MECHATRONICS BOOK SERIES

CONTROL AND INTELLIGENT SYSTEMS

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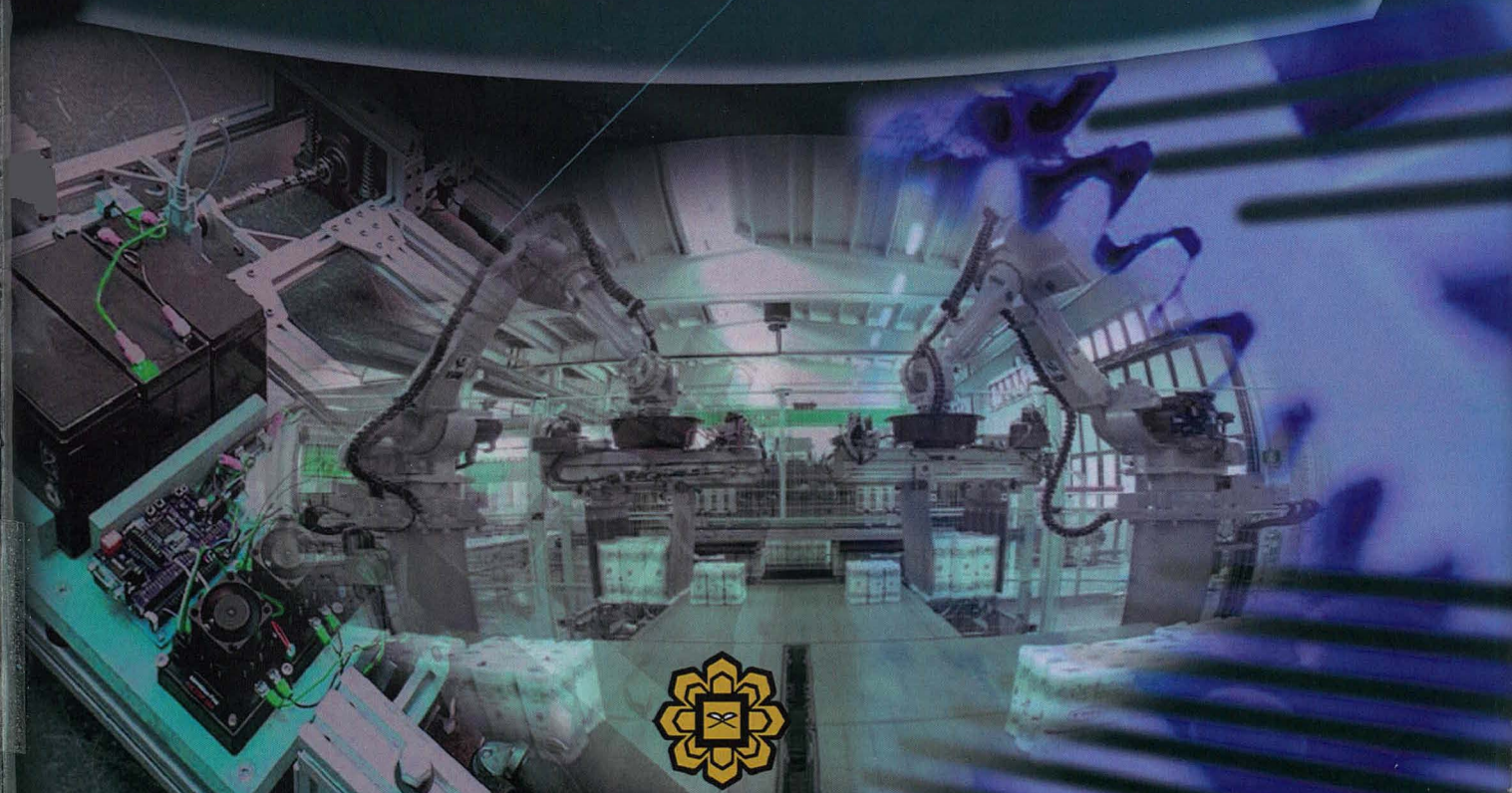
Abiodun Musa Aibinu
Yasir Mohd Mustafah



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Chapter 28
Intelligent Automatic Fruit Identification System

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28.1 Introduction

Fruits recognition and classification using machine vision and image processing techniques plays an important role in pre-harvesting, post-harvesting operations of various farm products. Various techniques have been suggested in the literature for fruits recognition and classification activities, these can be classified into: shape based; color based; dielectric based; conductivity based and more recently magnetic resonance imaging techniques. The need to sort fruits based on size, quality, types and grades need not be over emphasized. In a mono-fruit system, farmers or the packaging companies usually sort fruits by size, grade and quality in order to determine the price and post harvesting requirements of each type while in a multi-fruits systems or fruits selling outlets, the need to automatically identify and sort fruit packages into different level or compartment is usually a day to day activity.

Among the aforementioned techniques, three methods of fruits sorting will be discussed in this paper, these are shape based techniques, color based techniques and the fusion of color and shape based techniques. Shape based image analysis has been of keen research interest during the last few decades especially in the field of medical image diagnosis, machine vision, content retrieval system, surveillance, target recognition, industrial inspection, scene analysis [1]–[5]. Various authors have applied shape information in sorting fruits into various classes [1, 10]. Notable among the applied techniques include the use of Fourier descriptors, Autoregressive descriptors, farthest point techniques and so on. Despite the successful application of shape information in sorting fruits, it has been observed that the use of shape information only may not be appropriate since some fruits have almost the same shape.

Recently, the use of color information for fruits sorting is gradually gaining ground perhaps due to availability of personal computers and various machine vision based techniques. Various authors have reported higher recognition and classification accuracy from the use of color information compared to the use of shape information [6-9]. The use of the shape information in accurately sorting fruits into classes has also been reported in the literature [10].

The remaining part of this paper is organized as follows: brief review of some related work is covered in section II: the proposed technique is discussed in section III while results and conclusion is contained in section IV and V respectively.

28.2 Related Works

In [6], the paper describes a color image processing based vision system for sorting Fuji apples. Three CCD camera were installed at the top-left, top-right and above the fruits which hold 120° between each other to capture the apple images. Ohta color based image segmentation is used to segment apple colour and blob algorithm is used for noise removal.