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Water Tank Level Controller by using PLC

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Abstract: ***Automation has been an integral part of industries which provides safety, accuracy, efficiency and less human intervention with dangerous chemical process. So, our project work is on "WaterTankLevel Controller by using PLC". Water level management using PLC is design to control the level of water and avoid wastage of water in the tank. The system has an automatic pumping system attach to it. We are controlling the water level by using PLC, Sensors and motor. The purpose for doing this project is reducing time consumption and human resource consumption, increase product revenue and greater accessibility or more security. Also by using this project the wastage of water occurred by overflowing of tanks can be avoided. In future by making some changes this project can be used in different industries related to fluids like petroleum industries or oil refineries for controlling the level of filling the tanks and avoid wastage.***

Keywords-Power supply 24v, PLC, Float Sensor, Relay card.

I. INTRODUCTION

A Programmable Logic Controller, PLC or Programmable Controller may be a computer used for automation of mechanical device processes. It is used to convert previously used "Relay Logic" or "Wired Logic" for automation of industrial purposes into "Ladder Logic". Unlike general computers, the PLC is designed for multiple inputs and output arrangements, extended temperature ranges, immunity to electrical noise, and resistance to vibration and impact. In our project we are using AB-Micrologix 1400 PLC.

The project "Water Tank Level Controller by using PLC" is designed to monitor and control the level of liquid in the tank. The system has associate automatic pumping system hooked up thereto thus on refill the tank once the liquid gets to the lower threshold, while offing the pump once the liquid gets to the higher threshold. Sustainability of available water resources in many reasons of the world is now dominant issue.

This problem is quietly related to poor water allocation, inefficient use lack of adequate and integrated water management. Water is often used for agriculture, industry and domestic consumption. Therefore, efficient use and water monitoring and controlling are potential constraint for home or office water management system.

Our planned system are often divided into 3 main modules- sensing, decision making and implementation. Level sensors are used to implement the system.

These sensors detect the presence of water. The readings of the sensors ar utilized by the PLC to require the specified call. Finally the choice is enforced by the PLC through a relay switch. The ladder logic was implemented in RX logix 500.

The proposed system will control the liquid level of the tank continuously and will ensure that a sufficientlevel of water is maintained in tanks. This system can be used in industrial application. It can be used to prevent industrial accident by overfilling of any open container and to prevent overfilling of any closed container thereby creating overpressure condition. The high number of the input output port of the PLCwill enable this single system to control large number of tanks single handedly. The system is operated by PLC so there is no need of human interference this could save the human resources and provides protections to individuals from danger of industrial accidents. The system is highly reliable, once programmed it does not need any inspections.

II. LITERATURE SURVEY

A. Automation of tank level by using PLC and establish of HMI by SCADA by Rishabh das (2013). He analyzed the level control of single tank and implemented control strategy .From his paper we get knowledge about PLC automation that can be used in controlling water level in different tanks. Also came to know the process of interfacing the PLC to the HMI by using SCADA. Understood input and output components that are required to connect with PLC

B. "Programmable Logic Controller" article by Kelvin Ericson (associate professor of electrical engineering at university of Missouri) This article gives guidelines about basic knowledge of PLC and the ladder logic operations

C. "CosminaIlles" in his research paper "Water level control system using PLC and Wireless Sensors" in 2013 described water level control system using Siemens 24RL PLC and a pump controlled by electric motor. They have used wireless sensor for level monitoring.

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Block Diagram

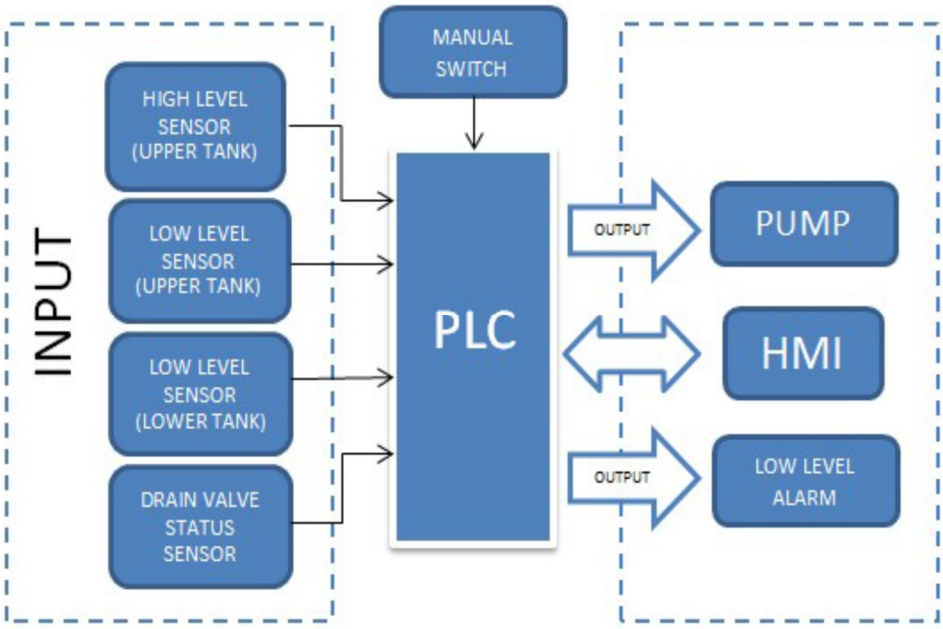


Fig.1 Block Diagram Of System

Block diagram represents the idea of processes that takes place when input is given by using ladder logic to the PLC. Level sensors are used as input to the PLC and according to that reading the PLC will give output by using pump and solenoid valves.

Flowchart

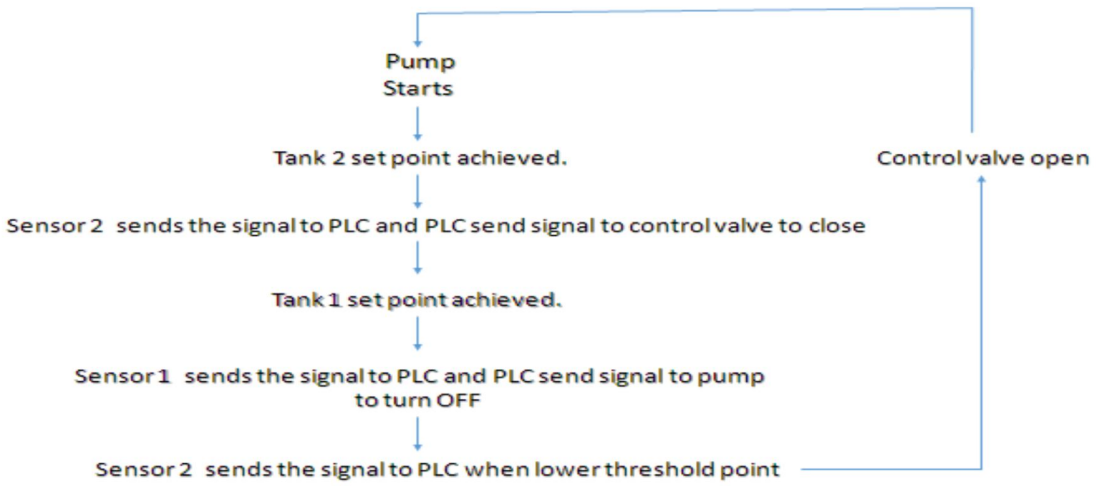


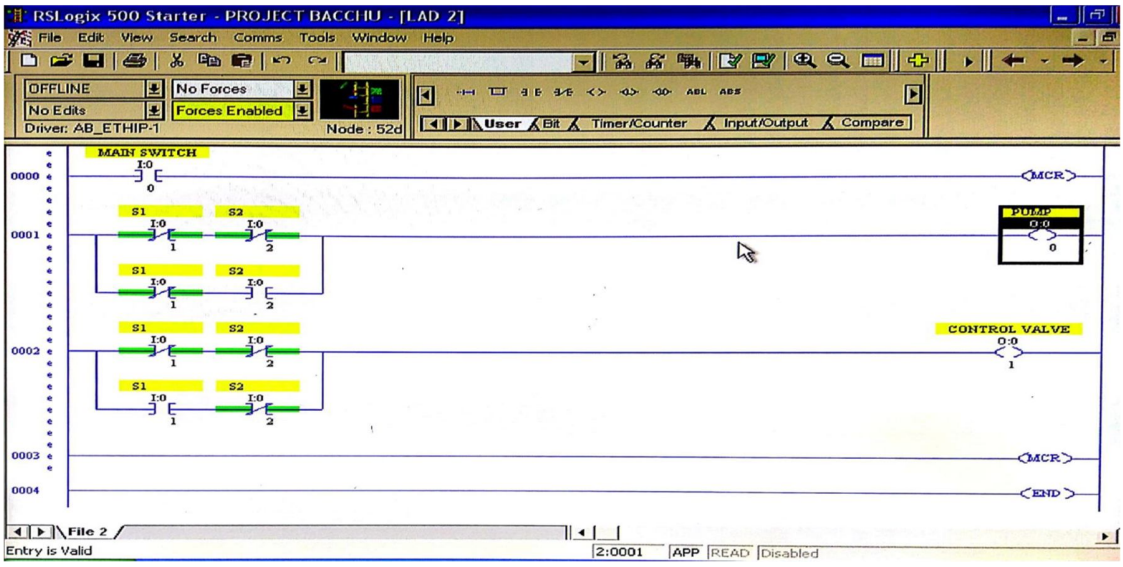
Fig.3 Flowchart

When we switch ON the power supply, pump will start pumping the water in tank 2 through tank 1 and control valve (CV). When upper threshold of tank 2 is achieved then sensor 2 will sense the water level of tank 2. S2 will send the signal to the PLC about upper threshold of tank 2. Now, PLC will send the analog signal to the control valve (CV) to interrupt the liquid flow. Then water will fill the tank 1. When upper threshold of tank 1 is achieved then sensor 1 will sense the water level of tank 1. S1 will send the signal to the PLC about upper threshold of tank 1. PLC will send the analog signal to the pump. Pump will stop pumping water to tank. When water from tank 2 is drained out sensor 2 will sense the lower threshold of water level in tank 2. S2 will send the signal

to the PLC about lower threshold of tank 2. PLC will send the analog signal to the control valve (CV) to let the liquid from tank 1 flow in tank 2. When lower threshold of tank 1 is achieved then sensor 1 will sense the water level of tank 1. S1 will send the signal to the PLC about lower threshold of tank 1. PLC will send the analog signal to the pump. Pump will start pumping water to tank. This operation will take place continuously and required result is obtained .

III. LADDER DAIGRAM

S1 and S2 will be the analog input to PLC. Input module of plc will convert this analog signal into digital signal. CPU of PLC will process this input signal and gives discrete output signal to output module. Output module converts the discrete output signal into analog signal. This analog output will be given to the two outputs of PLC viz. Pump and Control valve to operate moderately.
This would be done by using Ladder Programming in PLC.



IV. SIMULATION AND RESULT

We obtained real time monitoring and controlling of proposed system with the help of PLC system having input signals from floating sensors connected with both the tanks and sending analog signal to pump and solenoid control valve.
Visual representation of system can be obtained with the help of SCADA.

V. FUTURE WORK

To maintain water level at constant height.
To maintain water level at constant height.

VI. ACKNOWLEDGEMENT

We would like to thank our guide Prof.Jagdish H.Pawar of Electrical department for the valuable guidance and constructive suggestions,this helps us in making our project**.**

VII. CONCLUSION

Real time monitoring and visual representation of“Water Tank Level Controller by using PLC”. is obtained by PLC and SCADA which is not possible by other conventional control mechanisms

REFERANCES

[1] Automation of tank level by using PLC and establish of HMI by SCADA by Rishabh das.
[2] “Programmable Logic Controller” article by Kelvin Ericson (associate professor of electrical engineering at university of Missouri)
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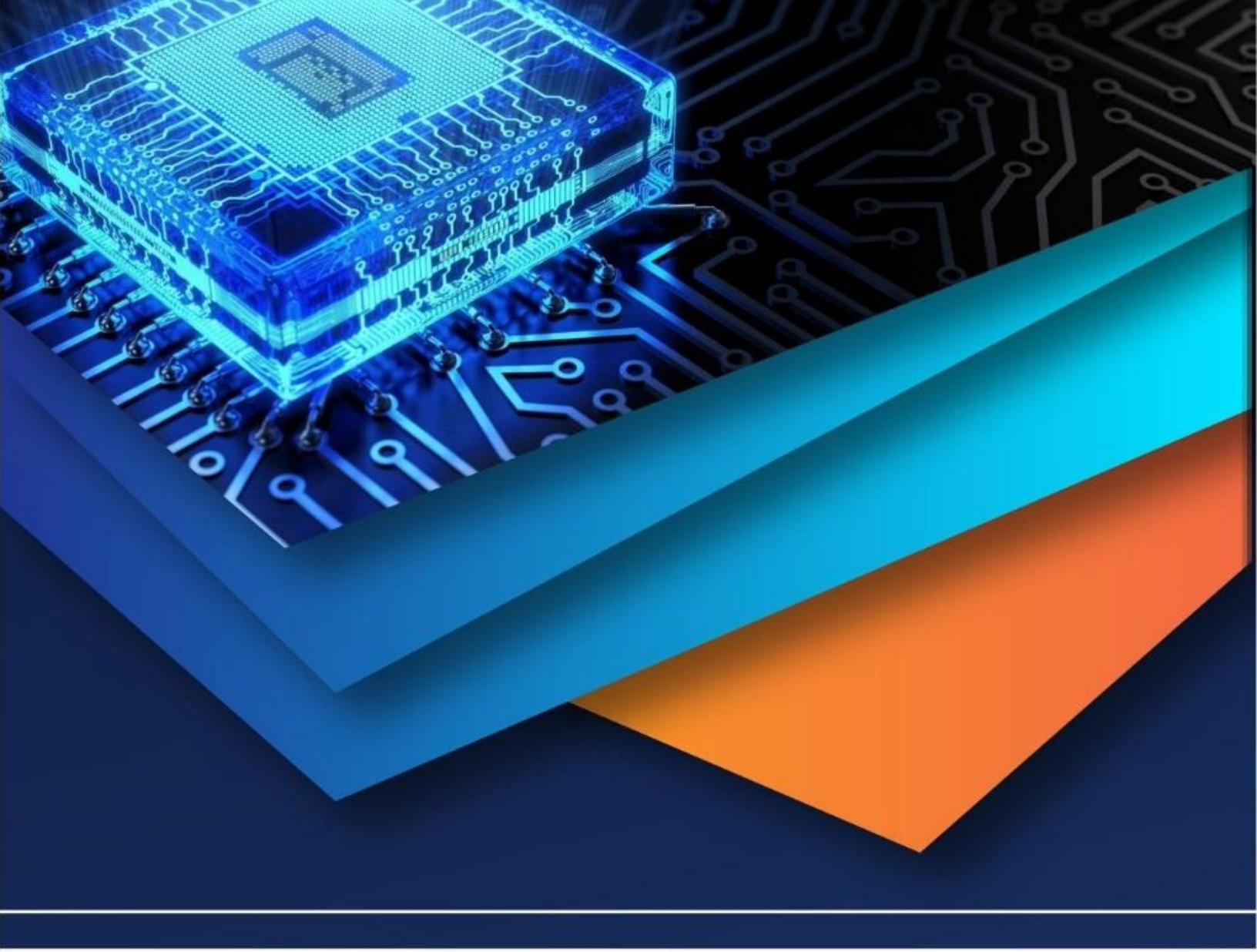

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