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CONTROLLING AND MONITORING OF AUTOMATION WATER SUPPLY SYSTEM BASED ON IOT WITH THEFT IDENTIFICATION

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Abstract

Water is the most precious and valuable because it's a basic need of all the human beings but, now a day water supply department are facing problem in real time operation this is because less amount of water in resources due to less rain fall. With increase in Population, urban residential areas have increased because of this reasons water has become a crucial problem which affects the problem of water distribution, interrupted water supply, water conservation, water consumption and also the water quality so, to overcome water supply related problems and make system efficient there is need of proper monitoring and controlling system. In this project, we are focusing on continuous and real time monitoring of water supply in IOT platform. Water supply with continuous monitoring makes a proper distribution so that, we can have a record of available amount of water in tanks, flow rate, abnormality in distribution line. Internet of things is nothing but the network of physical objects embedded with electronics, sensors, software, and network connectivity. Monitoring can be done from anywhere as central office. Using Adafruit as free sever data continuously pushed on cloud so we can see data in real time operation. Using different sensors with controller and raspberry pi as Mini computer can monitor data and also control operation from cloud with efficient client server communication.

Keywords: Water Supply System; IOT; Water Level Sensor; Flow Sensor; Turbidity Sensor; Raspberry Pi; Arduino Nano; GSM.

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1. Introduction

According to recent survey, water has become a big issue because of less rain fall, increase in population many cities are facing this problem people have to suffer from this problem they

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don't have sufficient amount for their daily needs (Ejiofor & Oladipo, 2013). Due to lack of monitoring water can't be supplied properly, some areas in city get water while other some areas can't so, there is a need of continuous monitoring, water supply scheduling and proper distribution another problems are excessive consumption, overflow of tanks, leakage in pipeline ,interrupted water supply (Kumura, *et al.*, 2015).

Water is a basic need of every human being everyone has to save the water many a times with lack of monitoring, overflow of these overhead tanks can occur because of this lots of water get wasted, another thing because of overflow in the pipelines with more pressure there is possibility of pipeline damage, leakage detection is one more problem all these problems are because of lack of monitoring, manual work, less man power (Ria, *et al*.,2013) (Vinothini & Suganya, 2014). Before implementing this project a survey of Aurangabad city and field survey have been taken to understand water supply distribution and related problems with the system. After taking a survey, a fact has been discovered that all the work is manual and need a better technology to make proper distribution.

By focusing on problems in traditional methods our system design and develop a low cost embedded system device for real time monitoring of water distribution system in Internet of things (IOT) platform (Shri, *et al*., 2013). IOT is a world where billions of objects can sense, communicate and share information, all interconnected over public or private Internet Protocol (IP) networks. These interconnected objects have data regularly collected, analyzed and used to initiate action, providing a wealth of intelligence for planning, management and decision making (Whittle, *et al.*, 2013) (Debasis & Jaydip, 2011).

2. Objective of Practical System

This system is focused on, Internet of things which is new scenario to make city as a smart city with different application. Main objective to implement this project is to design and develop a low cost reliable and efficient technique to make proper water distribution by continuous monitoring and also controlling it from a central server so that we can solve water related problems. Proposed system consist of a Raspberry pi used as minicomputer, different sensors such as water level sensor, flow sensor, and turbidity sensors are used. Arduino collects the data from sensors and send it raspberry pi. This system solves problem of Overflow, over consumption, Quality of water and makes a proper distribution. Continuous monitoring and controlling from a central server is possible using this system.

3. System Design

System consists of Raspberry pi, Arduino, level sensor, flow sensor, turbidity sensor, GSM module each block is explained below as shown in Fig. 1. We are working on a Prototype model. Raspberry pi is a low cost small and portable size of computer board it has a high performance powerful processor its main core language is raspbian OS can also develop script or program using python language. Raspberry pi 2 has CPU 900 MHz BCM2836 quad-core ARM Cortex-A7 Memory,1GB RAM, It has a 40 pin GPIO connector, micro SD. Purpose of using raspberry pi is an IOT. Raspberry is compatible with IOT. All the data collected from arduino is connected with a raspberry pi and it process continuously and push data on cloud.

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The Arduino Nano is a microcontroller board based on the ATmega328 it is a 8 bit microcontroller has 14 digital input/output pins (of which 6 can be used as PWM outputs). Using we are going to collect a data from sensors here, level sensors are connected to analog i/p and flow sensors are connected to digital i/p pins are used. Water flow sensor consists of a plastic valve body with a water rotor it uses a pinwheel sensor to measure how much liquid has moved through, water flows through the rotor rolls, speed changes which outputs the corresponding pulse Signal. Flow rate measured in Liters/sec/min/hour. By counting the pulses from the output of the sensor, can easily track fluid movement. Flow rate in our project flow rate is calculated in ml/sec. Turbidity sensor measure the amount of suspended particles, or turbidity in the water. If the Soil level increases transmitted light decreases Turbidity sensors are used to check quality of water.

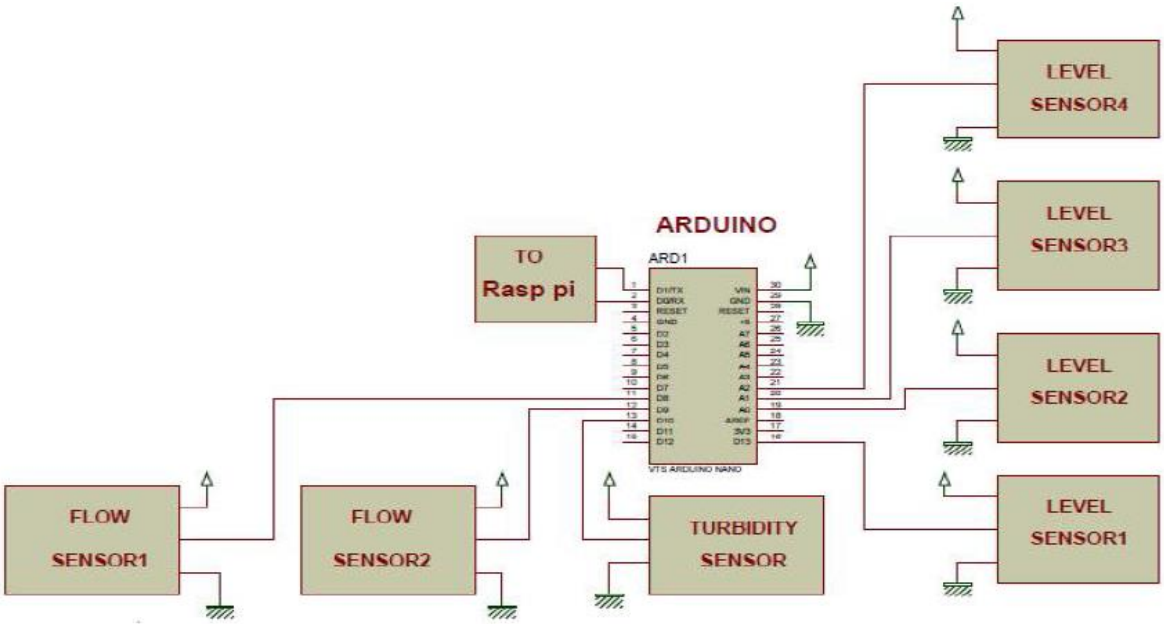

Figure 1: Block Diagram of Practical System.

Level sensor is designed so that, each sensor gives information in 4 levels for two different tanks It helps to sense the level of water present in the overhead tank or sump. As the float rises or falls with level of water in the tank, gets activated. GSM (Global System for Mobile communications) is a cellular network, operate in the 900 MHz or 1800 MHz bands. Here GSM is used to trigger a message when there is no water in line or if there is abnormality or theft occurred in water supply line.

Solenoid valve is a electromechanically operated valve. Solenoid valve also known as an electrically operated valve is an automatic valve which serves the purpose of removing manual handling. These valves are used at pipeline to supply water with automatic ON off control. We can automatically operate valves and supply water when it is needed it reduces manual work. Relays are used to drive solenoid valves. One 18w and two 19w Submersible motor are used which has 220v AC supply. Pump On off system made automatic by programming. This motor is used in the ground sump to supply water to overhead tanks. These motors are operated through

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relay. 16*2 LCD is connected with a Raspberry pi to display data locally and show the readings of parameters.

4. Results and Discussions

A feed for each parameter is created on Adafruit. First it checks turbidity off water here mapping has been done for turbidity if turbidity of water is less than five motor in ground tank will start automatically otherwise motor will remain off. As motor get started it will fill water in both overhead tanks according to its level of water in tankwater is supplied this valves operate automatically flow sensors gives flow rate in ml/sec. If we want to cut supply of any line we can control it from adafruit by making relay ON/OFF so, controlling is possible from a remote location.

If there is no water in any line GSM will trigger a message also if there is excessive consumption in any line it will trigger a message that abnormality in line. The system processes within given time period at adafruit also can operate as continuous process it means proper scheduling is done for distribution. On adafruit server we can see previous record also data continuously pushed on cloud so that we can monitor and control it in real time. 16*2 LCD is used to observe data locally connected to raspberry pi.

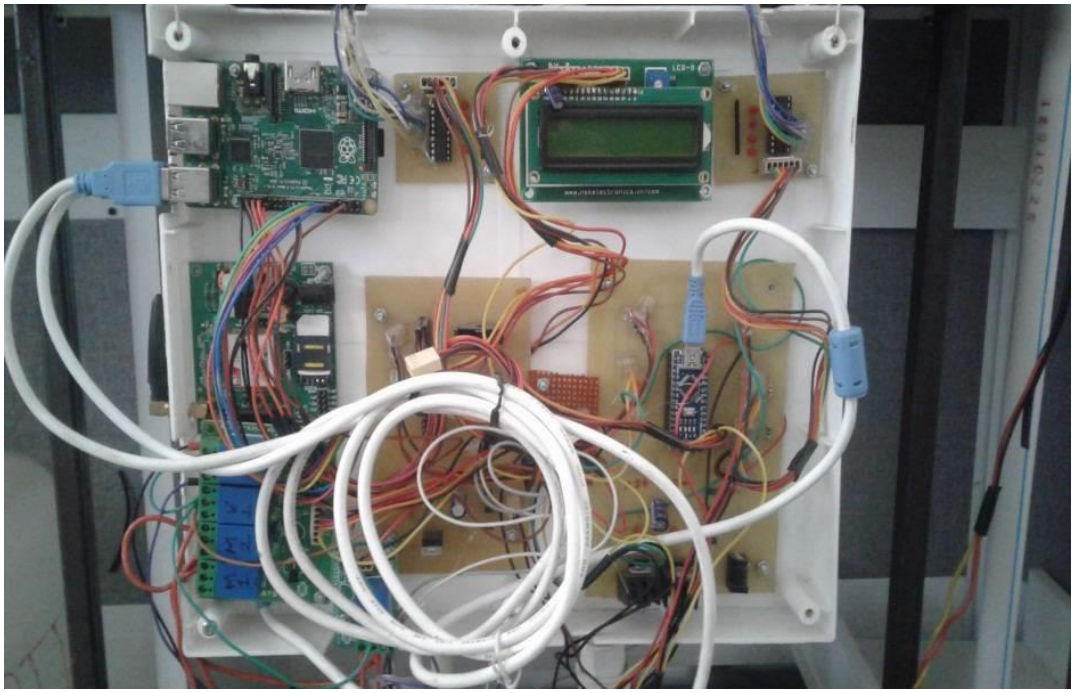

Figure 2: Components of Practical System.

The Fig. 2 above shows detail hardware set up of the system. All the sensors are connected to arduino. It takes data from all the sensor. Relays and LCD are connected to raspberry pi connector. Solenoid valves and motors operated through relay. GSM module has USB through which it is connected to raspberry pi. Arduino is connected raspberry pi through microUSB. Raspberry pi takes data and continuously push it on cloud.

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Adafruit server can be shown in Fig. 3 bellow. Feeds are created for each parameter to monitor it. If we double click on each feed it will show previous records also with graphs so that, we can monitor it, Valves are controlled from Adafruit. Sensor readings have taken and observed its analysis.

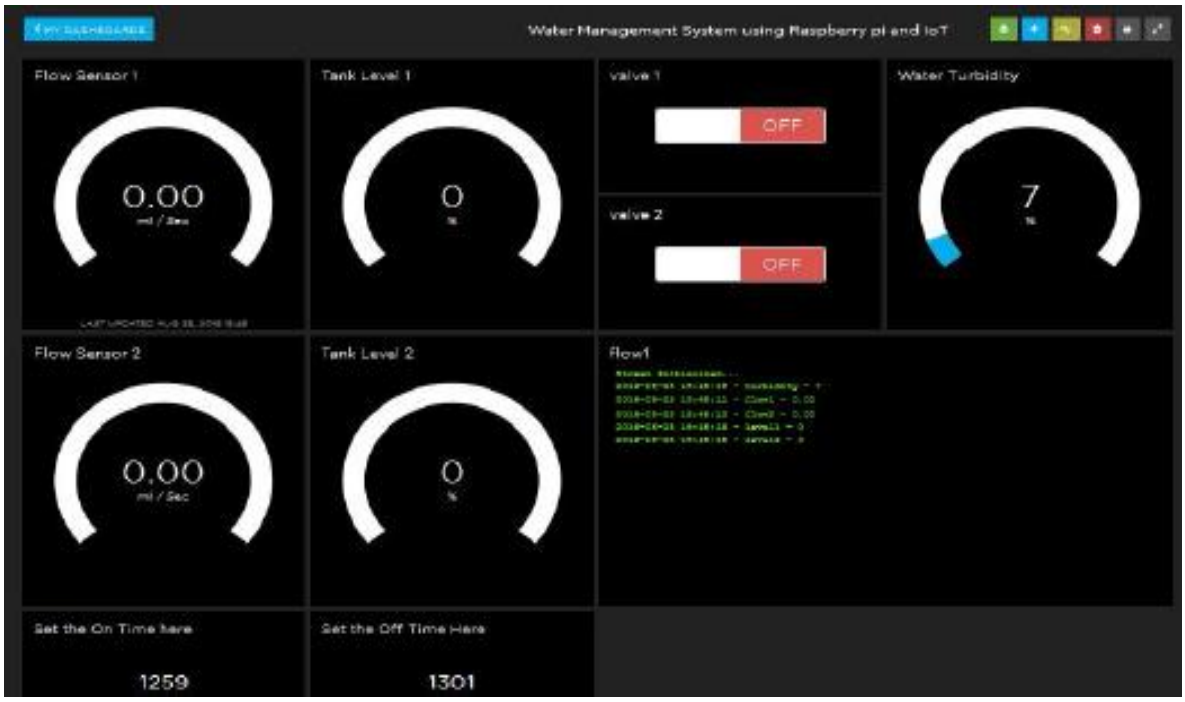

Figure 3: Adafruit Server.

Above figure shows Adafruit server. Feeds are created for each parameter to monitor it. If we double click on each feed it will show previous records also with graphs so that, we can monitor it, Valves are controlled from Adafruit. Sensor readings have taken and observed its analysis.

5. Conclusion

This system employs the use of different technologies in its design, development, and implementation. The secure and continuous monitoring is possible no need to go on field for monitoring so manual work has reduced it makes system more efficient, reliable, low cost and accurate we can data monitored from anywhere controlling is possible from a remote server it is economical in development. This research has successfully provided an improvement on existing water level controllers by its use of calibrated circuit to indicate the water level.

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