

# Emergence of Nano-PLCs in Vending Machines

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**Abstract**--Modern world is technology driven. Ironically, automation, led by us has reached beyond the human imagination. Be it food and processing industry or military application, instrumentation engineering has been proved more than useful in solving the problems as well as easing the hither to used systems. PLCs have been integral in the increasing dependence on automation. Yet with the advent of nanotechnology, it was feared that the PLCs will become obsolete. But the user-friendly modifications have led to nothing but an increase in the use of PLCs in modern industries. Following paper focuses on one such application of beverage vending machine using Nano-PLC, a miniature version of the traditional PLC. Being first of its kind, this paper mainly focuses on the theories rather than other citations and references.

**Keywords:** Vending Machine, Nano-PLC, HMI

## I. INTRODUCTION

A vending machine is a machine which dispenses items such as snacks, beverages, alcohol, cigarettes, lottery tickets, cologne, consumer products and even gold and gems to customers automatically, after the customer inserts currency or credit into the machine. [1] Today, vending machines are used almost everywhere across the globe for vending chocolates, gold bars, newspapers and what have you.

Commodity to be served			
1	Tea/ Coffee	7	Colognes
2	Milk Bottles	8	Food Packets
3	Chocolates/ Candies	9	Lottery Tickets
4	Newspapers	10	CDs/ DVDs
5	Ice-creams	11	Cigarettes
6	Soft drinks	12	Bicycle Tubes

Table. 1: Various types of vending machines

In their early days, vending machines were made using microcontrollers and PLCs. With microcontrollers in the picture, vending machines soon became simpler to construct and easy to operate.

## II. HISTORY OF VENDING MACHINE

Vending machines date back to 3rd century BC in Greece, wherein the Hero of Alexandra used it for the first time to dispense Holy Water. Of course the modern machines are nowhere similar in terms of working or the methods used, but the principle do remain the same, making the task of serving easier.

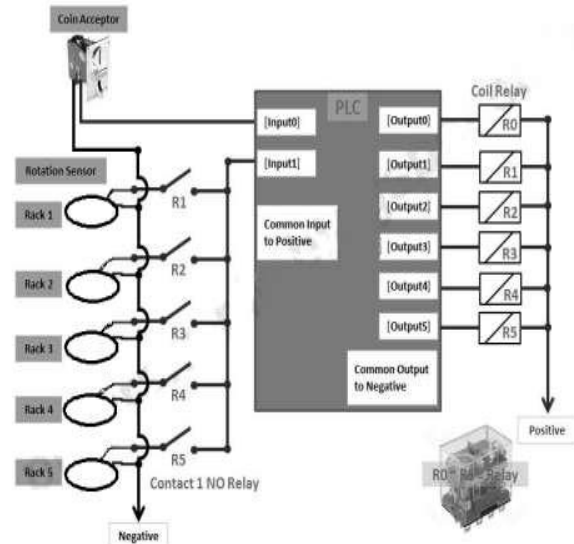


Fig. 1: Vending machine using a PLC.

## III. HISTORY OF PLCs-

PLCs were used to control multiple input-outputs simultaneously. But with digitization, advent of internet and increase in the communication field, it became difficult to cope up with all the requirements while maintaining the small size. And therefore, it had been forecasted that PLCs will lose their charm soon.

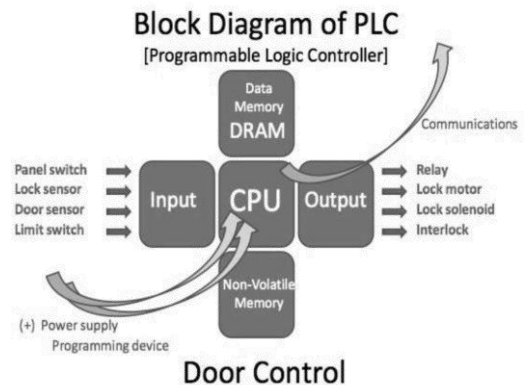


Fig. 2: Block diagram of a PLC

But lo and behold came the Nano-PLCs with its small size and similar functionality making sure that PLCs are in for the long run. Size and cost of traditional PLCs mattered the most in applications like vending machines, washing machines and other OEMs (Original Equipment Manufacturers).

## IV. CHARACTERISTICS OF NANO PLCs

Traditional PLCs can control over 500 devices simultaneously at a cost of high price and large size. That is

why, Nano PLCs have reduced capacity of 14-30 devices and Ethernet ports, making them compact and feasible for small scale and cost efficient processes. These Nano PLCs have enhanced memory compared to earlier versions of these CPUs. Firmware versions 4.00 and later cannot be used with the earlier hardware versions. [2]

#### V. CONCLUSION

On the basis of the above research, we can tell that Nano-PLCs have become an important component of vending machines. Only time can tell whether this dependence will increase with time or will be superseded by another piece of technology.

#### REFERENCES

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