# PREPAID WATER SUPPLY SYSTEM FOR SMART CITY

## Dr. RajanBabu W. [1] ,Mr. Hariprasath M. [2] , Mr. Rakshankrishnan S.[3] , Mr. Surendar S. [4]**

[1]Associate Professor, [2 to 4]UG Students

Department of Electrical and Electronics Engineering , Sri Eshwar College of Engineering , Coimbatore - 641202

Email: rajanbabu.w@sece.ac.in, rakshankrishnan@gmail.com, surendhar804@gmail.com, hariprasathrs45@gmail.com)

---------------------------------------\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*---------------------------------

## Abstract:

This paper provides advanced water supply system to smart cities and this is known as "Prepaid Water Supply for smart city" with secured water system. To solve this we have to introduce a process through adruino and relays. This machine is programmed to supply water for a particular cost and limits the water supply when the amount entered is fully utilized. We chiefly concern here with the conservation of water and provide adequate security in water overconsumption by our programmed water supply system.

*Keywords* —**Prepaid water, Secured water supply, Water conservation, Water cost maintenance**

---------------------------------------\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*---------------------------------

## I. INTRODUCTION

The cities are evolving into smart cities and technology has completely occupied us. It had occupied each and every possible sector. Though the technology has demerits but we can convert it into a useful process in water projects.

Thus to solve water cost problem we are to introduce a prepaid water technology through arduino[1] [3] [8]. The main problem faced the government is water management and tax. One such case is that consumers tend to overuse of water and often deny paying the water tax thus the prepaid water supply system comes to the action.

## II. PROBLEM STATEMENT

The water sector hasn't witnessed the adverse grown in the field of technology. Our main goal is to supply water by paying tax at advance thus reduces the problems faced by the government in water sectors[2] [3]. The system is designed with simple process and electronic components which in turn reducesbudget. This makes the system easy for commercial and domestic purpose[5] [7]. So further up gradation of the system is simplified [7].

## III. SURVEY

A survey has been done on water sectors in both villages and cities. Both are facing the similar problems in overconsumption and tax payment[2] [6]. So this survey gave us an idea to design a programmed circuit to overcome this problem.
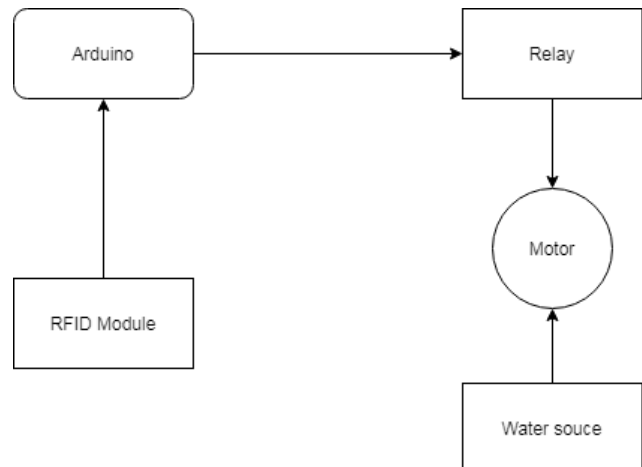
## IV. METHODOLOGY



Fig 1: Block Diagram

This block diagram tells that overall working of the circuit. The program which is required for arduino is programmed through software and it is fed using universal serial ports. Then the arduino and water suppliers are interfaced (including water pump, water tank and valve) [4]. The input to the circuit is provided by the RFID tag.

## V.   HARDWARE COMPONENTS

The components which we used in prepaid water supply system includes

1.   Arduino

2.   Water pump

3.   Relay

4.   RFID module

### 1)  *ARDUINO*

AnArduino is an electronic programmable circuit which is used for controlling equipment. These arduino's can process a task efficiently. These arduino can control other circuits and components connected to it.

The arduinoreceives information from sensors or inputs. The CPU of the arduinoprocesses the data and activates the output based upon the input given by the user or other input devices [1] [6].



Fig 2: Arduino UNO

#### a.  *Advanced Arduino Features*

- Modern, fully featured development environment.

- Classic Mode (identical to the Classic IDE) and Pro Mode (File System view)
- Basic Auto Completion (Arm targets only)
- Serial Monitor.

### b.  *HOW IS ARDUINO PROGRAMMED?*

AnArduino is usually programmed on arduino software (IDE) and is fed into the CPU of the arduino[1].

Mostly arduino is programmed with the "C" language. It is the basic programming language for programmable electronic circuits. Each line signifies the desired output. C language is easier to implement than any other languages.

It acts as a mediator for relay and RFID module. The code provides a significant output and converts it to a user specific output.

### 2)  *WATER PUMP*

A Water pump uses mechanical principles such as hydraulic mechanism [4] to create a certain kinetic energy to transfer water in a piping system.

These pumps can work in both AC and DC power for electrical supply to the pump or else it can use alternate sources such as diesel engines and gasoline engines.

Water pumps are classified into two types namely,

- Centrifugal pumps
- Positive displacement pumps

### 1)  Centrifugal pump

Centrifugal pumps come in several different types. They can be submersible, trash and other models. It consists of a rotating impeller which pushes the water with a certain kinetic energy into the piping system.

It also forms vacuum in the center causing water to be drawn through the intake. They are used in areas using low-viscosity fluids pumping and it gives high flow rates.

## The Centrifugal Pump

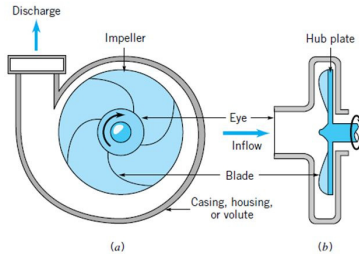**(Radial-flow turbomachines)**



Fig 3: Centrifugal Pump

### 2) Positive displacement water pump

A Positive displacement water pump provides supply of water though the mechanical contraction and development of a stretchy diaphragm.Liquid flows into the pump when the cavity expands on the suction side and discharges when the cavity collapses.

It is used in dealing with high viscosity fluids and works well and efficient with them. But low speed operation gives nominal efficiency where high speed operation outputs low efficiency.
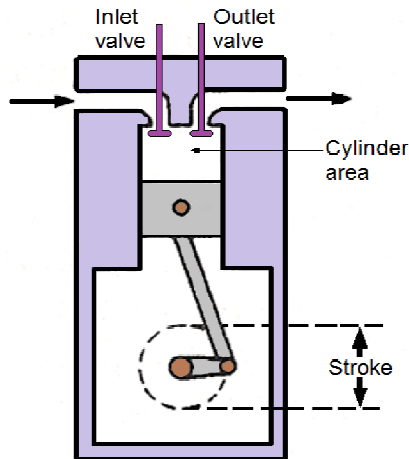


Fig 4: Positive Displacement Pump

### 3) RELAY

A Relay is an electromagnetic switch which is used for switching the circuits [1] [2]. The relay is connected to a series of sensitive components and requires very low current to perform these actions.

Relay consists of 5 pins which are connected to several sensors.

Below table 1 shows the detailed description of the relay used in this machine.

| PIN NUMBER | PIN NAME | DESCRIPITION |
|---|---|---|
| 1 | Coil End 1 and 2 | Used to trigger(On/Off) the Relay |
| 2 | Common (COM) | Common is connected to one End of the Load that is to be controlled |
| 3 | Normally close (NC) | If connected to NC the load remains connected before trigger |
| 4 | Normally Open (NO) | If connected to NO the load remains disconnected before trigger |

We used two relays 8 channels each of 24v coil for controlling the motor operation. The device connected to arduino is controlled by this relays. The input and output of motor is connected to the relay through arduino.
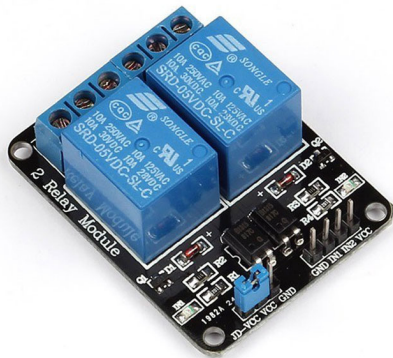
Fig 5: 2 Relay Module

### 3) RFID MODULE

A RFID module generates a frequency of 13.56 MHZ electromagnetic field which is used to read RFID tags with a maximum speed of 10mbps.

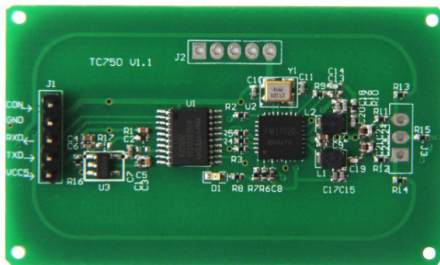The user can communicate to the arduino with the help of RFID card. To scan the card the RFID scanner is used.



Fig 6: RFID Module

It has a tiny radio transponder which transmits and recieves signals from arduino. The RFID provides the necessary input to the CPU [1] [2] [8].

## V. CONCLUSION

The following results have been obtained in this project,

1) Proper water tax has been paid to the government water sector.
2) Water conservation is successfully achieved.
3) Water is available 24/7.
4) Over usage of water is highly reduced.

## VI. REFERENCES

[1] Rohini Sharma, (2011), 'Internet of Things: An approach for Advancement in Educational Institution', Department of Computer Science and Applications, Panjab University, Vol.2, No.5, pp.32-45.J.

[2] Van der Steen and Peter, (2016), 'Integrated Urban Water Management: towards sustainability', Environmental Resources Department UNESCO-IHE Institute for Water Education, Vol.2, No.3, pp. 105-425.

[3] RohiniBhuse, MeghaGite, DhanashriHande, (2017), 'Waste Management System Based on IoT', Matoshri Collage of Engineering &amp; Reasearch Centre, Vol.5, No.2, pp. 1835-1837.

[4] Priyen P. Shah, Anjali A. PatilSubodh, S. Ingleshwar, (2017), 'IoT based smart water tank with Android application', International Conference on ISMAC, Vol.4, No.9,pp. 19 - 342.

[5] D.Loureiro,P.Vieira,C.Makropoulos,P.Kossieris,R.Ribeiro,J.Barateiro, E.Katsiri,"Smartmeteringusecasestoincreasewaterandenergy efficiency in water supply systems", in Proc. International Water Week, 5-6 November, Amsterdam, The Netherlands,2013.

[6] P. Vieira, D. Loureiro, R. Ribeiro, J. Barateiro, M. Rebelo, S.T. Coelho, Innovative smart metering based applications for water utilities. IWA World Water Congress. Lisbon, Portugal, 2014.

[7] Marchment Hill Consulting, Smart water metering cost benefit study Final Report, 2010.

[8] S.-C. Hsia, Y.-J. Chang, and S.-W. Hsu, "Remote monitoring and smart sensing for water meter system and leakage detection," *IET Wireless Sensor Systems*, vol. 2, no. 4, pp. 402–408, 2012.