SMART DEVICE TO CONTROL WATER BILLING UNITS

Prof. Ashay I. Rokade[1], Gayatri Mhatarmare[2], Shruti Khajone[3], Yadnyawalkya Phule[4], Karan Bhadange[5]

[1]Assistant Professor, Dept. of Electronics And Telecommunication Engineering, , Prof. Ram Meghe Institute of Technology and Research, Badnera, Maharashtra, INDIA

[2]BE Student, Dept. of Electronics and Telecommunication Engineering, Prof. Ram Meghe Institute of Technology and Research, Badnera, Maharashtra, INDIA

[3]BE Student, Dept. of Electronics and Telecommunication Engineering, Prof. Ram Meghe Institute of Technology and Research, Badnera, Maharashtra, INDIA

[4]BE Student, Dept. of Electronics and Telecommunication Engineering, Prof. Ram Meghe Institute of Technology and Research, Badnera, Maharashtra, INDIA

[5]BE Student, Dept. of Electronics and Telecommunication Engineering, Prof. Ram Meghe Institute of Technology and Research, Badnera, Maharashtra, INDIA

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Abstract - *Automation is a need of time. Today in this modern era automation helps us to save time as well as money. Most of the people prefer fresh water of municipality water pipe line. For that one has to pay for it. Water meter connected to the water pipe line supply at home measure the amount of water used in a particular home and that reading is shown on it. Reading of meter is then noted down for billing purpose. Air pressure 5 to 10 minutes before arrival of water also increases the reading on the meter thus without any consumption of water we pay for it.*

Our project Smart Water Meter is an Arduino based project. It is a prototype in which a valve attached before the water meter remains close until the water reach at meter and automatically gets open up when the water is sensed in a pipe line. We have used various components in this project such as pressure sensor, water sensor, driver IC, relays LCD and Arduino. All these components are controlled using Controller Atmega 328. The main aim of this project is to save out money which we pay for air pressure.

1. INTRODUCTION

Most of the people prefer fresh water of municipality water pipe line. For that one has to pay for it. Water meter connected to the water pipe line supply at home measure the amount of water used in a particular home and that reading is shown on it. . Reading of meter is then noted down for billing purpose. Air pressure 5 to 10 minutes before arrival of water also increases the reading on the meter thus without any consumption of water we pay for it.

In this project the Smart Water Meter is implemented using an Arduino. It is a prototype in which a valve attached before the automatically gets open up when the water is sensed in a pipe line. We have used various components in this project , water meter remains close until the water reach at meter and such as pressure sensor, water sensor, driver IC, relays LCD and Arduino. All these components are controlled using

Controller Atmega 328. The main aim of this project is to save out money which we pay for air pressure.

Arduino based system is with automatic water meter which saves our money that we pay for air pressure which passes through the meter that increases our reading on meter. In this system we are using Arduino which controls the operation of our system. Sensors used in this are water sensor and pressure sensor. These sensors will be attached before the water meter to sense water and air pressure. Two valves i.e. water valve and air valve are also attached which will get either open or close depending on the sensor reading. Valves are connected such that water valve will close the pipe line and air valve will be attached on the upper side to allow the air to pass.

2. Literature Review

In a modern world of technology, innovations are made every day for ease of living. While technology is developing from smart phones to artificial intelligence, our project emphasizes on a factor that is used in common man's day-to-day life, water taps. Our project, 'Smart Device to Control Water Billing Units' focuses on the main problem of extra charges that are incurred on water bills due to unnecessary air pressure generated in the water taps. In India, almost every household or at least every locality uses at least one water tap to use the water source provided by the municipality. The main problem that is caused in this process is that when the water is released from the assigned board, it flows through long pipes and travels long distance to finally reach the localities. Due to this long distance of flow, a huge air pressure is generated in the pipes, which practically reaches the water taps first before the water does. This makes the water meter start working even when the actual water flow is yet to reach the taps. Due to this problem, extra readings are measured on the water meter and thus, extra charges are incurred on the water bills. This problem needs to be eradicated and that's the main purpose of our project. Currently, our system uses decade old water

meters that works only on the pressure sensed at the tap. These water meters if replaced by our smart water taps, can help us to eradicate the extra billing problem. Our project uses advanced sensors and LCD screen that clearly shows the air and water pressure separately. This helps the billing officers to calculate only water readings and avoid the air readings that were causing extra pressure and subsequently extra readings that caused the extra charges. If these extra charges saved per month are calculated totally, we can observe a good amount being saved. This is a huge relief to specially those people who tend to save even small amounts of money for family. Thus, in a innovative world our smart project can make a huge impact on the core society. Also our project has huge scope for research as new implementations can be made if properly worked on.

BLOCK DIAGRAM:-
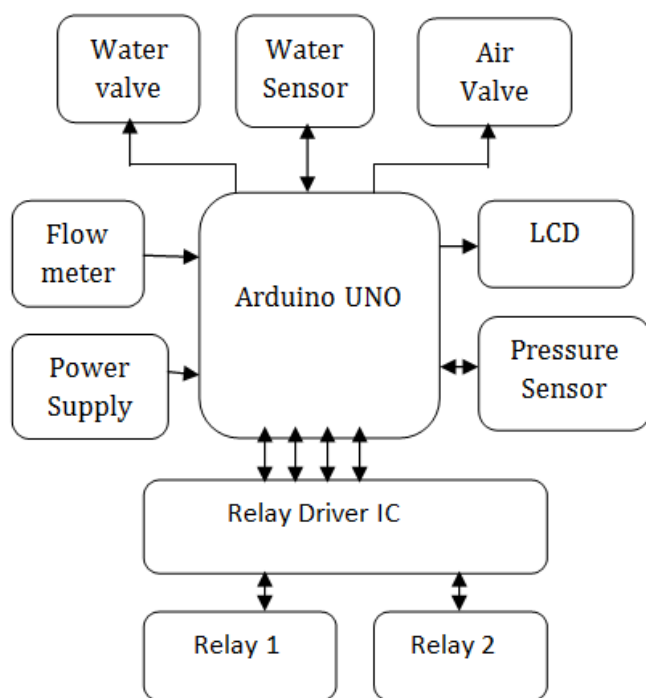
WORKING:

Project Implementation

This proposed Arduino based system is an automatic water meter which saves our money that we pay for air pressure which passes through the meter that increases our reading on meter. In this system we are using Arduino which controls the operation of our system. Sensor used in this is water sensor. This sensor will be attached before the water flow meter to sense water and air pressure. Our project, being a small scale work, it was not possible to connect the actual valves for water and air pressure as the pressure required for the valves to work is very high. Thus, for working purpose, we replaced the valves with a long pipe that helped to generate the air pressure and subsequently give us the air pressure readings. In practical

implementation, the water is supplied from the water board and thus, we don't use any water pump for the supply water. Though, we have connected water pump in our project to pump the water and provide the required supply. As soon as the water pump is turned ON, a large pressure is generated in the long pipe. This pressure is what we call the air pressure, generated before the flow of water. This air pressure passes through the long pipe into the flow meter and thus, the pressure readings are calculated and displayed on the LCD screen. This is that extra pressure that causes our meter to unnecessarily flow and give extra readings. Now, the air pressure is followed by the water flow through the long pipe. We have a water sensor connected to the pipe that senses the flow of water before the water enters the flow meter. Readings for water flow are calculated and displayed on the LCD screen. Thus, two different readings i.e. Air pressure and water pressure are calculated and separately displayed on the LCD screen. Our main cause to acquire only water reading is fulfilled and thus separated from the air pressure reading. This entire process takes place in few seconds of time but can acutely calculated and observed on the screen. We have used a power circuit and two ICs, IC 7412 to provide 12 V supply to the arduino and flow meter and IC 7405 to provide 5 V supply to the LED screen. Arduino AT Mega328 is used to upload the entire programming in the circuit. Flow meter YF-S201 acts as the passage for both water and air pressure. Our entire setup is compatible and easy to use also making it a smart system to use.

Practical Implementation

This proposed Arduino based system is an automatic water meter which saves our money that we pay for air pressure which passes through the meter that increases our reading on meter. In this system we are using Arduino which controls the operation of our system. Sensor used in this is water sensor. This sensor will be attached before the water flow meter to sense water and air pressure. Two valves i.e. water valve and air valve are also attached which will get either open or close depending on the sensor reading. Valves are connected such that water valve will close the pipe line and air valve will be attached on the upper side to allow the air to pass. Relays used in this system make the valves open or close and the relays are driven by driver IC ULN2803. Dual power supply is used in this system as Arduino needs not more than 5V supply but the valve will requires more than 5V. So 12V of supply is also provided here.

Pressure sensor attached before the meter and water valve, without opening the water valve, sense the air pressure and the signal is given to Arduino. To pass this air pressure out from pipe line, Arduino will drive the relay to open the air valve and thus air will come out from the pipe line without affecting out meter reading. Once water comes, it will be sensed by the water sensor and the Arduino will make the water valve open. Thus the meter reading now changes because of water flow only. At the same time LCD will

display the status of arrival of water in the tap. Thus makes our system smart for people.

Table -1: Hardware Used

Components	Operating Voltage	Operating Current
Arduino UNO	7-12V	40mA
Flow Meter	5-18V	15mA
Liquid Crystal Display	3.5V	2.5 Max
IC 7812	5-18V	
IC- 7805	5V	

ADVANTAGES:

- Saves the billing amount

- Wastage of water can avoided

- Simpler than traditional method

DISADVANTAGES

- Sensors may get damage.

- Maintenance and Monitoring of Sensors

APPLICATION:

- Useful save the billing amount of user

- Can be used in industry applications

FUTURE SCOPE

- Meter can be developed by including this unit.

  Using IOT user can get online bill

CONCLUSIONS

The project saves billing amount of the user as air gets removed from pipe. When water come through pipe, efficiently water valve gets open and user get water hence has to pay bill of amount equivalent to amount of water and not for air.

The same unit can be the modification in water meter and new meter can be developed by including this unit which can be called as Smart meter.

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