IoT Based Smart Water supply management monitoring Quality and consumption of water for Smart City

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***Abstract*— In urban areas the water supply to residence and commercial establishments are provided at a fixed flow rate. There are incidents of excess water drawn by certain customers/users i.e water will be released unofficially which is considered as water theft. In this project it's projected to develop associate degree embedded based mostly remote water watching and bar system by taking the information of water system at the consumer/user finish.. The general target of a dispersion framework is to convey healthy water to the consumer at particular area and in sufficient quantity and achieve continuity and maximum coverage at affordable cost. To accomplish this goal the association needs to advance working strategies to guarantee that the framework can be worked tastefully, work proficiently and persistently quite far at most minimal expense. Here we are using ARDUINO MEGA as our controller and also few sensors are arranged to detect the presence of water in that particular pipeline. As LEVEL sensors are used to detect the water level. After that here we used level sensor to detect an level of water in tank if tank is empty that time through relay solenoid valve will ON. Buzzer will beep. All the information will be displayed on LCD. Ph sensor for detecting dirty and clean water. All data will be updated over web server using IOT module(ESP8266) This project uses regulated 5V, 500mA power supply. 7805 three terminal voltage controller is utilized for voltage guideline. Extension type full wave rectifier is utilized to redress the air conditioner out put of auxiliary of 230/12V step down transformer.**

***Keywords*— Arduino uno, Level sensor, water pump, etc.**

I. INTRODUCTION

Around 1.2 billion people, or almost one-fifth of the worlds population lives in area of water scarcity [3],hurting agricultural workers & poor farmers the most .Water scarcity is among the main problems to be faced by many societies & the world in the 21st century. Water distribution infrastructure is crucial to economic, political and societal prosperity along with basic survival of the human race. Major challenges that threaten water supply are the depleting freshwater resources in several regions Sustainability of the water supply system faces several imminent challenges such as: 1) increasing water main breaks, 2) decreasing fresh water resources, 3) untraceable non-revenue water use, and 4) increasing water demands. Enormous Data is another specialized idea to gather monstrous measures of important information from sensors installed to monitor structural conditions usage, and system performance. This Big Data idea can be acknowledged by conveying Internet of Things (IoT) innovation all through the water supply foundation and shoppers' use. This seminar presents a schematic development of IoT application for Big Data collection through a myriad of water clients.

The Big Data concept is realized by deploying Internet of Things (IoT) technology throughout the infrastructure system. IoT comprises of three primary segments: 1)sensing equipment; 2) information transmission system; and 3) information process ability. After completely executing IoT and Big Data, the water supply framework acts like a shrewd living animal wherein issues are immediately distinguished and analyzed without ceaseless outsider observing. Parts of manageability from completely actualizing IoT and Big Data ideas can be abridged in twofold: 1) improving mechanical framework execution by limiting central conduit breaks, spills, and distinguishing structurally vulnerable locations; 2) optimizing system performance including pressure, flow, and usage.

This project proposes conceptual applications utilizing the proposed Big Data plan for the water industry. The goals of acquainting new innovations are with empower the two utilities and shoppers to proactively deal with their water utilization and accomplish more elevated amounts of manageability in water supply.

II. PROBLEM STATEMENT

Water supply has become a big problem over the past few years, due to overpopulation, climate change, and deterioration of pipes which can cause major problems, such as water leakage. The real problem is not (in most cases) the size of the leak, but the time it takes to detect it. In this paper, an implementation the project of water level monitoring as well as controlling with IoT module.

III. Related Work

1. **PatawalaAmatulla .H et al. precentediot based water management system for smart city**
   During the previous decade, water needs have expanded unusually in India. Expanding request of water supply has turned into a noteworthy test for the world. Wasteful usage of water, climatic changes and Urbanization has further depleted the resource. Preservation and the executives of the asset must be given most extreme significance In this paper, we present an IoT structure for water observing and control approach which supports web based data collection on real time bases. The framework tends to new difficulties in the water area - stream rate estimating and the requirement for an investigation of the supply of water in order to curb water wastage and encourage its conservation. We additionally measure the nature of water appropriated to each family by sending pH and conductivity sensors. The traditional water metering frameworks require intermittent human mediation for upkeep making it inconvenient and often least effective.For shortcoming of the existing models for a ubiquitous usage of wireless systems for smart quality monitoring and communicate data wirelessly.[1]

2. **sawsanalshattnawi et al. precentred smart water distribution management system architecture based on internet of things and cloud computing**
   The fast population growth needs to provide clean and affordable water that meet the human requirements. Thewater faces a problem in the future because of global climate change. An efficient water management and treatment is necessary to keep water quality and availability. Information and Communications Technologies (ICT) is combined with the Internet of thing (IoT) to facilitate water management and provide efficient operation of water resources, water distribution, and water quality. This paper presents an architecture for Smart Water Distribution System (SWDS) that corporate the IoT and Cloud Computing technologies with ICT. This architecture is designed for intermittent water supply while the previous works supposed a continuous water supply. No practical step is taken towards any phase in this paper, it contains all the theoretical requirements necessary to implement such system, especially in third world countries where the water supply is intermittent. A review of ICT-based water distribution management is provided and an overview of the most promising technologies related to them are thus explained.[2]
3. **joy shah et al precentedan internet of things based model for smart water distribution with quality monitoring**
   Water is a significant asset forever and its reality.Nowadays, due to increase in migration from arural area to urban areas, the population in cities is increasing rapidly. To meet the need of water requirement, its distribution and quality check, a novel approached is proposed which is based on IoT (Internet of Things). The proposed system consist different sensors like water flow sensor, pH Sensor, water control valve and a raspberry PI as a core controller. A water control valve is controlled through web interface based on water flow sensor value to ensure equal and adequate water distribution to each connection (end point).[4]

4. **sayaliwadekar et al precentedsmart water management using iot**
   This paper introduces an IOT gadget which help to oversee and design the use of water. This system can be easilyinstalled in residential societies. Sensors put in the tank which ceaselessly illuminates the water level at the ebb and flow time. This data will be refreshed on the cloud and utilizing an android application, client can picture the water level on a Smartphone anyplace that is associated with Internet. As indicated by the degree of water in the tank the engine working will be naturally controlled, at low degree of water engine will consequently turn on and when tank is about to fill up it will cut off.[5]
5. **chandarajurkar et al precentediot based water management**
   Targets: This undertaking centers around observing of utilization of water, consider, by one square of house in a level framework, where at the segment of pipeline from where the water gets diverted to various part of a block. Methods/Statistical analysis: Water places a vital role for living beings in their day to day lives. The earth's 71% is covered by water is a ubiquitous fact Among which Oceans has roughly 96.50% and 3% is viewed as freshwater, again out of which just 0.08% is available direct to human use and rest is saved in tundra regions and in different form on and in the earth surface which is very difficult to abstract for the human purposes. From this it states that only 0.08% is available as fresh water for human being to make use for drinking, domestic purposes, sanitation, manufacturing, leisure, agriculture etc which gets recharged by rain and snowfall 1.
6. **Hideyuki Tadokoro et al precentedMonitoring and Control Systems for the IoT in the Water Supply and Sewerage Utilities.**
   Monitoring and control systems play a role in the daily operation and maintenance of water supply and sewerage facilities. Moreover, the practice of working through the sense–think–act cycle is helping to pursue digital innovations that will contribute to the sustainability of the water supply and sewerage industry. The sense, think, act cycle involves using systems that gather ("sense") operational technology information, analyze the collected data from multiple perspectives ("think") using artificial intelligence or statistical analysis technologies, and then plan, upgrade infrastructure, and makeimprovements ("act") using the acquired knowledge. This makes it essential to providean infrastructure that can connect the monitoring and control systems to an Internet of Things platform, and make effective use of the operational technology information the systems hold. Hitachi has developed an Internet of Things gateway that makes this possible. It is anticipated that the sensing of data that could not be gathered in the past and collecting them for use on the Internet of Things platform will help create new value. Work is proceeding on a sensing initiative involving optical fiber sensing that overcomes the power supply challenge and can collect data from inside sewage pipes, as well as image analysis and voice recognition.[7]
7. **GauravGosavi et al precented Smart Water Flow Monitoring and Forecasting System**
   Accurate metering and determining proper tariff, as well as billing system, are vital in water management system. The paper proposes a method to watch and forecast the consumption of the water in the domestic pipeline through a web server. There are many systems to do the same, but this is about monitoring consumption of water using the Internet with the help of Raspberry pi and Arduino. The flow rate of the water is measured by Hall Effect sensor based flow meter. Raspberry Pi a micro-computer receives the data from Arduino micro-controller which is connected to the flow meter. The Raspberry pi uploads the data onto cloud infrastructure where database is setup. The web base solution also depicts the day to day consumption of the water to its users and water distributors.[8]
8. **F Ntambi et al precented Smart Design of a Water Management System**

Water is a vital component in our daily lives, and aprecious resource to human race. This paper describes the work carried out on the design of a water management system that can log pressure and pH readings

wirelessly and determine if there is a water leak within the pipe system or if the pH levels of the water are safe enough for human consumption. A pipe monitoring system was designed, implemented and fitted with pressure sensors as well as pH sensors. The data received from the sensors was processed by a microcontroller and sent to a computer via a wireless communication module. [8]

IV. PROPOSED SYSTEM

- Here we are using microcontroller through which we control all the operations.
- Here we can detect the level of water in tank USING level sensor.
- If tank is empty then water motor will on automatically using relay.
- If tank is full then Buzzer will beep.
- Ph sensor is used to check the quality of water.
- If it detect the dirty water then all data will updated over web server using thingspeak.
- All information will be displayed on LCD.

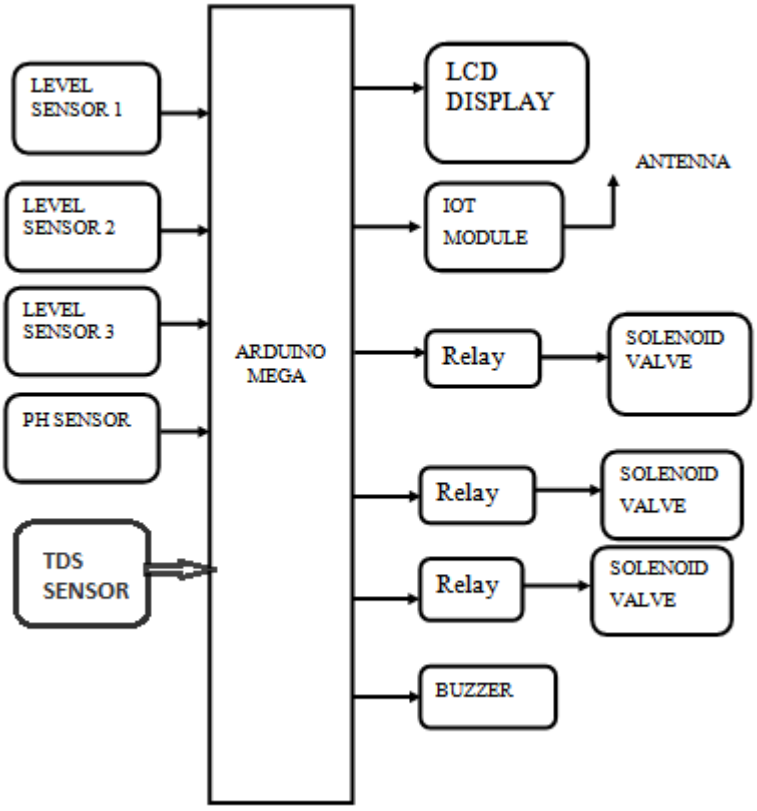

Fig1. Block Diagram.

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V. CIRCUIT DIAGRAM

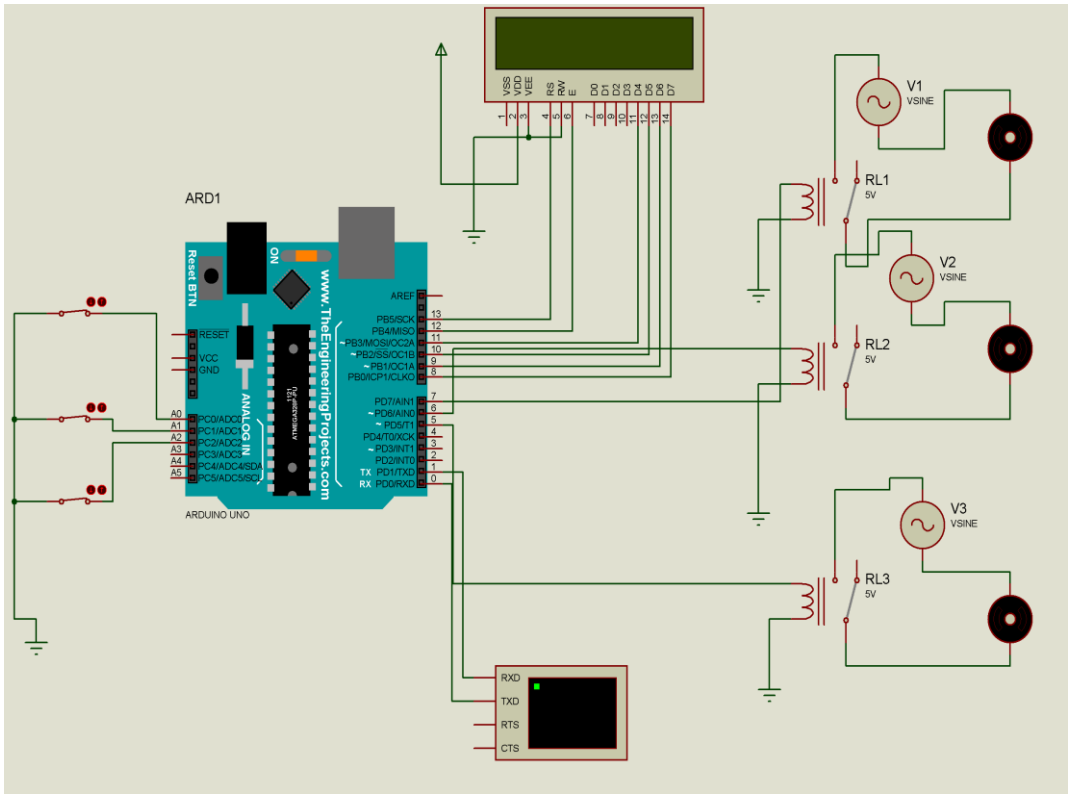


Fig 2. circuit diagram

A. ARDUINO MEGA

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 14 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. 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. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila.

B. IOT MODULE

Fig.3 ESP8266

VI. ALGORITHM AND FLOW CHART

A. FLOWCHART

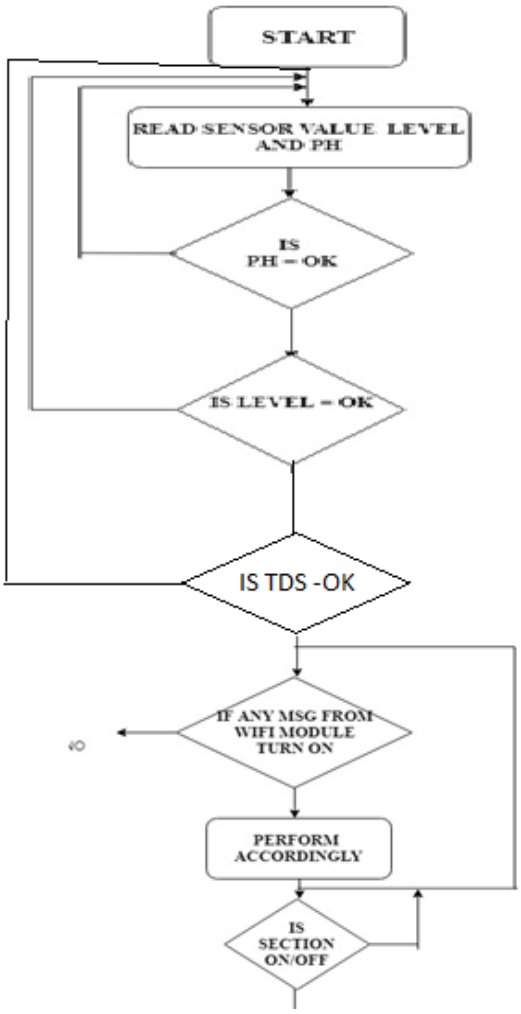


Fig4. FLOWCHART

B. ALGORITHM

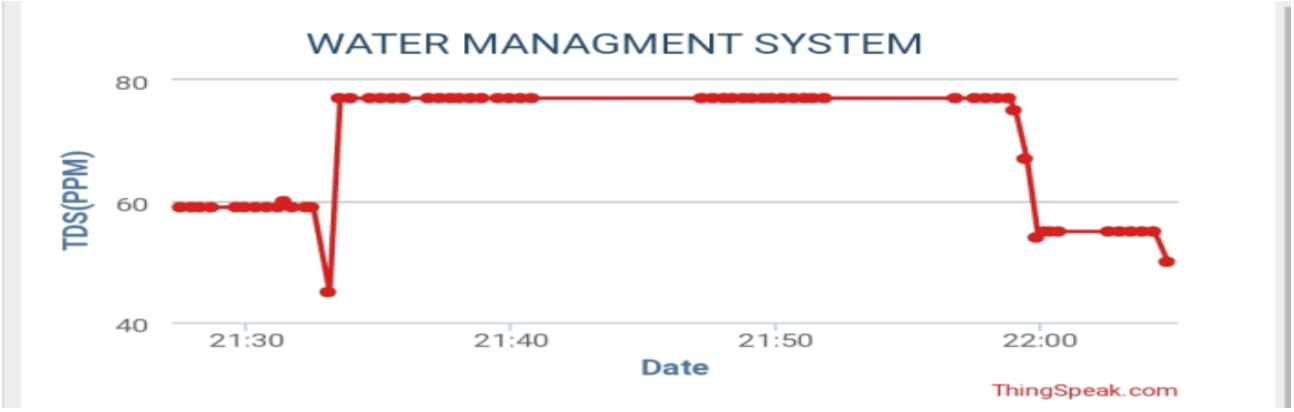
START

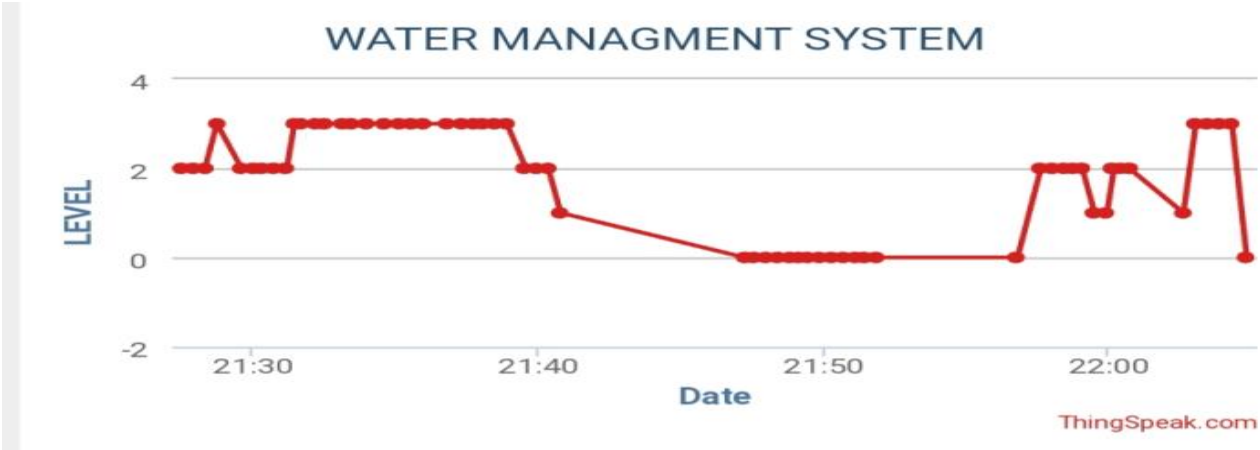
1. Read sensor value level and PH
2. Is Ph value ok then go to step 4 other wise go to step 2
3. Is level is full then go to step 5 Other wise go to step 2
4. Is any massage through wifi module then go to 6 other wise go to 7
5. Perform accordingly of massage.
6. Check the time for water supply to a,b,c.
7. Is section A time turn on if yes then turn on section A.
8. Is section B time turn on if yes then turn on section B.
9. Is section C time turn on if yes then turn on section C.
10. Send status of sensor value and status of section A,B,C.
11. Go to step 1

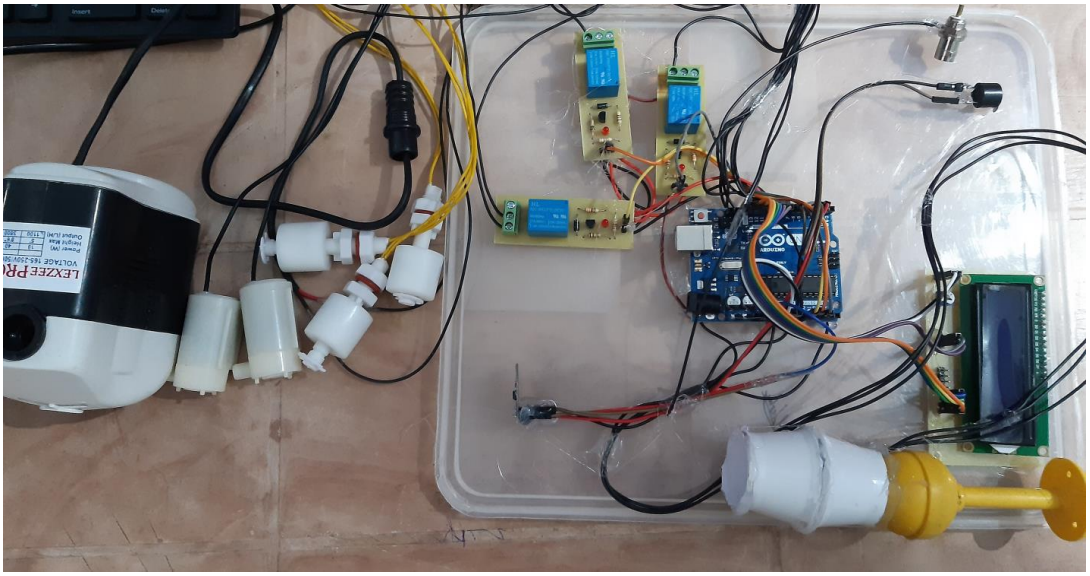
VII. RESULT

we have identified a suitable implementation model that consists of different sensor device and other modules,in this implimentationmodel we used atuno with wifi module . inbuilt ADC and WiFi module conneted the embedded device to internet.

After sensing the data from different aenaor devices,which are placed in particular area of internet .the sensed data will be automatically sent to the srever,when a proper connecation is established with server device**.**







VIII. CONCLUSIONS

This project describes a conceptual development of IoT and Big Data in the context of water supply systems highlighting its advantages and limitations. The project advocates implementing IoT and Big Data technology for saving water resources and energy. It is a basic undertaking to decrease a few billion gallons of treated water misfortune.

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