



A Study of Mechanical Automation System for Applying at Serunding Machine

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Abstract: This thesis problem statements about the serunding production until now still doing in half manual and half automatic method or fully manual method and time consumption is taking too long along with the increasing the labor cost and energy. The objective of this research is the development and implementation of a mechanical automated system for applying serunding, a traditional Malaysian meat floss, at a serunding machine. by using Programmable Logic Controller (PLC) and to study the simulation process of serunding production. Moreover, the scope of study is using a PLC system including timer and counter. Additionally, using software automation studio and CX programmer to make the automation system input and output data. The significance of study in this project is about Development of Mechanical Automation System for Serunding Machine is hoped to get make the Serunding Machine can run smoothly using PLC and to get less production time, production cost and labor cost when making the Serunding.

Keywords: PLC, Simulation, Serunding

1. Introduction

It is critical to have a control system for the manufacturing process in serunding production. The key issue is determining how to manufacture the serunding owing to high demand yet low energy use. The goal of this research is to transition the serunding manufacturing process from manual to automation. The method that our senior used on that project was analysis data production time against automatic and manual stamping process to get the average time taken. The test was repeated about 6 times to make the accuracy of time taken is better [1].

It is built with comprehensive automation technology, including a PLC (Programmable Logic Controller) and HMI interface, as well as input and output power wire and control wiring. The Automation Studio program is used to wire the panel.

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On its screen, there is an emergency power cut switch that is not physically present on the control panel. In this system, each component serves a role. The output mode of operation is controlled via relays. The SMPS (Switch Mode Power Supply) acts as a rectifier, converting AC current to DC current [2]. The elevator is commonly used in many industrial and sector places such as shopping malls, car shops, towers and others. So, the importance of making the control system elevator is much higher that will make a higher profit and benefits to our local citizen to inspire and use the elevator with the control system [3]. From other research, Arduino UNO was used as a microcontroller (main system). The HC-SR04 ultrasonic sensor is used as a distance detector to operate automated faucets and showers, and an LDR sensor is used as an item detector that enters the closet. They used a limit switch instead of a PIR sensor to incorporate automated lights [4] Other than that, previous researcher made the control system for home security using Raspberry Pi. Its function is to make a motion detection program that detects if other people move in front or on selected area of the program. the control system that has been built in project was included password code door lock, live CCTV surveillance system and motion detection system. [5] Lastly, Other research made the PLC was used as main function to detect weight of vehicle as an input to response give a response to toll to open the gate as the input was reached the specific weight. While if the input is lower than specific weight, the toll is remaining closed gate. Other than that, SCADA as second function to display a congestion and diversion in a city of target that place a PLC system. [6]

In Summary, literature review provides the strong evidence that the automation system for serunding still not implemented or created.

2. Materials and Methods

In this section, all the steps to create the mechanical automated system for applying to serunding machine will be presented. The goal of this chapter is to explain the methods being used while making the project as shown in Figure 1. This section will be separated into several sections to discuss the sub-systems independently.

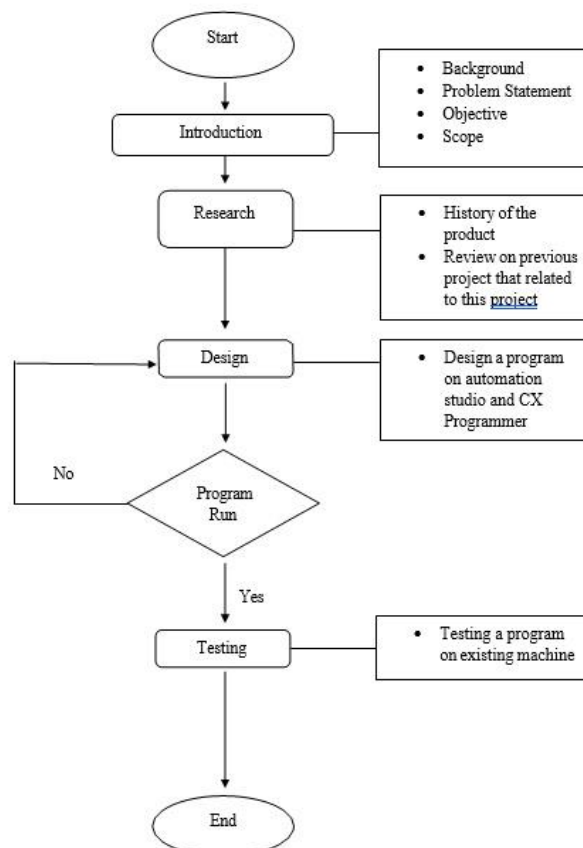


Figure 1: Flow chart of the project

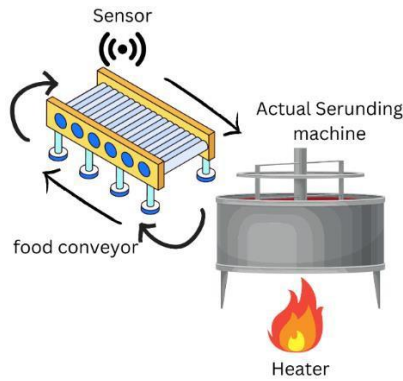


Figure 2: Schematic Diagram for Automation Process

2.1 CX Programmer

To create a programme or ladder diagram, CX-Programmer software was utilised. The program was transferred from a computer to Programmable Logic Controller (PLC). CX Programmer is the software for every Omron's PLC series, that contains a plethora of options to help us to create a PLC programmer faster.

2.2 PLC

A programmable logic controller (PLC) is a tiny, modular solid-state computer that can be programmed to execute a specific task. PLCs, which are utilised in a wide range of industrial control systems (ICS), have essentially supplanted mechanical relays, drum sequencers, and cam timers. PLCs are valuable instruments for repetitive operations since they have no mechanical components and can gather data. Each central processing unit (CPU) continuously loops through an input scan, programme scan, output scan, and housekeeping mode, completing a single job while monitoring conditions. The information gathered by the controller may be utilised as feedback to lead desired modifications and improvements to processes, some of which can be executed automatically based on the device's coding.

2.3 Automation Studio

An automation system is a collection of sensors, controllers, and actuators that work together to complete a task with little or no human interaction. This subject is focused on Mechatronics, which is an interdisciplinary discipline of engineering that blends mechanical, electrical, and electronic systems. The majority of automation systems are generated from manual procedures such as drilling, cutting, welding, and so on. These systems employ robotic arms to control the movement of the tool that performs the original function. Other applications, notably in the field of process control, employ automation to monitor and regulate process parameters. This is accomplished by modifying the functioning of equipment such as heaters, motors, pumps, and compressors, or by opening or isolating process lines via control valves. Automation systems come in a variety of configurations, even for a single purpose.

3. Results and Discussion

The goal of designing machine layout development is to minimize waste, maximize efficiency, enhance productivity, and create a safe and ergonomic working environment. It involves careful consideration of the interactions between different components and the workflow of operators or automated systems to achieve optimal performance.

3.1 Electrical Diagram

In Automation Studio, an electrical diagram (Figure 3) typically consists of symbols representing various electrical devices, such as sensors, actuators, relays, motors, and power supplies. These symbols are interconnected with lines to indicate the flow of electrical signals or power between components. Additionally, the diagram may include labels, annotations, and text to provide additional information and clarify the connections.

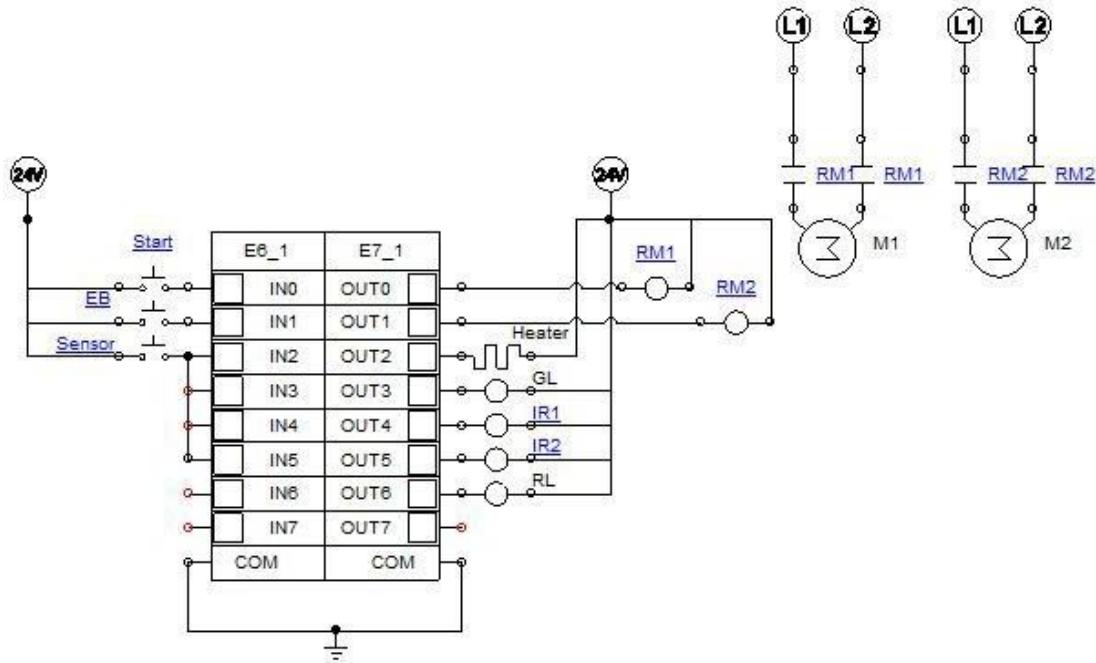


Figure 3: Electrical Diagram

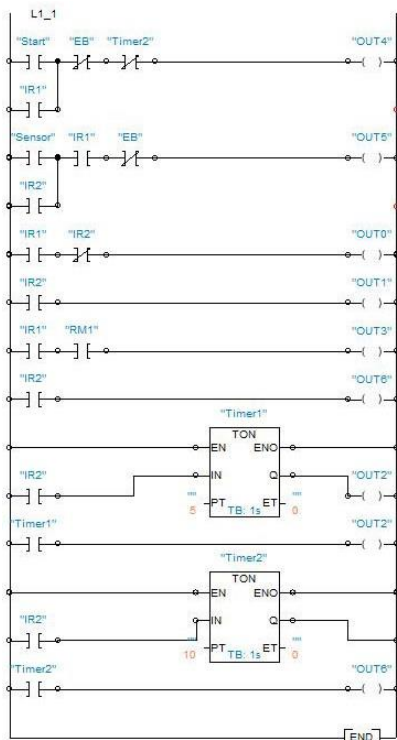


Figure 4: Ladder Diagram

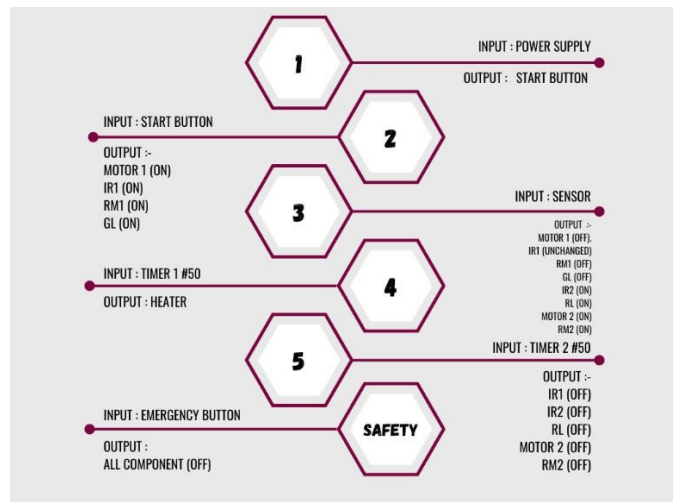


Figure 5: Motion Diagram

4. Conclusion

As a conclusion, this project focus on to make changes from manual process in the beginning of serunding production to fully automation process as the first objective target. For second objective target, this project designs the automation system using PLC with connect to the main switch of the machine to make the whole system on the process become automatic process make the production become stable and faster production. The new mechanism added to the automation system, the conveyor as the automatic machine that acts as a first machine to bring the ingredient of the serunding go to the actual serunding machine with the PLC guidance makes the earlier process become controlled smoothly.

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