

## Gripper-Enhanced Fabric Cut Piece Sorting System based on Defects

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### Abstract

Sri Lanka's garment industry is crucial, contributing significantly to the country's export market. However, current fabric handling methods in Sri Lankan companies are primarily reliant on manual labour, creating a compelling potential for research and development in the field of automated fabric handling. Fabrics present distinct challenges due to their dynamic and static character, needing novel solutions to overcome these limitations. Furthermore, human fabric problem detection achieves just 60% accuracy, emphasizing the importance of automation in this vital sector. Significant benefits can be obtained by automating these processes in textile manufacturers. The fundamental goal of this project is to design and build an innovative system capable of automatically separating and classifying cloth cut pieces based on the presence of defects. Our suggested device includes a cylindrical manipulator outfitted with cutting-edge pinch-like grippers designed exclusively for effective ply separation. To improve defect detection accuracy, we use a custom-trained Convolutional Neural Network (CNN) with a validation accuracy of 80%. We have also created a simple platform for remote control and real-time monitoring of the entire system by using IoT technology. This complete project not only meets the critical demand for fabric handling automation, but it also has the potential to change the garment manufacturing process in Sri Lanka.

**Keywords:** *Automated fabric handling, Fabric defect detection, CNN, Pinch gripper*