Design of a Product Sorting System Based on Color Using S7-1200 PLC

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***Abstract*—This undergraduate thesis presents the design and implementation of a product sorting system based on color using a S7-1200 PLC. The author describes the system's components, including color sensors, relays, and an Arduino Uno R3, and explains the overall structure and functionality of the system. The work highlights the challenges faced in the design and implementation, particularly the limitations due to the lack of comprehensive literature in the field. The system was designed to sort products based on their color, but its performance was not quantitatively evaluated in the thesis.**

***Index Terms*—PLC, S7-1200, color sensor, Arduino, TIA Portal**

I. Introduction

The thesis introduces the concept of a product sorting system based on color, focusing on the use of a S7-1200 PLC. It outlines the system's components, such as color sensors, relays, and an Arduino Uno R3, and explains the overall structure and functionality of the system. The author acknowledges the limitations of the project, including the lack of comprehensive literature in the field and the challenges in achieving optimal performance. The system was designed to sort products based on their color, but the author notes that the system's performance could be improved with better synchronization between the PLC and the manual operation [1]. Published articles on the methods and subject of this project provide context for this English summary [6], [7], [8]. Published books on the methods and subject of this project provide context for this English summary [9], [10].

II. Methods

The author designed and implemented a system using a S7-1200 PLC, Arduino IDE, and TIA Portal V16. The system includes a color sensor for detecting the color of products and LED indicators for displaying the sorting results. The code for the color processing and PLC programming is provided. The system was designed to sort products based on their color, but its performance was not quantitatively evaluated in the thesis. The author acknowledges the limitations of the project, including the lack of comprehensive literature in the field and the challenges in achieving optimal performance [1].

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III. Results

The thesis documents the colour-sensing hardware, PLC interfaces, and Arduino colour-processing code for the proposed sorting model. The author reports rebuilding a WinCC supervision interface and successfully connecting and simulating it with the S7-1200 PLC software. The discussion notes that the proposed automated system and manual operations were not fully synchronized, limiting the effectiveness of the overall workflow. A tomato-sorting production line appears in the background review as an example; the report does not claim a tomato-specific evaluation of this prototype [1].

IV. Discussion

The author acknowledges the limitations of the project, including the lack of comprehensive literature in the field and the challenges in achieving optimal performance. The system was designed to sort products based on their color, but the author notes that the system's performance could be improved with better synchronization between the PLC and the manual operation. The author suggests that further research is needed to address the limitations and improve the system's performance [1].

V. Conclusion

The report presents a hardware-oriented colour-sorting model using an S7-1200 PLC, sensors, peripheral connections, and a WinCC supervision interface. The author states that the supervision screen was connected and simulated with the PLC software, while integration with manual operations remained imperfect. The source does not provide a quantitative sorting-accuracy test for the prototype. The work therefore documents the component design and software simulation, with synchronization and operational testing left for further refinement [1].

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