DRAINAGE MONITORING AND CONTROLLING SYSTEM

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ABSTRACT
Automatic Drainage Monitoring and Control system using PLC is proposed to overcome real-time problems. The concept is to replace the manual work in drainage cleaning by automated system. With the continued expansion of industries, the increasing problem of drainage must be urgently resolved due to increasing sewage problems from industries of the surrounding environment. This problem can be resolved by using automation.
PLC is the major controlling unit and the drainage level is monitored by sensors used. In this system we are using level sensor, dc motor (24V), submersible water pump, pressure valve, filtering plates, etc.

KEYWORDS: Programmable logic controller, level sensor, submersible water pump.

INTRODUCTION
In today's world, though automation plays very important role in industrial applications and commercials, it is still a challenging task. Drainage pipes are used for disposal of wastes, but unfortunately sometimes there may be loss of human life while cleaning the blockages in the drainage pipes. To overcome this problem and save the human life. We implement design "Drainage Monitoring and Controlling System ". We design our project to use the efficient way to control the disposal of wastages and regular clearance of blockages. We also monitor the disposal in   frequent manner.

DESIGN PROCEDURE FOR DRAINAGE CONTROL SYSTEM
 PLC MODULE
Programmable Logic Controller (PLC) is a digital computer used for the automation of various electro-mechanical processes in industries.
- ➢ Schneider TM200C16R
- Digital Inputs:16
- Digital Outputs:16
- CPU: X86 800MHz
- RAM: DDR2 512MB
- Storage: 4 MB
- DAC:16 bits,2 channels,-10v to +10v
- Support Language: Ladder Programming
- Operation Power:24 VDC,1A Min

POWER SUPPLY
Power supply is used to step down ac supply voltage to 230 V 50Hz to 24Volts regulated DC mainly. It supplies 24V to PLC. Power supply is mainly of two types Switched mode power supply and linear regulated power supply. In our system we used SMPS for supply voltage.
Power supply having blocks are transformer, rectifier, filter and regulated IC which provides perfect regulated DC voltage.

SUBMERSIBLE WATER PUMP
- Voltage/Frequency : 220V/50HZ
- Current : 0.23A

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- Power : 18W
- Flow : 2000L/h（1meter high 24L/min）
- Pumping head : 2.5m
- Pump Height : 5 inches

LEVEL SENSOR

The primary function of Level Sensor is to detect the level of flowing water. In this project, four level sensors are used. Each level sensor consists of two proximity sensors respectively. The two proximity sensors are placed at a distance of 20mm each.

This sensor detects the level of water at level sensor and accordingly the water pump is turned ON.

Specifications of Proximity Sensor:-

- Type:-inductive sense metal target
- Supply:- 24V dc
- Diameter:- 8mm
- Sensing distance:-2mm
- Length :-50mm
- Output:-PNP NO three wire

BLOCK DIAGRAM
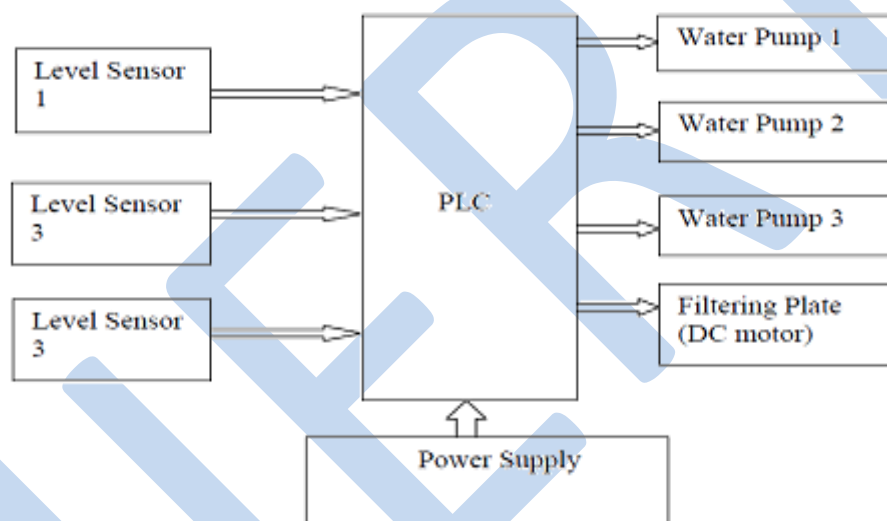
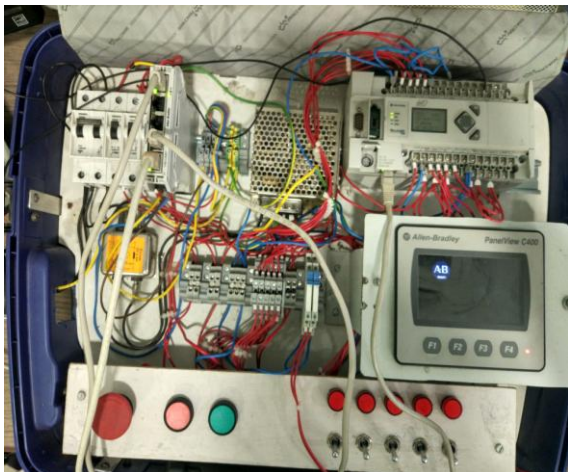## CONTROLLING METHOD OF DRAINAGE SYSTEM

Automatic Drainage Monitoring and Control system using PLC consists of level sensor for monitoring and the devices used for controlling are hooter, filtering plates, water pumps. This system is utilized in the urban and rural areas. Level sensor is a device that is used for detecting the level of water in drainage pipes where the minimum flow rate is 19L/min (approx 5%) and maximum flow rate is 114L/min. In this system, the water pumps are turned on when the water level is less than 20% due to the presence of obstacles in the form of solid particles that may cause choking of the drainage pipeline. The level sensors are activated simultaneously to check the water level created inside the pipe.

➤ THE CONTROLLING OF THIS SYSTEM INVOLVES TWO CONDITIONS.

- First case: The obstacles detected will be sensed due to the discontinuous rate of water level (less than 20%) and the water pumps will get turned on in order to clear the obstacles and get the water flow back to normal (60%-80% of the total drainage water flow).
- Second case: The water pumps are expected to turn on and apply the water forcefully for clearing the obstacle. But in case of heavy particles which restrict themselves from moving forward, the water flow rate gets affected (reduces). This may happen in case of choking of pipelines due to deposition of other material on one place for a long time. Therefore, a hooter is required here to make the operator aware about situation and to work on the issue immediately.

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RESULTS
IMAGES OF IMPLEMENTATION

CONCLUSION

In this way, this paper presents a system which is used to operate automatic drainage cleaning and monitoring. Implementation of this project leads to reduce human labour. Also we have followed thoroughly the study of time motion and made our project economical and efficient with the available resources. We hope that this will be done among the most versatile and interchangeable one even in future.

REFERENCES

1) JIANG jing, ZHANG xusong, campus sewage treatment based on plc. 978-1- 45772074-1/12 2012 IEEE.
2) Rishabh Das, Sayantan Datta, Anushree Sarkar, automation of tank level using plc volume 7 july-august 2013.
3) Westrom, I., G. Exkbohm, H. Linn, and I. Messingi. 2003. The effects of controlled drainage on subsurface outflow from level agricultural fields. 17, 1525-1538.
4) Ireri, L.N (2009), An Investigation into Suitability of Storm Water Drainage Systems in Nairobi's CBD, B.A Building Economics, University of Nairobi.
5) Ng'ang'a J.M (2001), A Focus into the Provision and Maintenance of Drainage System in Savanna Estate Nairobi, B.A Building Economics, University of Nairobi

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