International Conference on Advances in Materials, Computing and Communication Technologies
In Association withInternational Journal of Scientific Research in Science and Technology
Volume 9 | Issue 1 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X (www.ijsrst.com)

Design and Implementation of Three Floor Lift Using PLC

Deepthi L R, Divya Dharshini J N, Vishwa Bharathi R, Thangam E*
*Department OF EEE, Ramco Institute of Technology, Tamil Nadu, India

ABSTRACT

Elevator control systems use relay logic to operate. Traditional elevator systems have a higher number of relay logic connections, making debugging more difficult. We're using a programmable logic controller to construct a three-level elevator control system. Despite the fact that elevators are not typically operated by PLC, we used it because it is a suitable device in which to explore a variety of PLC features. Industry's main goal is to improve stability, operating speed, reliability, and protection. Contractors and switches are used in industrial automation to replace a variety of equipment. Elevator is a vertical carrying system that is used to move people and goods. Elevators are the most significant necessity for multi-storage buildings. The floor suggestion is regulated by a limit switch. The limit switch is used to keep the floor in place. The elevator filing cabinet is moved by a DC motor. In order to control the elevator in both the upward and downward track, an electromagnetic style relay is used in the organize circuit. Elevators are an important part of infrastructure because they minimize human effort, reduce accidents caused by rope breakage, and increase elevator performance and speed. Elevator control is simple with a PLC.

Keywords: Programmable Logic Controller, Ladder Logic diagram,elevator cabin, limit switch, push button, relay

I. INTRODUCTION

The demand for elevators is increasing as a result of rapid population growth in cities and multi-story buildings. Elevator systems are becoming more useful as human life standards and knowledge rise, and technological advancements are resulting in better, quicker, stronger, and higher-quality elevators being made.Elevator Control System coordinates all aspects of elevator operation, including travel, distance, acceleration, deceleration, door opening speed and delay, levelling, and hall lantern signals.There was no automatic landing placement in the early elevators. Elevator operators used a form of deadman's switch to control the elevators. This form of elevator's controller will usually have a limited number of relays. Some older freight elevators are worked by pulling on adjacent ropes to activate switches. Before the elevator can be used, safety interlocks ensure that the inner and outer doors are locked.

Elevator controllers from the 1990s and earlier are usually Programmable Logic Controllers (PLCs) with interfaces for monitoring, voice synthesisers, and other features. They can be programmed for a single

car, multiple cars, or sized by the number of stops. The controller can also provide a feature that allows for device testing without shutting down the elevator. PLC stands for "programmable logic controller," which is an industrial microcontroller device (in recent years, processors have replaced microcontrollers) with hardware and software tailored to the industrial setting. PLCs (programmable logic controllers) have long served as the backbone of industrial automation. They allow machines to analyse data and collaborate in automated manufacturing and service lines. Elevators are an excellent example of such devices, as the majority of their operations are powered by microprocessors, including PLCs.When the elevator receives several requests from various floors, it will serve them in order of arrival. Also, the ladder logic should be as versatile as possible so that the serving technique can be modified as needed. The dispatching algorithm is one of the most critical aspects of the control system when designing lifts with PLC, and an effective algorithm will minimise the average passenger waiting time to a remarkable average of 25 seconds or less, as well as reduce the lift system's power consumption.

II. COMPARISION BETWEEN TRADITIONAL LIFT AND PLC BASED LIFT

One of the most significant advantages of programmable relays over PLCs has been cost. Micro PLCs, on the other hand, are closing the gap. Micro PLCs are less costly than programmable relays in many applications. They are also not difficult to programme. The same can be said for training. Compared to programmable relays, micro PLCs have the following advantages.

- Adaptability
- Price-to-benefit ratio
- Options for communication
- Operator interface with all the bells and whistles
- Advanced systems are simpler to develop.

Micro PLCs, rather than programmable relays, can provide a more scalable solution. This allows for future growth. Advanced programming and I/O can be conveniently applied to a micro PLC if a processor is updated.Micro PLCs also have features that were previously only available with large PLCs, such as programmable relays. Math calculations, subroutines, and analogue control are among these features. Increased memory, alarms, and diagnostics are all included in this smaller kit, which previously only allowed for the use of programmable relays. Programmable relays, on the other hand, are simpler to specify, and spares are inexpensive.

III. DESIGNMETHODOLOGY AND IMPLEMENTATION

A. PROGRAMMABLE LOGIC CONTROLLER

A Programmable Logic Controller (PLC) is an industrial computer control system that continuously monitors the state of input devices and controls the state of output devices using a custom programme. This type of control system can greatly improve almost any production line, machine operation, or process. The ability to adjust and repeat the procedure or process when gathering and transmitting critical information is the most significant advantage of using a PLC. A PLC framework also has the bonus of being modular. That is, you can mix and match the various types of Input and Output devices to suit your needs.

A PLC is a pre-programmed, ruggedized, digital industrial computer control device that performs automated operations in industrial processes. To complete the task in the manufacturing process or machinery, the PLC continuously tracks and collects information from input devices or sensors, processes the information, and activates the associated output devices.Industrial computers are similar to programmable controllers. PLCs may be used as stand-alone units to control and automate a process or a particular system operation in real time. PLCs can be connected together to manage an entire

manufacturing line. PLCs can be configured to track and manage a wide range of sensors and actuators; they process electrical signals and use them to execute pre-programmed commands in almost any application. In industrial automation, PLCs are used to improve system efficiency, stability, and performance while reducing the need for human operators and the risk of human error.

B. WORKING

The system consists of a limit switch, push button, motor, elevator cabin and indicators (LED). The limit switch is used to sense whether the cabin has reached the specified height. The push buttons are used to call the elevator to the required floor. The indicator indicates whether the elevator has arrived or not to the particular floor. The elevator is designed to transport passengers between three levels. The car is initially on the first floor, indicating that it is at the very beginning of the service. It is not an issue for the software if the elevator is on a different floor from the start. The car will drive in response to signals from call buttons. The elevator car will move to the respective floor at which the button is been pressed.It will move in a power-saving order, meaning that if the car is going in one direction and another call comes in from the opposite direction, it will respond to all calls in the first direction before responding to the second. For example, if the elevator has just risen from floor 1 to floor 3 and there are two more calls to floor 5 and floor 1, it will begin to rise to floor 5.The PLC is in charge of reading inputs like push buttons and sensor signals, as well as sending logic commands to the elevator motor.The elevator motor that raises or lowers the car is operated directly by the elevator drive.

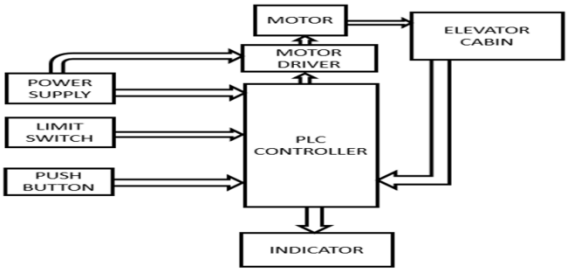

Fig 1. Block Diagram

C. PLC PROGRAMMING

Ladder diagrams are combinations of relay symbols and function blocks that compose programmes using relay symbols as a basis in a picture similar to a hard-wired relay sequence. Ladder logic is a quick and easy way to programme a PLC with logic expressions to automate repetitive computer tasks and sequences. It's used in a wide variety of industrial automation programmes.The 'rung' units are used to construct the ladder diagram software. A rung is a network that is linked to other networks. The rung numbers are a sequence of numbers (decimal number) that must be completed in order. The number of rungs is unrestricted. A single rung can only have 11 lines and 12 columns.

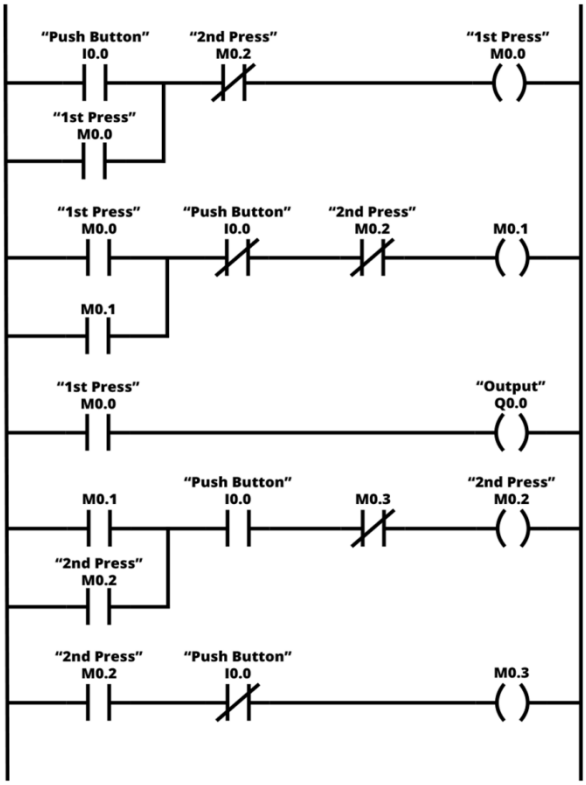

Fig 2. Ladder Logic Diagram

IV. RESULT AND FUTURE SCOPE

Previously, we operated elevators with relays and IC boards. However, owing to its inconvenient nature, it has now been replaced by PLC. Controlling elevator machines with a PLC is easy. The elevator in question is completely automated and operated by a PLC. Control operations such as going forward and

backward, opening and closing doors, and so on are carried out using input signals from the operator and sensors. However, it can provide a good representation of a realistic Elevation Operation. PLC is oftennot commonly used in elevators. Even so, we've used PLC as an elevation process controller because it's a good place to put PLC's maximum power to use.For the future improvement the following work can be implemented

- Using methods like Nearest-Floor-First or Floor-With-More-People-First to save time and power consumption.
- Adding a weight sensor to the lift to set a maximum weight limit for the lift.
- Also, each floor will have a weight sensor to keep track of which floor has the most people.
- To operate it in practice, a weight counterbalancing technique should be used. More protection (such as the sounding of an alarm when the lift's weight exceeds a predetermined maximum level) could be implemented.

V. CONCLUSION

The development of the lift control system algorithm is discussed in this paper. The fuzzy lift control system is used to demonstrate how network construction is dependent on traffic patterns and zoning division. The ladder logics are discussed and contrasted to understand the evolution of the electrical circuitry of the PLC operated lift system.

Elevators are becoming more important in the modern developed world as architecture technology progresses. The design of an elevator-based control system is more important because the whole task is more important. The ladder diagram programming method was chosen because it is simple to programme the various PLCs. The study of the personnel-machine-environment system is carried out to ensure not only worker safety but also the smooth functioning of the machine and the workplace. Future research should concentrate on the implementation of lift control systems and the development of an excellent working atmosphere for their efficient operation, as the current study has done.

VI. REFERENCES

[1]. A M Anusha and Ashok V. Sutagundar, “Design of a PLC Based Elevator Control System”, International Journal on Emerging Technologies (Special Issue on NCRIET-2015) 6(2): 32-36(2015).

[2]. Abdelkarim Ahmed Eltahir Ali, Zhang Jiang Min, “Design of Five Floors Elevator with SCADA System Based onS7200 PLC”, International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 Index Copernicus Value (2013): 6.14 | Impact Factor (2015): 6.391 Volume 5 Issue 4, April 2016 www.ijsr.net.

[3]. T.Y.Ladakhi et.al, “Application of PLC for Elevator Control System”, International Symposium on Devices MEMS, Intelligent Systems & Communication (ISDMISC) 2011 Proceedings published by International Journal of Computer Applications (IJCA).

[4]. Sandar Htay , Su Su Yi Mon, “Implementation Of PLC Based Elevator Control System”, International Journal of Electronics and Computer Science Engineering- ISSN- 2277-1956 www.ijecse.org

[5]. Yelpokonde Atikesh et.al., “Elevator Control System By Using PLC”, IJARIIE-ISSN(O)-2395-4396 Vol-2 Issue-3 2016 www.ijariie.com.