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Elevator Operation Control through PLC

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Abstract

Now a day's application of PLC is widely known and used in digital world. PLC's application is applied in many sectors especially in industrial sector. PLC's can also be used for controlling purpose. This has made the production rate to increase and error to decrease. In this project we have designed an elevator controller by using PLC and Scada visualization using "Ladder Logic Programming". Elevator is one of the important aspects in electronics control module in automotive application. With the overall speedy capitalization taking place in all fields the living standard of human being particularly in metros vastly increased as such as industries, malls, hotels etc. Thus the excavations of lift in high rise buildings become an important part of infrastructure for the transportation of human and material. So the control system is to be vital for stability and steady state of lift. It guides the lift in what order to stop at floors, when to close and open the door.

Keywords*: Elevator, PLC, LogixPro, Control System.*

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1. Introduction

As we can see the rapid population growth at the cities and multi-stored buildings, the need of elevators is being increased. With the rising life standards and attention to human and with the technologic developments, elevator systems are getting better, more fast, stronger and better. To control the elevators of any multi storied building/shopping mall etc. Each floor has a button to request upward or downward movement. When the elevator gets multiple requests from different floors it will serve them according to first-come, first-serve basis. The ladder logic is much flexible so that the serving technique can be changed according to the requirement (like nearest-floor-first, floor-having more-people-first etc.). The current floor number will be shown within the lift by a small display. In the traditional system there were few drawbacks and have high failure rate that were mainly due to numerous contacts, complexity of wiring circuit.

2. Methodology

A programmable logic controller (PLC) or programmable controller is an industrial digital computer which has been ruggedized and adapted for the control of manufacturing processes, such as assembly lines, or robotic devices, or any activity that requires high reliability control and ease of programming and process fault diagnosis. They were first developed in the automobile industry to provide flexible, ruggedized and easily programmable controllers to replace hard-wired relays and timers. Since then they have been widely adopted as high-reliability automation controllers suitable for harsh environments. A PLC is an example of a "hard" real-time system since output results must be produced in response to input conditions within a limited time, otherwise unintended operation will result.

The main difference from other computers is that PLCs are armored for severe conditions (such as dust, moisture, heat, cold), and have the facility for extensive input/output (I/O) arrangements. These connect the PLC to sensors and actuators. PLCs read limit switches, analog process variables (such as temperature and pressure), and the positions of complex positioning systems. Some use machine vision [4]. On the actuator side, PLCs operate electric motors, pneumatic or hydraulic cylinders, magnetic relays, solenoids, or analog outputs. The input/output arrangements may be built into a simple PLC, or the PLC may have external I/O modules attached to a computer network that plugs into the PLC.

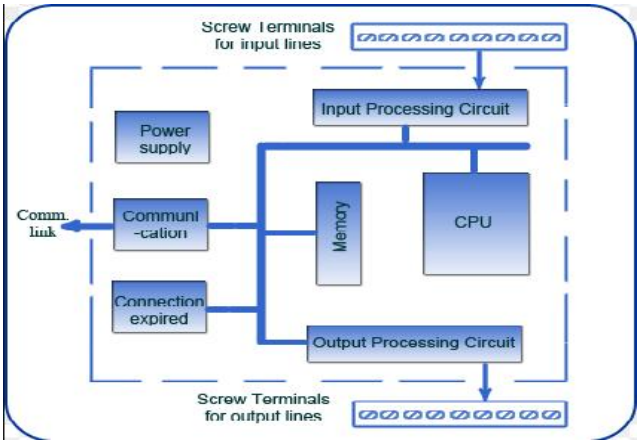

Fig. 1: Block diagram of PLC

3. Implementation

For designing the elevator control circuit the flow chart is designed first for 4 floors.

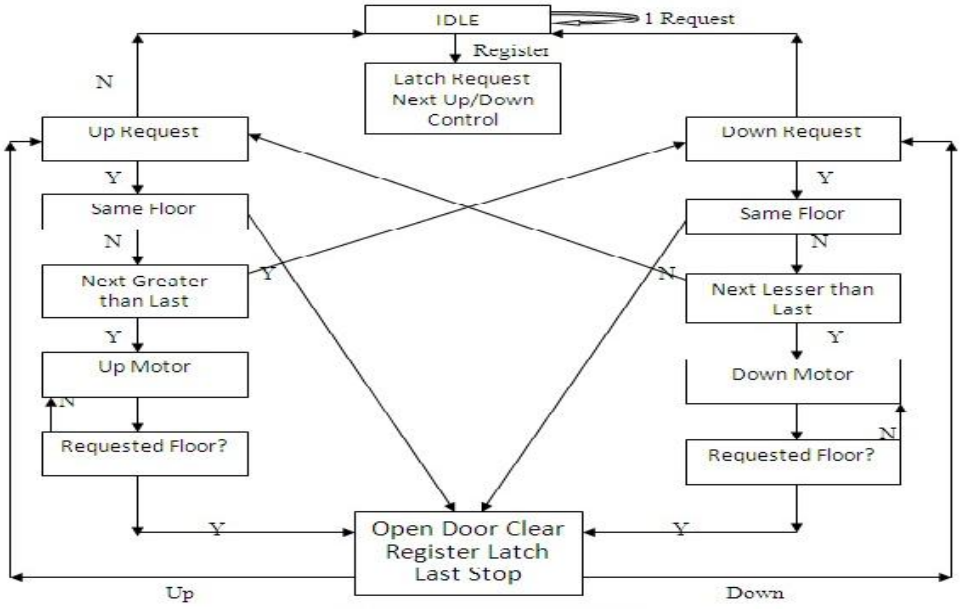

Fig. 2: Flow chart for elevator control

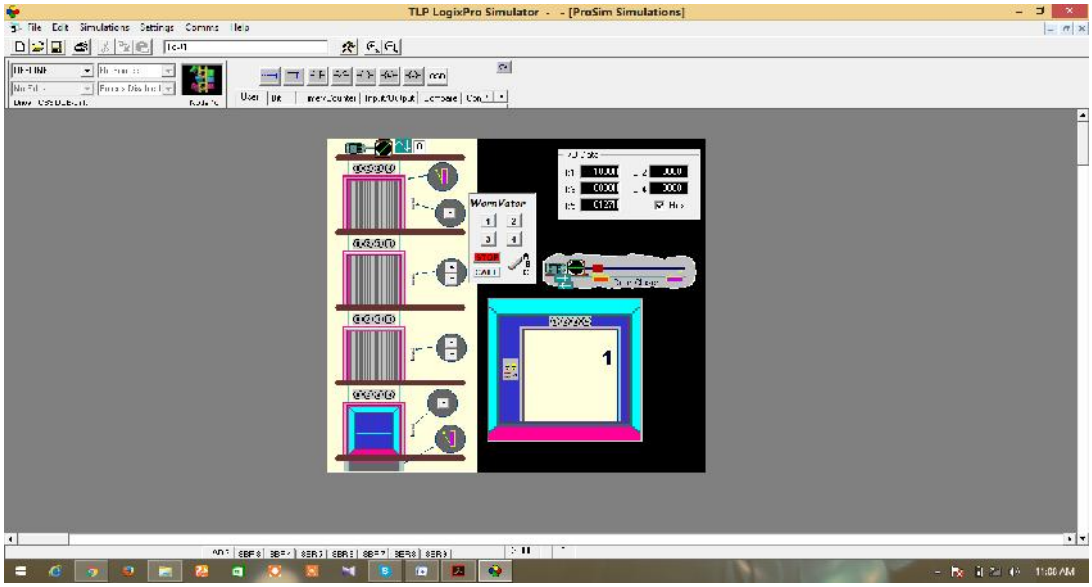

Fig. 3: Elevator control visualization in Logixpro

4. Conclusion

Although some calibrations and requirements may have, the modeling PLC based on elevator control system is done. The traditionally used relays and IC boards have been replaced by PLC for easy and cheap controlling of machines used in this elevator. By developing this proposed system, the result of elevator control system can be applied in the real world. By using PLC based elevator control system, the desired position can be forecasted. The simulation results of the four floors system have been discussed. As a future work, IVC1 1410MAT PLC based elevator model is intended to construct and tested to be applicable in the real world. Here the required inputs and outputs for elevators forward and reverse motoring, door opening and closing motor operation and various sensors present in every floor and at the end of both the door opening and door closing have been included in the logic and the program is interpreted.

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