Smart Water Management System Using IOT and Arduino for Metrocity Application

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Abstract- Water is so precious and every living things on earth depends on water. To ensure the wellbeing of every living, water management must be done effectively. Water is wasted frequently due to rising water consumption, leaks, and needlessly leaving the faucet open. It is assumed that this will require competent analysis, management and implementation. A suitable plan should be developed and put into action to maintain water quality and prevent water waste. The intension of this work is water management, monitoring and proper distribution of water to save water and make efficient use of it so that we can satisfy the trust of others. The system has been designed in such a way that it will monitor the available pH level continuously. Distribute the water in each block as per the prepaid smart card amount. System had been implemented using embedded system and communication will take through IOT.

KEYWORDS: IOT, Water Management, pH Monitoring, RFID, Water Distribution.

I. INTRODUCTION

The demand for water for growing urban infrastructure is also increasing. Water management can come from many sources, including leaks, artificial laziness, and labor errors. There is also the issue of unequal water supply. An algorithm based on programmable control is used to control the water supply to reduce water usage. Monitoring water resources can effectively prevent water levels. Therefore, in recent years, urban water supply monitoring systems have attracted attention. In many apartment sectors, water meters are used in residential or commercial buildings provided by public water supply systems, used to measure the system to determine the flow throespecific part of the system. Furthermore, due to query administration, applications are delayed to make innovations realistic and to improve and expand administrations. Unlike privately owned businesses, if the administration neglects to control water simply, the legislature has a responsibility and, in these ways, must take care of the human rights of individuals. The relevant human reason perceived through work is a rational choice for water. Some sectors can guarantee that this right will not be neglected by giving water to everyone. Planning, creating, and the process of water management. Water is a fundamental need. No living thing, including humans, can survive without water. Good management also ensures that water is clean and safe, protecting the general public's health. Setting water management as a top priority helps to prevent water waste and maintain your water infrastructure. If you use water wisely managing the best possible use of water resources is, your water bill will be lower, and there are numerous other ways to save money on water. If you're familiar with your facility's water consumption and have more knowledge of its water infrastructure, you'll be able to spot when it—or even specific equipment—is using water unusually. You can find ways to reuse the water in your building with the help of water management. This reduces the strain on the shared water supply in your community while also saving you money.

II.PROPOSED SYSTEM

2.1- Water Source using RFID

At a central location, we will set up automation using RFID in each building. So, each apartment renter will be given a unique RFID badge that they can use to access a communal water supply. In order to update the amount of water used by a person at the water bank, we are using RFID technology. The RFID tag will initially be used to identify the person, and if that person belongs to the same society as the RFID tag, only that person will be allowed water to use.

Fig-2.1 RFID

2.2- Water Flow Sensor

Water flow sensor with a microcontroller like Arduino, we can calculate the flow rate, and check the volume of liquid that has passed through a pipe and control it as required.

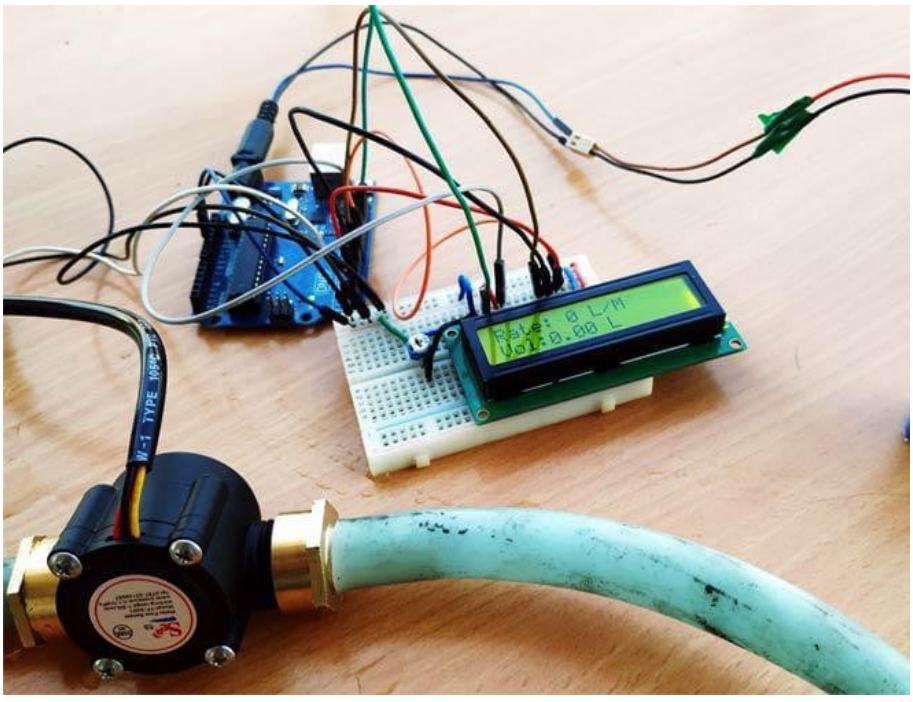

Fig-2.2 Water Flow Meter

As seen in the diagram below, the sensor has three wires: RED, YELLOW, and BLACK. The black wire is connected to GND, while the red wine is utilized for supply voltage, which ranges from 5V to 18V. The output (pulses) from the yellow wire are readable by an MCU. The pinwheel sensor that makes up the water flow sensor counts the amount of liquid that has gone through it. If the pipe's output valve is opened. The wheel inside the sensor turns as a result of the water flowing through it. We can see the sensor-generated pulses under these circumstances. The Arduino UNO will use these pulses as an interrupt signal.

2.3- Purity Analysis using PH Sensor

The pH level of water is one of the most crucial quality indicators. The pH levels in water must be right. For instance, hazardous heavy metals dissolve rapidly in acidic water and are more dangerous to living beings. The pH level also impacts the availability of important plant nutrients, with several nutrients being less accessible at a pH over 7 .There is no legally enforced guideline for drinking water pH levels because pH is considered an aesthetic water quality. Yet, the U.S. Environmental Protection Agency (EPA) recommends a pH between 6.5 and 8.5 for drinking water. Low pH drinking water may contain dissolved metals since metals easily dissolve in acidic water. Metals including lead, copper, manganese, and iron can leach

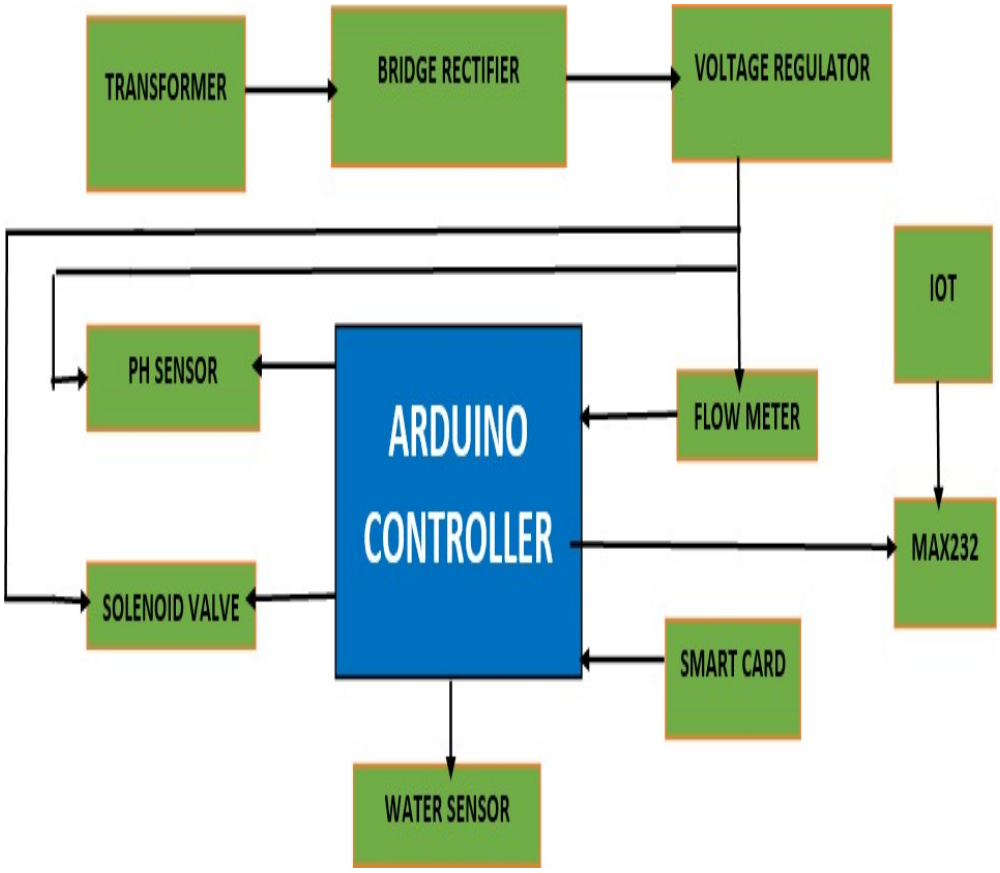

Fig-2.3 BLOCK DIAGRAM

2.4- METHODOLOGY

Water is the primary resource for all living things globally. Due to the uneven distribution of water, some of them did not get enough water: the previous method, appropriate optimization based on water distribution and management system. The conventional technique cannot easily interface with the sensor in the water distribution method. So we proposed a Smart Water Management System Using logic control. The technique contains a flow meter, solenoid valve, IOT (Internet of thing) based digital code algorithm. For example, take an apartment area, the fifty of people using water in a daily manner, the water flows through solenoid value, and it contains a flow meter. Each apartment has a contain flow meter and solenoid value with certain limit accesses of using water, and it analyzes through IOT. If the specific apartment finishes the water level and determines the intimation message through IOT and stops water through solenoid value latterly, if the concern people recharge by using the smart card, then people use the water. The controller technique and the controller sense the sensor data and output level of the circuit. The pH sensor is sensing the water quality and distribution of the concerned person with clean water processes.

Fig-2.4 FLOW CHART

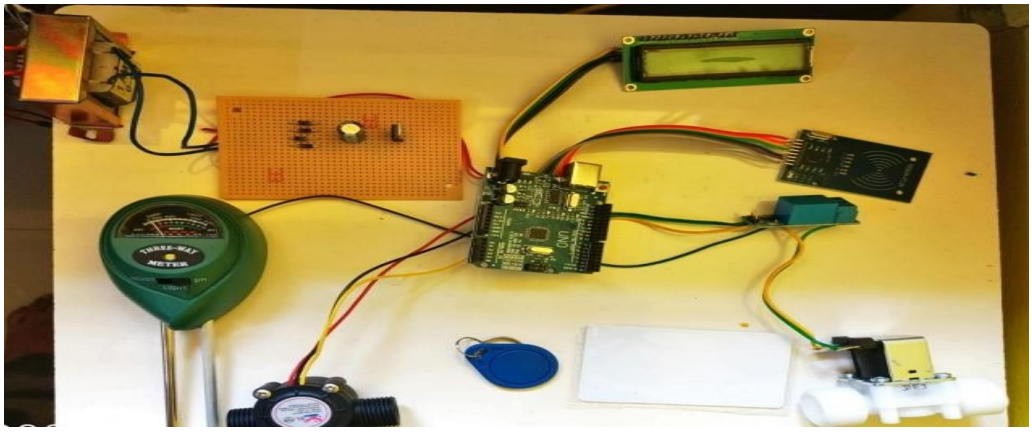

Fig-2.5 HARDWARE IMPLEMENTATION

III.CONCLUSION

In this work, a method for managing and monitoring water use and consumption is developed, which benefits big residential societies. Additionally, it evaluates the water's quality and has the ability to perform real-time monitoring and calculate water consumption for smartcard purpose. Water tracking and management that is done properly may save hundreds of liter of water. Conserving water can help alleviate water shortages in high-demand locations. The IOT service enables flexibility and remote water usage and purity monitoring. With such original ideas, this Project has the potential to develop into an important part of society. Rapidly rising economic and population growth in metropolitan areas has resulted in increased demand for water supply expansion. Agriculture, industry, and urban areas all require clean water. Drought has also resulted in water shortages in numerous regions of India. As a result, proper water management leads to the resolution of such challenges. We suggested a portable system that is adaptable, affordable, and simple to configure for water management and waste reduction. The above-described implementation can be expanded to include intelligent agriculture practices for watering gardens and plants. Monitoring liquid levels is crucial in many industries today, including the automotive and oil industries. The suggested solution can employ analytics and insights to detect leaks, vandalism, or any other type of damage along supply tracks. It can also automate the process of liquid detection and optimal management. This system also aims to check the quality of water using pH sensor and use to calculate the consumption of water by each of individual user which can be used for the purpose of smartcard.

REFERENCES

[1] Steffelbauer, D.B.; Blokker, E.J.M.; Buchberger, S.G.; Knobbe, A.; Abraham, E. Dynamic Time Warping Clustering to Discover Socioeconomic characteristics in Smart Water Meter Data. J. Water Resour. Plan. Manag. 2021, 147, 04021026.

[2] Anupama, H.S.; Bhavani, A.D.; Fayaz, A.B.A.Z. Smart farming: IoT based water managing system. Int. J. Innov. Technol. Explor. Eng. 2020, 9, 2383–2385.

[3] Logic Controller Using State Space Techniques'- *Taylor & Francis, Electric Power Components and Systems*, Vol.39 C.Nagarajan and M.Madheswaran - 'Stability Analysis of Series Parallel Resonant Converter with Fuzzy (8), pp.780-793, May 2011.

[4] B. Hammi, R. Khatoun, S. Zeadally, A. Fayad, L. Khoukhi, IoT technologies for smart cities, IET Networks. 7 (2018) 1–13.

[5] S. O. Latino and T. Joubert, "Enabling Communication Networks for Water Quality Monitoring Applications: A Survey," in IEEE Access, vol. 7, pp. 100332-100362, 2019, doi: 10.1109/ACCESS.2019.2904945.

[6] C.Nagarajan and M.Madheswaran - 'Experimental verification and stability state space analysis of CLL-T Series Parallel Resonant Converter' - *Journal of ELECTRICAL ENGINEERING,* Vol.63 (6), pp.365-372, Dec.2012.

[7] Myint, Cho &Gopal, Lenin &Aung, Yan. (2017). ReconFigurable smart water quality monitoring system in IoT environment.435-440.10.1109/ICIS.2017.7960032.

[8] V. Radhakrishnan and W. Wu, "IoT Technology forSmart Water System," 2018 IEEE 20th International

[9] Conference on High Performance Computing andCommunications; IEEE 16th International Conference onSmart City; IEEE 4th International Conference on DataScience and Systems (HPCC/SmartCity/DSS), Exeter,United Kingdom, 2018, pp. 1491-1496.

[10] C.Nagarajan and M.Madheswaran - 'Performance Analysis of LCL-T Resonant Converter with Fuzzy/PID Using State Space Analysis'- *Springer, Electrical Engineering*, Vol.93 (3), pp.167-178, September 2011.

[11] K. Gupta, M. Kulkarni, M. Magdum, Y. Baldawa and S.Patil, "Smart Water Management in Housing Societies using IoT," 2018 Second International Conference onInventive Communication and ComputationalTechnologies (ICICCT), Coimbatore, 2018, pp. 1609-1613.

[12] Nagarajan and M.Madheswaran - 'Experimental Study and steady state stability analysis of CLL-T Series Parallel Resonant Converter with Fuzzy controller using State Space Analysis'- *Iranian Journal of Electrical & Electronic Engineering*, Vol.8 (3), pp.259-267, September 2012.

[13] M. M. Srihari, "Intelligent Water Distribution and Management System Using Internet of Things," 2018International Conference on Inventive Research inComputing Applications (ICIRCA), Coimbatore, 2018, pp.785-789.

[14] G.Neelakrishnan, M.Kannan, S.Selvaraju, K.Vijayraj, M.Balaji and D.Kalidass, "Transformer Less Boost DC-DC Converter with Photovoltaic Array", IOSR Journal of Engineering, October 2013; 3(10): 30-36.