Automated Water Conservation and Theft Detection using IOT

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Abstract - *Today's world is growing rapidly in urban residential area , to avoid water scarcity of water problems and requirement of consumers. It is supposed to supply adequate water distribution networks are managed automatically. Along with this another problem in the water supply system is that public is using suction pumps to suck the water directly from the home street pipeline. In this project it is proposed to develop an IOT based remote water monitoring and theft prevention system by recording the flow rates at the consumer/user end. In order to implement the proposed water supply system, each consumer should be provided with an IOT based water flow monitoring system consisting of a MSP to record the flow rate using a flow sensor .The valve turns on/off to stop the water supply whenever the flow rate exceed a predefined limit. The solenoid valves are also controlled using real time clock to control flow of water accordingly for a fixed duration of time.*

Key Words: **MSP430 Launch Pad, W5100 Ethernet shield, Flow Sensor, Theft identification**

1. INTRODUCTION

As the world is progressing towards the future with an ever growing population and crave to the consumption of water, there would be a need to introduce uniform water distribution in order to avoid imbalance of water in various areas. The monitoring of water resource for these enterprises can prevent the occurrence of stealing water and leaking water effectively. Therefore, the monitoring system of urban water supply has aroused extensive attention in recent years. Urban water supply networks form the link between drinking water supply and drinking water consumers.

The person in charge will go to the place and then open the valve to that particular area. This type of operation needs man power. The people may take excess water for their personal use with the help of motor or some other equipment. Due to this many people will not receive sufficient water for their use.

1.1 Literature Review

Literature Review 1

Name of the Journal & Year of Publication:

International Journal of Engineering and Innovative Technology (IJEIT) 2014

Title of the paper: Automated Water Distribution and Performance Monitoring System

Abstract: The integrating system is capable of predicting flow of water, issuable of water with appreciable quality and automatic supply of water. It can be done by employing sensors such as flow sensors and pH sensors.

Hardware Used: LCD, ADC, Control circuit, Control valve, Pipeline, Flow sensor, pH sensor, Microcontroller, Power supply, Zig bee

Software Used: Kiel μ Vision

Applications: Automated water distribution and performance monitoring system focuses on various entities such as proper supply, over consumption alert and water quality assurance

Future scope of work: Future work deals with tasks such as water level detection and intimation of less volume of water in main tanks which are gathered from other tanks located in different places.

Literature Review 2

Name of the Journal & Year of Publication: International Journal of Innovative Research in Computer and Communication Engineering (2015)

Title of the paper: Automated Drinking Water Supply System and Theft Identification Using Embedded systems.

Abstract: In this project it is proposed to develop an embedded based remote water monitoring and theft prevention system by recording the flow rates at the consumer/user end.

Hardware Used: DMA flow sensor, Opacity sensor , Pressure logger, Service reservoir, Pressure regulating valve, GSM ,Hall Effect Sensor, Solenoid Valve

Software Used: MySQL, Kiel μ Vision

Applications: Automated water distribution and water theft detection.

Future scope of work: We can make centralized water control and theft detection system. We can ensure fair water supply to

all users by preventing water theft and ensuring by taking necessary action. The disadvantage of the existing system that required manpower was eliminated.

Literature Review 3

Name of the Journal & Year of Publication: International Innovative Research Journal of Engineering and Technology ICEIET-2017

Title of the paper: An Efficient Water Distribution System for India using IoT

Abstract:It is also proposed to employ a IoT modem for wireless communication and hence information is transmitted to many responsible consumers and officers to take immediate action under problematic situation.

Keywords : IoT modem, solenoid valve , flow sensor

Hardware Used: Level sensors , Flow sensor , Microcontroller , PH sensors , Vibration sensor , Pressure sensor

Software Used: Kiel μ Vision.

Applications: It provides a review of smart water distribution and utilization of water resources for every Indian citizen to save the nation from water scarcity

Future scope of work: There is a need for low cost and low maintenance smart water system which is simple for household appliances in terms of data reliability.

1.2 Existing Method

The system is provided with an electrically operated solenoid valve to supply water to the consumers. The valve turns on/off by the central processing station PC to supply the water for a particular time period. The system is provided with another electrically operated solenoid valve to stop the water supply whenever the flow rate exceeds a predefined limit. The microcontroller will switch ON/OFF the solenoid valve using a transistor as a switch. It is proposed to employ a GSM modem for wireless communication so that the information can be passed to particular responsible officer's cell phone for immediate action as well as to the central processing database.

1.2 Proposed Method

The existing system is replaced by the Ethernet communication protocol and it feeds the data to the cloud . The cloud on the other hand sends the data to the centralized system . The difference in the volume of water passed from the main tank to the sum of the individual systems will determine whether there is a leakage or theft.

2. DESCRIPTION OF PROPOSED METHOD AND ITS FUNCTIONS

ATMEGA 328 MICROCONTROLLER

- ATMEGA328P-PU is a low power CMOS 8 bit microcontroller base on the AVR enhanced RISC architecture.

- ATMEGA 328 has 32KB internal built in memory. It has 1KB Electrically Erasable Programmable Read Only Memory (EEPROM).

- These features consist of advanced RISC architecture, good performance, low power consumption, real time counter having separate oscillator,6 PWM pins, throughput up to 20 MIPS etc.

DC 12V MINI WATER PUMP

- The DC12v mini water pump has Weight of 150g and dimension of inlet and outlet: 15mm O.D. / 5mm O.D.

- The working voltage is 12Vdc and the rated voltage is also 12Vdc. The working current ranges from 0.1A-0.5A and lift is 130cm (at 12Vdc).

- The flow rate is 300L/H.

YF-S201 WATER FLOW SENSOR

- The Red wire is 5V , the Black wire is GND and the Yellow wire is PWM signal output.

- The Lowest rated working voltage is DC4.5 5V-24V and the Maximum operating current: 15 mA (DC: 5V)

- The Working voltage range is DC 5~18V with the Load capacity: ≤ 10 mA (DC 5V)

- The Temperature withstand is ≤ 80 ℃ and allowed pressure is 1.75Mpa

W5100 ETHERNET SHIELD

- With this Ethernet Shield, your Microcontroller can be used to connect to internet and can be used as server or client.

- Directly plug puzzle board, no soldering required. As the Controller W5100is used.

- This is the latest version of the Ethernet Shield.

- This Ethernet Shield which is based on the Wiznet W5100 Ethernet Chip gives you an easy way to get your Microcontroller Online.

- It adds a micro-SD card slot, which can be used to store files for serving over the network.
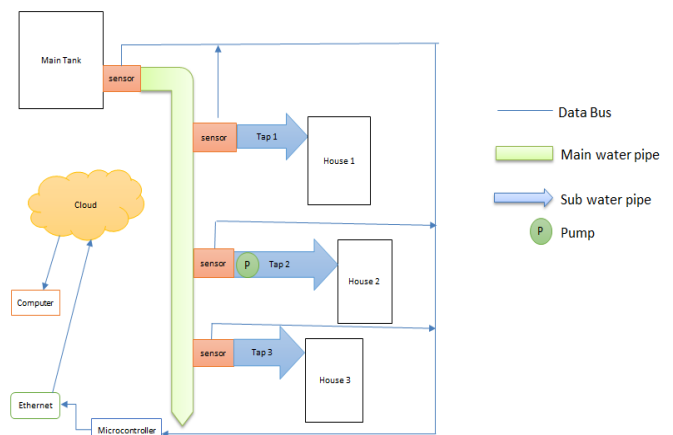
Table -1: Proposed Model
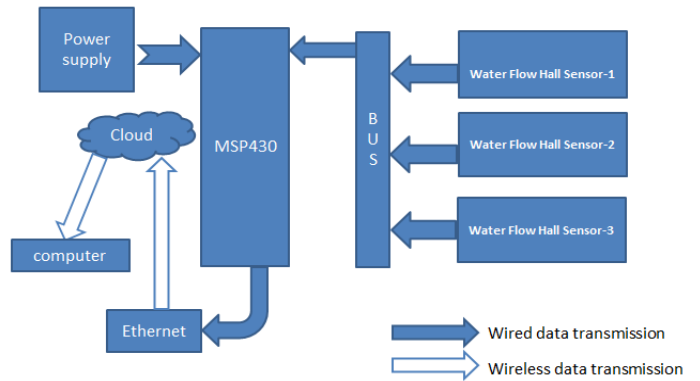
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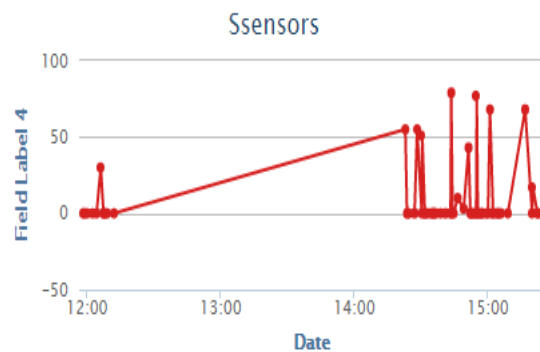
Chart -1: Sensor Output

Fig -1: Hardware total setup

Fig -2.1: Mobile app output

Fig -2.2: Mobile App Output

CONCLUSION

The proposed method consists of the IOT (Internet Of Things) based water theft detection and corresponding bills acclaiming by the water board. This will automate the unorganized water supply system to a organized one. In addition to this we can detect water tapping and corresponding measures can be taken in a very fast method with a less cost system , this will also generate a additional revenue to the government . In the present day of Smart lifestyle this is a great requirement as water resources are diminishing slowly.

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