

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/324719546>

# IMPLEMENTATION OF WATER AND STREET LIGHT MANAGEMENT SYSTEM FOR SMART CITY

Article · April 2018

CITATIONS

0

READS

44

2 authors, including:



**Dr S Elangovan**

Jansons Institute of Technology

13 PUBLICATIONS 53 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



MLI based SAPF [View project](#)



---

**International Journal of Intellectual Advancements  
and Research in Engineering Computations**

---

**IMPLEMENTATION OF WATER AND STREET LIGHT  
MANAGEMENT SYSTEM FOR SMART CITY**

**S. BALAJI<sup>1</sup>, KRISHNAKUMAR. M<sup>2</sup>, LOGITHA. S<sup>3</sup>, MAHENDRAN. A<sup>4</sup>, ELANGO VAN. S<sup>5</sup>**

*<sup>1,2,3,4</sup> UG Scholars, Department of EEE, Jansons Institute of Technology, Coimbatore, Tamilnadu, India*

*<sup>5</sup> Associate Professor, Jansons Institute Of Technology, Coimbatore, Tamilnadu.*

balajisugumar3@gmail.com

**ABSTRACT**

This proposed automated water distribution system is used to distribute the municipal water to all street pipelines through PLC technology. Here PLC is used for time scheduling purpose. Consider a storage tank with a level sensor to measure the water level in the tank and flow sensor is placed at the main pipeline to check the flow rate of water, then set point is fixed for each pipeline in PLC through the program. Solenoid valves are kept for each sub-pipelines and they are operated by means of a relay. The output from the flow sensor and level sensor is given directly to PLC and then the output signal is given to ARDUINO. Now the control signal is sent from ARDUINO to transmitter side GSM module then it is followed by receiver side. In receiver side, another GSM module receives the control signal and gives to ARDUINO based on it relay operates solenoid valve according to the signal.

This proposed system also includes accomplishment of street light control using PLC and relays. Here we are using LDR sensor to measure the light intensity for the particular time period since to increase the lifetime of the sensor we use it only for

some time. Then PLC is directly connected to relay through wires and the street lights were get operated by means of relays.

**KEYWORDS:** PLC, ARDUINO, GSM MODULE, LEVEL SENSOR, FLOW SENSOR, LDR.

## I. INTRODUCTION

In recent days, our country has been developed by improving our technology in maintaining the cities through humans and machines. In general, cities were under the control of the corporation and its main responsibility is to maintain the cities clean. So that in each corporation's several numbers of workers were given jobs at various sections according to their qualification and other skills. The major problem which we are facing today in our country is water scarcity, it happens mainly through deforestation and because of Global Warming our underground water table level has been reduced. To increase the underground water level, the corporation has introduced several methods like rainwater harvesting. By this method, groundwater level is increased and supplied to people by water line management which is organized by the corporation. Workers regulate the water supply to various parts of the cities through pipelines according to the framed schedule. In order to reduce the human effort we move on to latest technology like PLC in which the input is fed and by running the program we can get the desired output, it is widely used for many real-time applications. Now let us consider our city's pipeline connections, it is complex network by which the water supply is

regulated by each house and industry. Workers were allotted to operate the water supply at each area but at the time of critical situation like human error occurrence, we met a problem like water scarcity. In order to avoid such error, we are going for a

developing technology called PLC, in which the solenoid valve of the pipeline is controlled by the program and constant water supply is provided throughout the cities and reduces human error and time. It is an efficient way of regulating the water supply in cities, this process can be extended by using some sensors in pipelines and it detects the excess flow of water and an indication is made and given to us. Similarly, the street lights of the city are also been controlled using PLC it is an automation process when there is no any detection of sunlight then the street lights tend to be turned ON while if sunlight is detected street lights were turned OFF, this process also reduces the human time. Hence by using the PLC automation technology we are able to reduce the errors caused by the human and constant supply of water and light is given to the cities and it is very efficient technology for recent days. The automation process mainly reduces the human effort and time then the output is maintained frequently in an efficient manner.

## PROBLEM STATEMENT

Generally, the person who allocated to manage water distribution for a particular area by municipality should go to the pumping section and he or she has to do opening and closing of the valve manually based on a time schedule. This method consumes more time and manpower. It may cause human errors such as water leakage, mankind laziness, partially problems. This leads to wastage of water and water scarcity problems. Because of this improper management water does not reach end users and some people in urban area suck a huge amount of water using motors. To overcome this improper handling,

we are going to automatize water distribution system, this will reduce the time and manpower, water wastage. Same in case of street light management system manpower get wasted and human error will affect the society.

## CONSTRUCTION

### A) PROPOSED BLOCK DIAGRAM

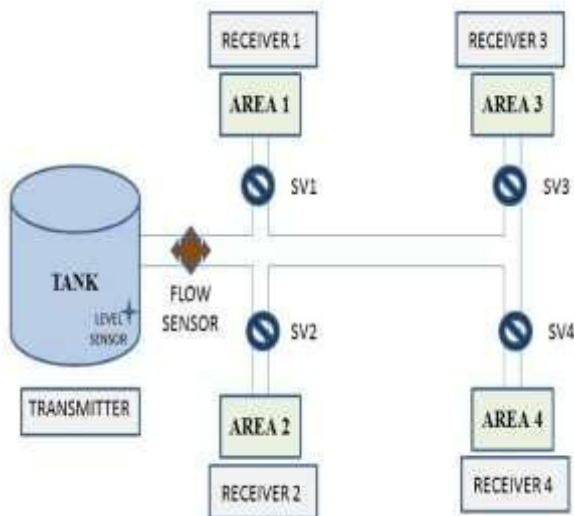


FIG.1

In this proposed system water level sensor measures the quantity of water in the storage tank and flow sensor measures the velocity of water flowing from the storage tank. The output is given to PLC it has time scheduling for water distribution. The fixedpoint is already set. When the water reaches the fixed point, the output signal from the PLC is sent to the Arduino and Arduino sends the signal to the GSM module. Through GSM module Solenoid valve gets opened and closed which is placed near the storage tank. The street lamp will be controlled using PLC and LDR.

### B) HARDWARE BLOCK DIAGRAM

#### TRANSMITTER CIRCUIT

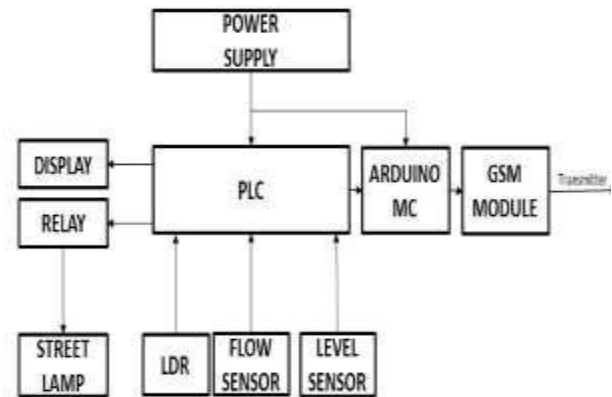


FIG.2

#### RECEIVER CIRCUIT

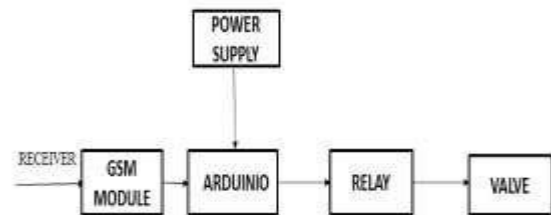


FIG.3

A Programmable Logic Controller, or PLC, is a ruggedized computer used for industrial automation. PLC using ladder logic as a programming language. These controllers can automate a specific process, machine function, or even an entire production line. The PLC receives information from connected sensors or input devices, processes the data, and triggers outputs based on pre-programmed parameters. Programmable Logic Controllers are a flexible and robust control solution, adaptable to almost any application. In our project PLC monitor and controls the water flow. PLC get data from the flow sensor and the level sensor

then it operates solenoid valve through microcontroller and GSM module.

Water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. Its speed changes with a different rate of flow. The hall-effect sensor outputs the corresponding pulse Signal.

Level sensors detect the level of liquids and other, in our project Water Level Sensors are used to detect the level of water in the storage tank.

A solenoid valve is an electromechanical actuated valve to control the flow of liquids and gases. The basic principle that is used to open and close solenoid valves is the magnetic field exerts a force on the plunger as a result, the plunger is pulled toward the center of the coil so that the orifice opens. The valve is controlled by an electric current through a solenoid: in the case of a two-port valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports. Multiple solenoid valves can be placed together on a manifold. Their tasks are to shut off, release, dose, distribute or mix fluids.

The Arduino is a programmable logic controller. Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output activating a motor, turning on an LED, publishing something online.

A GSM modem is a device which can be either a mobile phone or a modem

device which can be used to make a computer or any other processor communicate over a network. A GSM modem requires a SIM card to be operated and operates over a network range subscribed by the network operator. It can be connected to a computer through serial, USB or Bluetooth connection.

LDR stands for Light Depending Resistor. An LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it. This allows them to be used in light sensing circuits.

## WORKING

| AREAS                                                                                                                  | On Time in minutes | Off Time in minutes | Duty Time in minutes |
|------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------|----------------------|
| Area 1                                                                                                                 | 5                  | 10                  | 5                    |
| Area 2                                                                                                                 | 12                 | 19                  | 7                    |
| Total time 20 minutes. After 20 minutes the system will be reset. And the same schedule will be repeated continuously. |                    |                     |                      |

**Table-1**

This table explains about the water distribution for area 1&2. The schedule can be done on the daily base or weekly base for more number of areas and it can be re-scheduled.

| STREET LIGHT | ON Time in minutes (Hrs=Mins) | OFF Time in minutes (Hrs=Mins) |
|--------------|-------------------------------|--------------------------------|
| LDR          | 5 pm                          | 7 pm                           |

|                                                                                                                        |             |             |
|------------------------------------------------------------------------------------------------------------------------|-------------|-------------|
| <b>Schedule</b>                                                                                                        | <b>7 pm</b> | <b>6 am</b> |
| <b>LDR</b>                                                                                                             | <b>6am</b>  | <b>8 am</b> |
| Total time 24 minutes. After 24 minutes the system will be reset. And the same schedule will be repeated continuously. |             |             |

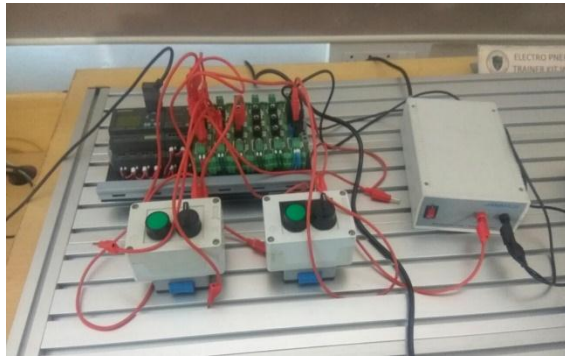
**Table-2**

This table explains the street light operation. Here we use LDR sensor only for a particular time as per the table in order to maintain the reliability of the sensor.

## RESULT

### HARDWARE IMPLEMENTATION

#### A) TRANSMITTER SIDE

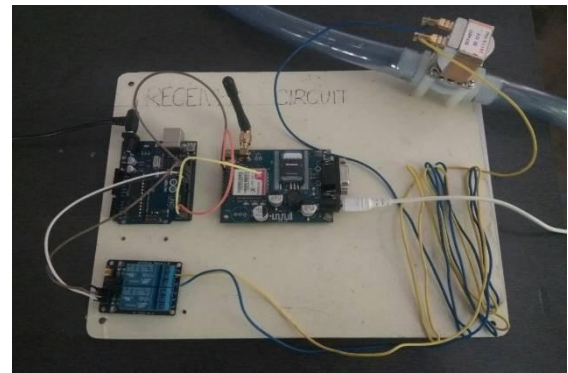


A PLC will give the control signal as a programmer programmed. The signal is fed to the Arduino. The Arduino will receive the control signal and it will send the signal to receiver circuit through GSM module. Moreover, the transmitter circuit consists of LDR, flow sensor, and level sensor. The above sensors have modified the schedule

as per the real-time data. The LDR and flow sensors were produced expected results. The level sensor is in process.

#### B) RECEIVER SIDE

A receiver side of the hardware was given the expected result. It can receive a signal from the transmitter circuit via GSM module. The signal which is received can be



processed by Arduino microcontroller. The Arduino microcontroller can ON and OFF the valve as well street light.

## CONCLUSION

This project reduces manpower and water wastage through automatic water distribution system using PLC. This project deals with the level sensor so we can easily identify the availability of water in the storage tank and flow sensors are used to the project works with a wireless communication system which will produce effective outputs. Automatic water distribution system reduces human error and leakages due to improper handling. The street lights were controlled using PLC and LDR. While LDR is used in seasonal variation. This proposed PLC based street lighting control system has great potential

to revolutionize street lighting which in turn saves a large amount of power.

DISTRIBUTED SYSTEM AND TESTING OF WATER" in IOSR Journal of Electronics & Communication Engineering (IOSRJECE).

## REFERENCES

1. P. Mukesh Aravind, S. Sukhumar, C. Karthik, M.Jagadeeshraja, L. Manivannan and Dr. N.Suthanthira Vanitha, "PLC BASED AUTOMATIC CORPORATION WATER DISTRIBUTION SYSTEM USING SOLAR ENERGY" in International Journal of Engineering Research & Technology (IJERT), Vol. 2 Issue 12, December-2013.
2. Gaikwad Sonali Ashok, "WATER ANTI-THEFT AND QUALITY MONITORING SYSTEM BY USING PLC AND SCADA" in International Journal of Electrical and Electronics Engineering Research (IJEER), Vol. 3, Issue 2, Jun 2013, 355-364.
3. RamleelaKhare, Dr.Filliperodrigues, & E. Mela; "Automation of water distribution plant", International Journal of Research in Engineering and Advanced Technology, Vol.2, pp: 1-6, 2014.
4. Aunbhanchal, KetakeeDagade, ShubhangiTamhane, Kiran Pawar, &Paradnya Ghadge; "Automated water supply system & Water theft Identification Using PLC and SCADA", International Journal of Engineering Research and Applications, Vol.4, Issue.4, pp: 67-69, April 2014.
- 5.T. Baranidharan, A.Chinnadurai, R.M.Gowri, J. Karthikeyan, "AUTOMATED WATER DISTRIBUTION SYSTEM USING PLC AND SCADA" in International Journal of Electrical and Electronics Engineers, IJEEE, Volume 07, Issue 01, Jan- June 2015.
6. Prof. Anubha Panchal, KetakeeDagade, ShubhangiTamhane, Kiran Pawar, Pradnya Ghadge, "AUTOMATED WATER SUPPLY SYSTEM AND WATER THEFT IDENTIFICATION USING PLC AND SCADA" in Int. Journal of Engineering Research and Applications, Vol. 4, Issue 4 (Version 6), April 2014, pp.67-69.
7. Mr. Prashant palkar, Prof. (Dr.) ShrinivasPatil, Prof. Mrs. Pooja Belagali, Mr. Ashish Chougule, "AUTOMATION IN DRINKING WATER SUPPLY