OMS – VISION SYSTEM

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Abstract
OMS is a commercial device for the sensing and high-speed analysis of optical data. It may be programmed by the user to perform optical processing tasks, such as the recognition of objects and the measurement of characteristic quantities, and to communicate with other devices. ‘Interactive’, ‘Master’ and ‘Slave’ modes of operation are possible. Typical operation times are under one second and applications include robot vision, sorting, handling and quality control problems.

Introduction
Recent developments of micro-processor technology have made feasible the concept of a general-purpose optical sensor. This differs from the previous generation of dedicated sensors in that it is flexible and not developed especially to perform a single task.

This paper refers to OMS (Fig. 1)\(^1\,\,^{2,4}\) which has been designed for use in a wide range of applications. OMS is well established as a production device and practical experience in laboratory and industry\(^3\,\,^{6,7,8}\) has been gained and is being exploited in continuing development.

System features
These may be divided into two classes, optical processing features and peripheral features. OMS features have been chosen to cover a broad spectrum of optical analysis tasks and to suit various modes of application.

The basic OMS optical processing features are briefly listed in Table 1. OMS may be specified by the purchaser to include some or all of these features. Existing systems can be up-graded by the addition of slide-in modules (Fig. 1). Picture data is analysed in binary form and the assumption is made that a suitably, high-contrast picture (in either transmitted or reflected light) can be obtained by using tube, matrix or line-scan cameras. The accuracy of measurements is limited primarily by area represented by a pixel (picture size 256 × 415 pixel for raster cameras, 1024 × 512 for line-scan-cameras). Calculations are carried out in sub-pixel units to avoid rounding problems. A detailed discussion of optical features is contained in [2].

The mode of application of OMS sets user requirements additional to those of optical processing. Such requirements vary from application to application. Three basic modes may be defined (Fig. 2).

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1. **Stand-alone.** OMS is used interactively by a human operator who observes the selected field of view on a TV monitor and enters appropriate commands through a keyboard. Typical applications are remote object recognition and measurement (quality control) and OMS programme development.

2. **Master.** With the aid of data won from optical analysis, OMS is used to drive a slave device such as a sorting unit for a conveyor system. The operation is pre-programmed in OMS by the user. OMS issues instructions to the slave to implement actions such as ‘STOP’, ‘REJECT OBJECT’, ‘SELECT OBJECT TYPE X’.

3. **Slave.** OMS is used to provide an analysis of optical data to a master computer which controls an operation. Data such as object type and the co-ordinates of a desired point can be provided upon request. Typical applications include automated assembly.

Table 2 outlines some of the basic peripheral features of OMS and indicates their relevance to each of the three modes.

**Programming**

The system may be programmed via the 20 key OMS front panel, via an optional ASCII keyboard or from a host computer. OMS instructions are selected by the user from a series of system functions (Table 3). Each function involves a simple...