Development of an Automated Sorting Conveyor Based on Image Processing

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Image processing is a one of the popular techniques used in industrial quality controlling. Such a system usually consists of image acquisition and processing, followed by actuation operations. Image processing provides several benefits such as high accuracy, high throughput rates, reduced labour requirement and reduced fatigue for manual labour. Since it is naturally a non-contact measurement process, it has wider range of applications. In this background, this research aimed to develop a sorting conveyor system based on image processing in order to sort object of different colour, shape, and barcode. A custom-made image processing software was developed in C++ using the OpenCV library. Output signals from the image processing software were used to drive a microcontroller which operates the conveyor system. The conveyor system consists of a belt conveyor driven by an electric motor and a rotary indexing table installed at the end of the conveyor having radial compartments to store items. When items are sent through the belt conveyor, based on the type of objects identified by the image processing software, the indexing table is indexed to pre-set positions such that the respective types of items are dropped on to the relevant compartment. Based on the developed prototype, a series of experiments were conducted with the objective of fine-tuning the software parameters to improve the identification of objects. Eventually it was found that the system can sort items at a maximum frequency of 1 Hz, based on colour, shape or barcode. Additionally, the software was further developed to count items, which can effectively work even at 10 Hz. The proposed automated system provides a cost effective, but flexible means of sorting items using image processing. With further developments, this system can effectively be used for industrial sorting applications.

Keywords: computer vision, sorting system, image processing, openCV, sorting conveyor