

Vision-based Automation of a Manual Tablet Sorting Machine

A dissertation submitted to the
Department of Electrical Engineering, University of Moratuwa
in partial fulfillment of the requirements for the
degree of Master of Science

By

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DECLARATION


The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.



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Abstract

Tablet production is a complex process. The ultimate goal of pharmaceutical manufacturing is to provide quality products to its end user or the patient. It is explicable that during this manufacturing process some of the tablets may end up with defects. It is mandatory to separate these defective tablets from the high-quality tablets in order to ensure the safety, quality and efficacy of the tablets.

At State Pharmaceuticals Manufacturing Corporation (SPMC), sorting of defective tablets are carried out using a manual tablet sorting machine. Manual tablet sorting is a very difficult task, as operators have to keep their eyes on a moving tablet bed all the time and eye is easily fatigued by this. The process is less efficient and does not cost effective. The accuracy and speed of this process exclusively depends on the ability of the operators. Once the operators are fatigue, the whole process is interrupted. The objective of this research project is to upgrade this manual tablet-sorting machine into an automated system with the aim of improving the speed and accuracy of the sorting process.

Dark color spots on white colored tablets and color variation among colored tablets are two common defects that can be found in tablets. Therefore, these two defects were considered for the purpose of this project. Using the newly developed automated tablet-sorting machine, these two defects could be easily identified and separated from a tablet bed.

A web camera was used to capture images of moving tablets on conveyor belt, those images were processed and defects on tablets could be extracted from images using basic image processing techniques and mathematical models such as Euclidean distance. After detecting a defective tablet, a pneumatic system was used to separate defective tablet from others.

The result shows that system has 100 % accuracy to detect defects, if the defect size is higher than 0.5 mm. However, the speed cannot be maximized since the web

camera used has a lesser speed (30 frames per second) and the programming software does not support to give the results immediately.

Although the speed of the automated machine is less than expected, the high accuracy and precision are important. It can reduce the manpower needed and does not depend on the ability of the operator. Use of a high-speed inspection camera and compatible software would increase the speed of the process further.



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