   Gouthaman, J., R. Bharathwajanprabhu, and A. Srikanth. "Automated urban drinking water supply control and water theft identification system."Students' Technology Symposium (TechSym), 2011 IEEE. IEEE, 201.

[9]   Eswaran, P., and Aswin Kumar. "Conceptual design and development of water metering system for multiple family residential buildings."International Journalof Advanced Computer Research2.4 (2012).

BIOGRAPHY

Mr. Paritosh Khanwe is final year student studing in NIT Polyechnic Nagpur. Activally Participated in college activity.His area of Intest is IOT and its applications

 Mr. Sahil Kasekar is final year student studing in NIT Polyechnic Nagpur. Activally Participated in college activity.His area of Intest is IOT and its applications.

Mr. Dhananjay Raut is final year student studing in NIT Polyechnic Nagpur. Activally Participated in college activity.His area of Intest is IOT and its applications.

Mr. Virendra Zade is final year student studing in NIT Polyechnic Nagpur. Activally Participated in college activity.His area of Intest is IOT and its applications.

Mr. Pranay Golait is final year student studing in NIT Polyechnic Nagpur. Activally Participated in college activity.His area of Intest is IOT and its applications.

Prof. Rita H. Pawde currently working as lecturer In EJ Dept, NIT polytechnic Nagpur. She has received a Master degree from ME - Savitribai PHULE Pune university, Pune -2015(VLSI and Embedded Systems). She had completed his B.E.in Electronics from sant gadge baba amravati university, amravati (Electronics and telecommunication) in 2012.