



AUTOMATIC HAND SANITIZER PRODUCTION USING PLC

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Abstract-Hand sanitizer is a supplement or alternative to hand washing with soap and water. Today's world is infected by various type Of disease. Because of that every person need to protect ourself from the bacterial and viral disease. So every person need to clean our hand by soap, powder or by sanitizer and live disease free life.This ethanolic extract in combination with glycerin and absolute ethanol were used for the final preparation.

1. INTRODUCTION

Hand sanitizer is alcohol-based or alcohol-free liquid, which is used for cleaning the hands to maintain the personal hygiene and to decrease the risk of infectious disease by killing germs present on the hands. It typically came in the liquid, gel or in foam form and recommended to use when soap and water is not available to wash the hands. Hand sanitizers are now being used on a daily basis in the schools, hospitals, supermarkets, and public places to disinfect the hands and to kill the germs.

The alcohol-based hand sanitizers contain 60% to 95% alcohols to kill the bacteria and viruses present on the hand.

The hand sanitizer production line has hand sanitizer mixer, mixing preparation pot, working platform, control panels and essential pipes, valves and filters.

Hand Sanitizer Market size is projected to cross \$2 billion by 2025, growing at a CAGR of 7.8% during the forecast period 2020-2025. Hand Sanitizer is an antiseptic disinfectant available in the form of a liquid, gel, foam and many others. It is said to be more effective than soaps due to its ability to eliminate most microorganisms. Public awareness campaigns by global health authorities such as the WHO (World Health Organization) also play a significant role in promoting the use of hand sanitizers.

Increasing consumer awareness about hygiene coupled with such government initiatives are driving the hand sanitizer market. On the other hand, the Automation Process for Mixing these Chemicals for mass production of Sanitizer also plays important role in terms of Quality and

quantity of the Products. In the past few years, after the Industrial revolution industries have adopted several automated machines for its purpose. In our project it is done by Programmable Logic Controller (PLC) and SCADA. This work will provide low operational cost, low power consumption, accuracy and flexibility to the system and at the same time it will provide accurate volume of liquid in bottle by saving operational time. The system sequence of operation is being designed by ladder diagram. Automating repetitive tasks in the industries increases the productivity. It reduces the probability of error and maintains product quality.

Traditional methods of mixing fixed quantities of different types of liquids and filling them in bottles involve manual mixing of the constituent components based on measurements and bottling of the mixture as desired. Manual handling of such tasks is time consuming expensive and often lack consistency in product quality due to human errors. A Laboratory Prototype of a Programmable Logic Controller (PLC) based automated liquid mixing and bottle filling system is designed to automate the control and mixing of two different liquids in predefined proportion and filling the generated mixture in bottles to achieve quality control reduce human intervention and improve productivity. The main goal of proposed system is to adopt automation in the mixing industries like

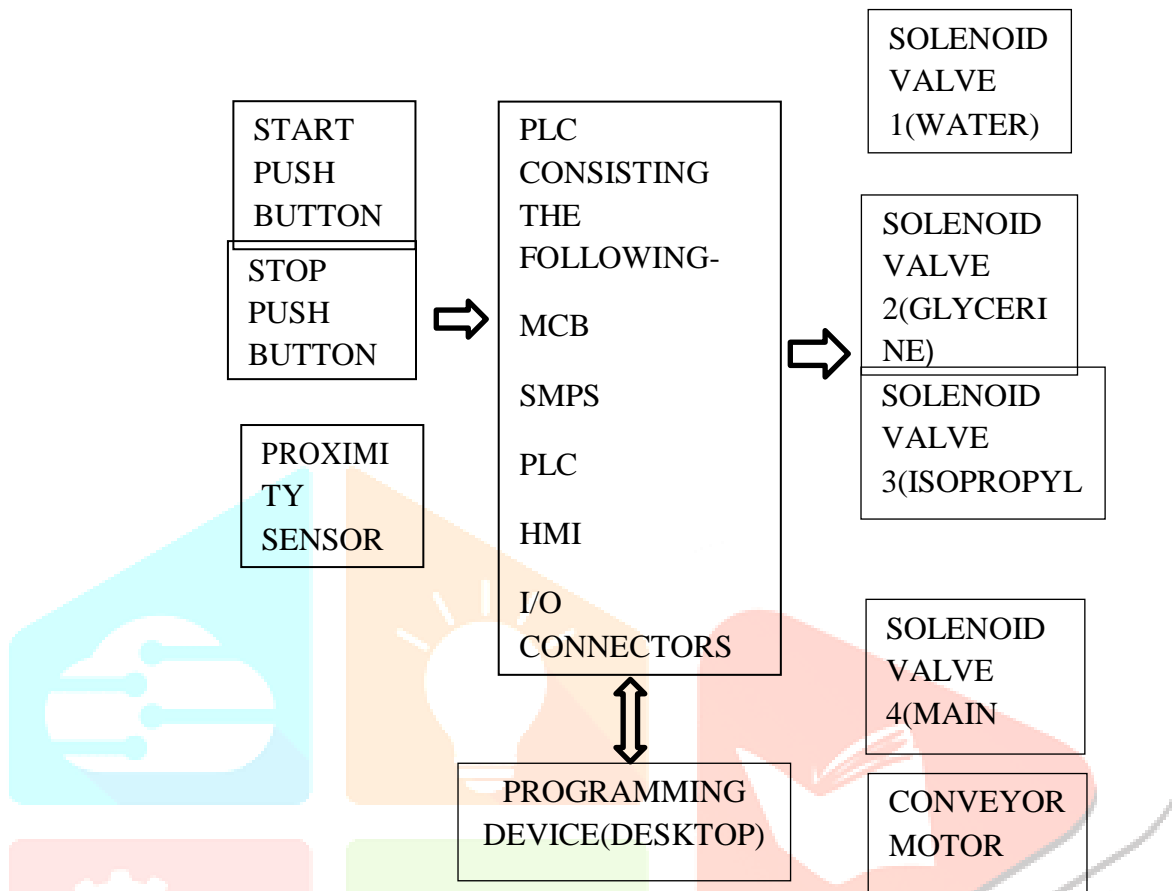
medicinal syrup manufacturing industries, colour mixing, and food industry.

2. LITERATURE SURVEY

The above project idea is totally new in the current market. As the basic process idea is old one ie. batch process for liquid mixing and bottles filling using plc. so while taking current situation of corona into consideration we have designed such prototype for production of hand sanitizer. Some research study related to the mixing and filling process in industries with different methods are describe below.

In some industry used capacitive sensor for sensing the bottle depending on output of sensor the bottle filling process is takes place. But the problem that exist in present system are that it can fill only a particular type of container of certain height and filling amount is set by operator. Previous systems are not only flexible for different liquid mixing but also for filling of different size of bottle. So from above literature survey it is observed that their is need of automation in liquid mixing and bottle filling. Our proposed model mainly consist of allen bradely micrologix 1400 plc based automatic sanitizer production. This is done by extending the existing system ie liquid mixing to the sanitizer production. So with the help of plc human interference will be less and ultimately reduction in overall cost takes place. Proposed model is very useful in future point of view.

3. METHODOLOGY



- When Start Push Button is pressed, Tank A (Ethanol) starts dispensing the Ethanol for 3 Mins into the Main Tank.
- Tank B (Isopropyl) for 2 Mins into Main Tank.
- Tank C (Glycerine) for 30 seconds into Main Tank
- Tank D (Water) for 3 mins into Main Tank.
 - Once all the chemicals are received through the Tank A,B,C, D, the Stirrer Motor in the Main Tank turns ON immediately for 2 Mins.
- Once the Sanitizer is ready in Main Tank, Conveyor starts running with empty CANS / Bottles.
- When Capacitive Proximity Sensor senses the presence of the Bottle/CAN, it stops the Conveyors and starts the Dispensing of

Main Tank which stays ON for next 2 Mins and stops the filling process and starts the Conveyor again.

- The Process keeps repeating until we stop it using a Stop Switch.

- List of Components-

- A) PLC Panel
- B) Solenoid Valves (Total 5)
- C) Stirrer / Blender Motor

A) PLC Panel : PLC stands for a programmable logic controller and they are extremely efficient. These PLC control panel systems make it simpler to maintain systems and can decrease the cost.

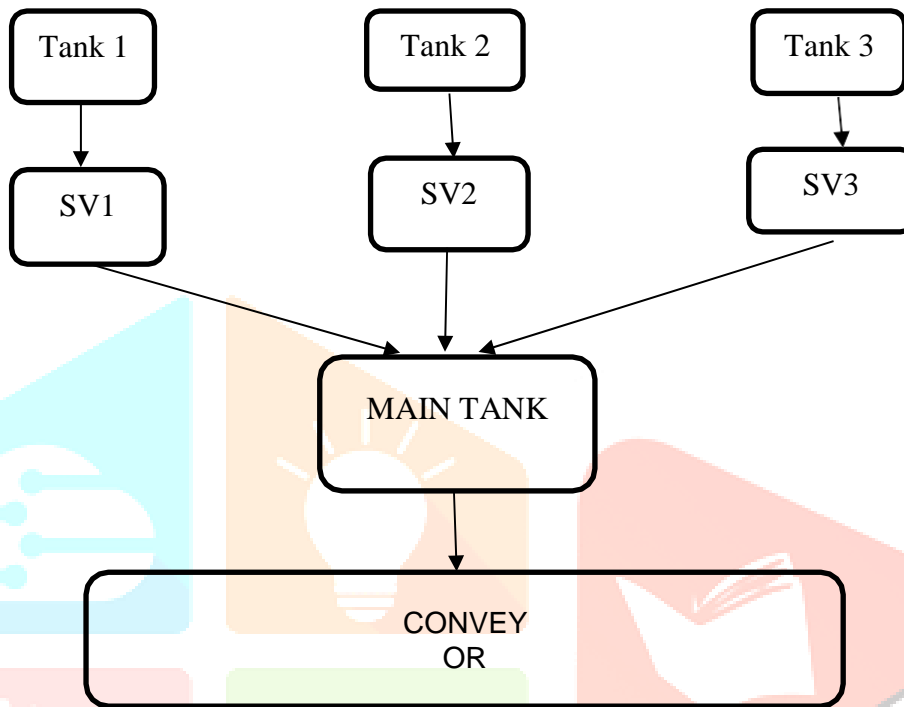
B) Solenoid valves :- It consist of a coil, plunger and sleeve assembly Once the solenoid coil is energised, the resultant magnetic field raises the plunger, enabling

flow. When the solenoid coil is energised in a normally open valve, the plunger seals off the orifice, which in turn prevents flow.

C) Stirrer/Blender Motor :- The motor of a blender is generally quite basic, being a

small air cooled electric motor situated in the housing of the blender unit. The motor is situated so that when it is in operation, it causes a small vertical coupler shaft to spin at a high speed

• General Arrangement Diagram-



• Functions each Part:

- 1) PLC- Allen Bradley Micrologix 1400 (Datasheet added separately)
- 2) MCB- 6A Double Pole – Used for Over Current, Short Circuit Protection
- 3) SMPS- 3A 24v DC- Converts 230V AC to 24V DC
- 4) Relay Board- 8 Channel 24V DC Operated Coil Voltage
Relays are used for ease of Switching of any load
- 5) Wires- 0.5mm Dia polycab Wire- To carry upto 300mA Current
- 6) Terminal Blocks- Connectors for external Devices
- 7) Hardware stand- Mild Steel Made in 2 Inch Angle Frame

- 8) Tanks- High Quality Plastic plus Polycarbonate material- To store Fluid Chemicals (Raw Material)
- 9) Pipe- R.O. Pipe with 4mm Diameter
- 10) Solenoid Valve- 24V DC Operated digital valve
- 11) Conveyor Structure- Mild Steel Frame with Rubber Belt with Vertical alignment for better grip
- 12) Conveyor Motor- 24V DC Motor with 5 KG Torque, 30 RPM

CONCLUSION

In conclusion, hand sanitizer was produced to solve the problems faced from the action of germs, bacterial and viral infections. It can quickly reduce the number of microbes on hand. The use of alcohol hand sanitizer enhance hand hygiene programs due to their ease and

convenience of using in conjunction with plain or antimicrobial soaps and water thereby increasing hand hygiene compliance level.

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