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MODEL OF THE AUTOMATED SYSTEM OF DETAILS SORTING

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Relevance of Project. Conveyor sorting systems are material handling technologies designed to increase the efficiency and accuracy of manufacturing and shipping operations. Industry professionals use them to separate products from in-feed conveyor lines and direct them to shipping, palletizing, packaging, and other processing stations. They are suitable for use with a wide range of items, varying in size and weight and material.

Project's objective. The research aims to increase the productivity and efficiency of controlling the continuous flow of products through a production line by using the automated sorting system. Such a system is to minimize errors, time, and the use of multiple conveyors in a productive factory.

Project's purpose. Compared to manual or conventional sorting methods, sorting conveyor systems offer numerous advantages to industrial shipping facilities, including:

- **Greater shipping accuracy:** The use of smart conveyor systems reduces the risk of products being directed to the wrong shipping lane and, consequently, sent to the wrong customer.
- **Higher productivity:** Using conveyor sorting systems decreases the amount of time employees spend in processing products and increases the number of products that can be processed within a single shift.
- **Lower production costs:** The higher productivity achieved by using conveyors for sorting operations translates to lower production costs since

facilities can spend less on manual labor to process greater amounts of products in a shorter period.

Tasks of project. In purpose to create a sorting conveyor to achieve the previously mentioned objectives, it is necessary to accomplish several tasks [1].

Belt speed control. Conveyors are driven by squirrel cage induction motors, which have a robust construction and are high reliability. Motor output typically ranges from 0.15 to 1.5 kW depending on the size of the conveyor and the nature of the track. The rated speed of motors in variable-speed operation is based on the speed at which the conveyors are mostly expected to run to reach the desired number of products transferred per minute. Motor speeds can be adjusted both above and below this rated speed and should be sized with a sufficient safety margin to provide the necessary output both above and below the rated speed.

Material detection and sortation. Sorting conveyor detects and identifies products to sort them based on their size, weight or material, using the right sensors and place them correctly on the conveyor, and a programmable stepper motor to sort products.

Safety features:

- The first safety feature would be not starting the whole conveyor sorting system unless there are products in the storage at the beginning.
- The conveyor belt should not work at the same time as the stepper motor.
- System stops and alert in case of full storage at the receiving point.

To implement the system the following hardware is necessary (Tab.1).

Table 1 – System hardware

Microcontroller	Sensors	Actuators
Arduino	Inductive sensor	Servo motor
-	Capacitive sensor	Stepper motor
-	Start /Stop button	LCD
-	-	Lamps

The block diagram of the proposed system is given on Fig. 1.

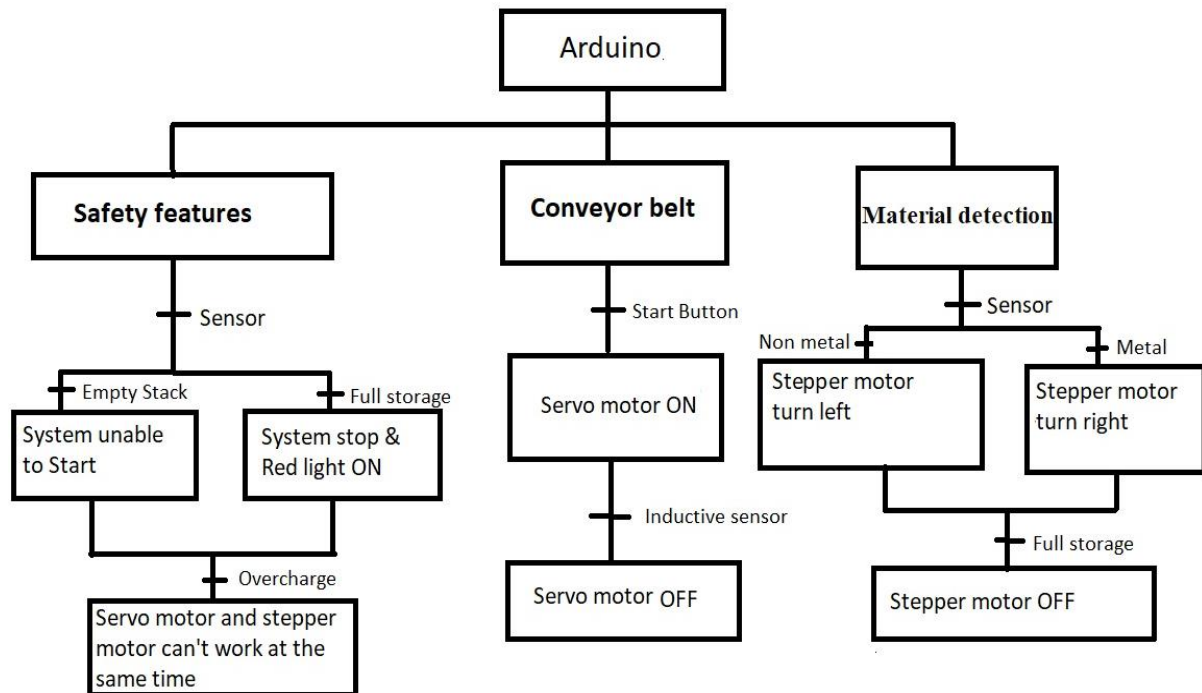


Figure 1 – System Diagram

References:

[1] Controlling variable speed conveyors. [Electronic source]. Access mode: https://pwemag.co.uk/news/fullstory.php/aid/850/Controlling_variable_speed_conveyors_.html

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АВТОМАТИЗАЦІЯ СИСТЕМИ КОНТРОЛЮ ЯКОСТІ ПРОДУКЦІЇ ТА ЇЇ СОРТУВАННЯ НА СКЛАДІ ЗА ДОПОМОГОЮ МАШИННОГО ЗОРУ

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Машинний зір є підрозділом інженерії, пов'язане з обчислювальною технікою, оптикою, машинобудуванням і промислової автоматизацією. Одне з найбільш поширених додатків машинного зору - інспекції промислових товарів, таких як напівпровідникові чіпи, автомобілі, продукти харчування та