PLC BASED AUTOMATION IN CONVEYOR BELT WITH OBJECT SEPARATION

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ABSTRACT

Today's world is extremely competitive. In this scenario, rapidly evolving technology is largely to blame. The country with the most advanced technology dominates the world. Technology is critical to surviving in the competition. Industry has a significant impact on a country's economy. There must be some product manufacturing where there is industry. Industry needs to increase its technological capabilities in order to produce better product. Industry requires a great deal of automation. This product is transported from one station to another using a conveyor belt. It is a crucial tool in an industry's manufacturing line. The articles can be separated into metal and non –metal categories on a conveyor belt. A product will be required to fulfill these requirements.

INTRODUCTION

Conveyor belt system are now widely used as item separators in power plants, cement plants, food processing plant,and manufacturing plants, among other places. Conveyor belt are an extreme and widely used option in the great majority of assembly mechanical applications where complete sequential construction system computerization is required, such as synthetic businesses, packing plants, food preparation and bundling industrial facilities. The entire process, from creation through sorting good for bundling, takes place on a single conveyor belt, with procedures taking place in the center of the belt as it moves. Determining the constant and extremely precise properties of small things ina fast-moving stream would offer up new avenues for industrial arranging operation. Metal-based item separator.

Objective

A conveyor system's primary function is to transport things from one area to another. The plan permits protests that areexcessively huge or bulky for people to covey by hand to be moved. When delivering product from one area to another,conveyor system save time. Whose classification is solely based on the quantity factor (metal non-metal). In the event of a low- production –rate industry, manual labor is usually sufficient. Event so, making an exact measurement throughout the production is impossible. The quantity of any product, whether it is a fruit, a pen, or any other object, is a key component in determining the economy's growth and financial health. The focus of this paper is on metal and non-metal object.

LITERATURE SURVEYS

Industrial automation and robots are critical to industry growth. The quality and adaptability of the product are themost important requirements in the sector. Robots were utilized in the 1980s to undertake operation that did not requirehigh accuracy, such as machine tending, material transfer, panting, and welding. Industrial robots would become increasingly important in applications that need high precision and accuracy, according to a prediction made in the 1990s. Autonomous robots with sensors are utilized to improve product accuracy and precision, resulting in increased industry growth. To attain this level of precision, robots are trained to do a single task: collecting sensory data. Industrial sorting operation could take on new paths if small objects in a fast –flowing stream could be identified in real time and with great accuracy.

METHODOLOGY

Before beginning the project, the first step was to assess the project scope and research topic. The next step was to design the mechanical framework of the conveyor belt that would be constructed. After that, once all of the design had been finalized the hardware and circuitry were implemented. The programming segment, which occurred toward the finish of the venture, was explicitly for the sensor input, detecting interaction and result to the servo motor in the punching system. Last but not least, changes to the hardware and software were made to improve the system's abilityto conduct finer movements. As a result, while the system was performing its task, troubleshooting took place tocorrect certain faulty processes.

FIGURE AND TABLE

Block Diagram

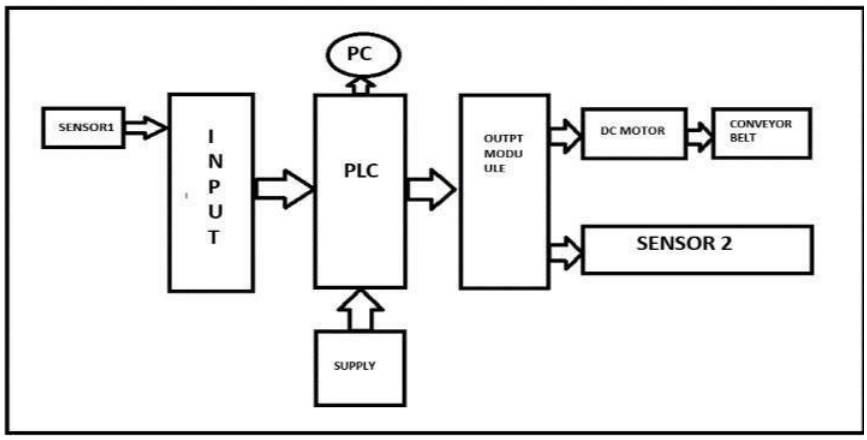
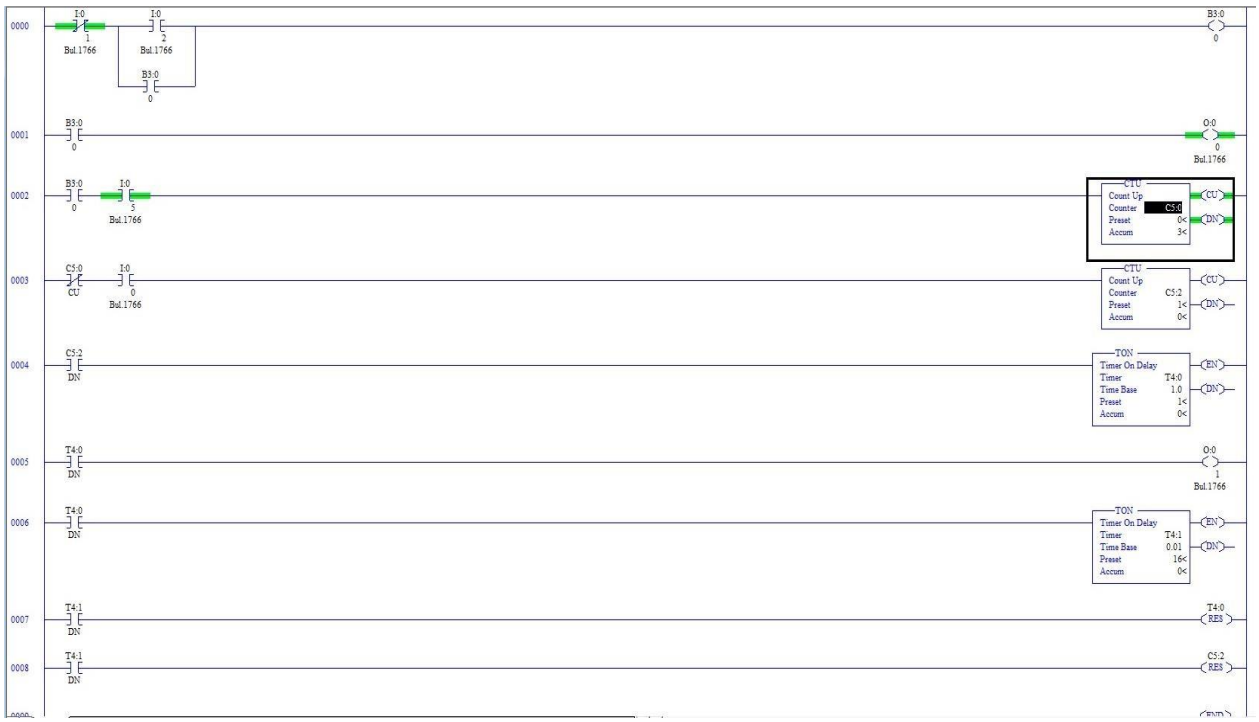


Fig 4.1 shows the block diagram of PLC Based automation in Conveyor Belt With object Separator . Here we canused input or output module wia PlC connection for the operation of the conveyor belt aslo object separation and detection .
Fig show's that sensor 1 connnect to PLC wia input module it gives to I/P command to the PLC .
PLC connect to the input ac supply between that we can used SMPS for convertion of 230v ac supply to 24v DC by using SMPS we can convert the required 24v supply to the PLC also they connect to the PC for interfacing the program to the PLC by using the PLC RX LOGIX 500 software we can interfaced or store the program in PLC unit.

Block diagram shows that Output module connect to the 12v DC motor for running of the conveyor Belt . After givinginput(START)command to the PlC output motor 1 started roataing .

PLC Program



Need of the system

A Conveyor system is a type of mechanical handling equipment that transports things from one place to another. Conveyor systems are widely used in the mechanical handling and packaging sectors because theyallow for speedy and effective delivery of a widerange of products. However, we need to count them over aperiod of time, thus each object will appear in multiple frames. As a result, we must count each and every item. The entire system is easier to maintain due to the lack of duplication and singularity of purpose of theindividual components. As a result of the greater maintainability, the system becomes more stable.

Cost

SR. NO	PARAMETER NAME	RATE	QUANTITY	TOTAL
1.	Conveyor Belt	250	1	250
2.	Ply wood sheet	800	1	800
3.	DC Motor	200	2	400
4.	Pully	50	2	100
5.	LCD Display	220	1	220

6.	Allen Bradley PLC		1	
7.	SMPS	900	1	900
8.	Push Button	70	2	140
9.	Connecting Points	10	6	60
10.	Proximity Sensor	1150	1	1150
11.	Nut Bolts	80		80
12.	Screw	40		40
13.	Bending And DrillingCharge	200	-	200
14.	Travelling Charge	1800	-	1800
15.	Connecting Wires	50	-	100
16.	Belt Joining Charge	150	-	150

Table 4.4. Costing

FACTORS IN THE DESIGN

The following criteria are taken into account when designing the project

- Material strength, belt elasticity, sorting time and length
- The motors speed
- Consumption of energy
- The objects maximum size

Mechanism for pushing object

Exchanging the slider unit after preparing a unit off line can shorten the time necessary for mode changeover for simple automation devices or fixtures made compatible with many models by connecting a processing unit to the slider unit.

What is slider crank mechanism and how do I use it?

A four link mechanism with three revolute joints and one prismatic, or sliding, joint is known as a slider crank linkage. The linear movement of the slider is driven by the rotation of the crank, or the rotation of

the crank can be driven by the expansion of gases against a sliding piston in a cylinder. A quick return mechanism is what it's called. Create a mechanism with a slider and a crank.

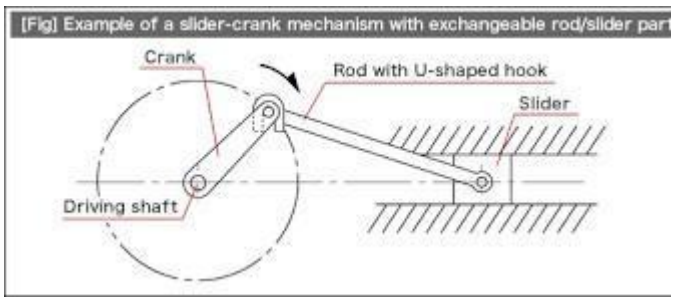


Fig 4.2 Slider mechanism

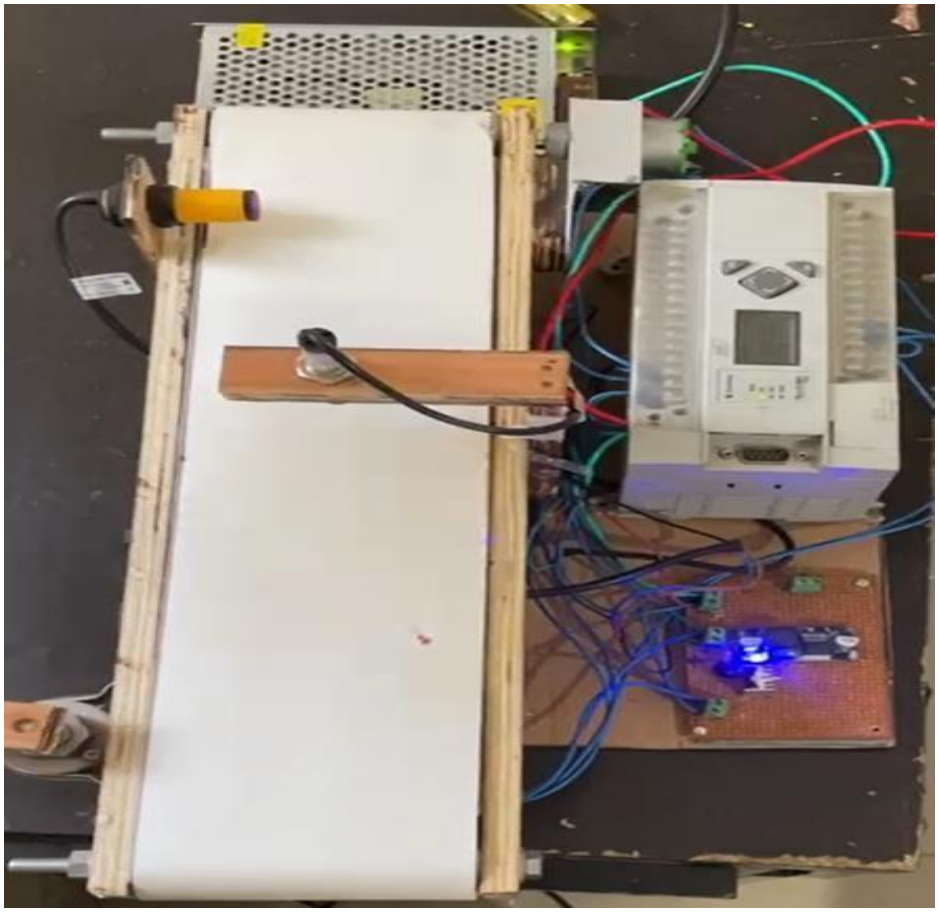


Fig 4.3 picture of project

Advantage:

- There is less time and people necessary to short the product.
- Because the entire system is automated, there is a lower risk of error.
- It has the potential to lower inspection costs. It has the potential to raise the percentage of high quality products.
- Conveyor belts can handle large products at low cost in a hazardous environment, and the systemsinstallation and operating costs are quite low. A s a result it is incredibly cost-effective

Disadvantages:

- For small-scale industries, it is too expensive
- Because the segregation method is time based, it necessitates frequent monitoring.
- PLCs are type of proprietary gadget.

FUTURE PROSPECTS:

Object detection technology future is still being proven, a like the initial Industrial Revolution. It can possibly alleviate individuals from common place undertakings that machines can perform all the more proficiently and actually. Many other downstream computer vision tasks, including as instance, segmentation, image captioning, object tracking, and more are built on top of it. Pedestrian detection, people counting, face detection, text detection, pose detection, and number plate identification are examples of specific object detection applications.

FUTURE DEVELOPMENT:

- In the absence of mains, an extra power source can be included.
- The mechanical structure is limited by the limited motor power, and a heavy construction can be obtained by increasing power for a smarter look and more effective power.
- Taking extra precautions to protect sensitive gadgets from harmful emissions can help sensitivities.
- Sorting by any dimension can be done with a little tweaking.
- Sorting can be done more accurately if the sensor quality is improved.
- By reducing the time delay, the procedure can be made faster.

CONCLUSION:

We aimed to design a setup that would reduce human efforts in this project report, and we succeeded to some extent by employing the low cost automation system (LAC) to prevent risk, enhance accuracy, raise production speed, and reduce cycle time. Because of the practical challenges in programming the project according to the availability of materials and components, there will be limitations. This configuration can be needed even further to create sorting mechanism that sorts the things based on additional physical factors.The many sensors can be used to do this. It can be used in industry to sort a variety of objects and tools witha high degree of accuracy and quality using automation.

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