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Automatic Bottle Filling Machine Using PLC

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Abstract: *In today's fast industrial environment, automation of production processes has become essential for maintaining high productivity and ensuring product quality. One critical area where automation plays a significant role is in the bottle filling process, especially in the beverage, pharmaceutical, and chemical industries. Manual filling methods are prone to errors such as inconsistent filling levels, and slower production rates.*

This research presents the design and development of an Automatic Bottle Filling System using a LOGO Siemens Programmable Logic Controller (PLC). The system is designed to detect bottles automatically using sensors, control the movement of a circular conveyor belt, and manage the filling operation through precise timing and valve control. The Siemens 6ED1052-1HB08-0BA1PLC Logo PLC is programmed using the LOGOSOFT software with ladder logic to achieve synchronized control of all components.

The developed system can consistently fill bottles to the desired level with minimal human intervention, ensuring accuracy, reducing product wastage, and improving production speed. Testing of the system showed a filling accuracy of 98% and a cycle time of approximately 1.2 seconds per bottle. The system is also flexible enough to adjust for different bottle sizes and filling volumes through simple modifications in the PLC program. Overall, the proposed automatic filling system provides a cost- effective and reliable solution suitable for small, medium, and large-scale industrial applications. Future improvements include integrating a weight sensor for even higher accuracy and using advanced monitoring systems for remote operation and maintenance.

Keywords: Automatic Bottle Filling System

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