mvTD Compact Machine Vision System

Targeting Machine Vision Development and Deployment

Datacube's mvTD provides a versatile platform for integrators and OEMs who want the ability to develop machine vision applications and deploy them without complex system integration issues. The mvTD can act as a machine vision server for remote applications including motion guidance, surface inspection, verification of part placement and dimensions, and more. As a stand-alone box, mvTD can also be used to deploy embedded applications created with the optional Tornado™ development environment from Wind River Systems.

System Components

The mvTD system is based on *mvPower*, Datacube's stand-alone VME-based image processor with an embedded PowerPC CPU. Designed specifically for machine vision applications, *mvPower* delivers high speed and precision in a low-cost, single-board design. Paired with an Ethernet daughtercard, *mvPower* is installed in a compact, two-slot box that can serve as both a development system component and a complete target system for the delivery of finished applications. A MaxACQ module installed on the *mvPower* supports image acquisition from a variety of analog and digital cameras and sensors. The mvTD system's front panel is tightly coupled with the inputs to Datacube's MaxACQ modules, allowing quick and easy camera integration.

Powerful Software Development Tools

mvTD supports the MaxVision Toolkit from Datacube. Included with mvTD, the Toolkit simplifies application development with a group of fast, highly accurate, and easy-to-use machine vision tools. It is layered on top of ImageFlow, Datacube's extensive library of pipeline image processing functions. It includes software routines for image acquisition, preprocessing, object finding (correlation or blob analysis), metrology, and camera calibration in a package specifically designed to minimize programming time for machine vision developers. The Toolkit's finder and metrology routines include normalized correlation, connectivity, line fitting, arc fitting, and edge locators. Used in conjunction with a golden template and pixel counting inspection tools, these functions can be used to verify the correctness of part position and dimensions, the presence or absence of features, and the detection of surface flaws with sub-pixel accuracy.

The optional SMT Package, also available from Datacube, includes specialized algorithms for fiducial and general pattern recognition, and component recognition and inspection. These tools can further simplify development of an ever-widening variety of semiconductor and electronics applications.

Flexible Application Development

Two tracks are available for application development with mvTD. The first is a Remote Procedure Call (RPC) facility that provides for easy, transparent development from a host computer, allowing mvTD to be used as a high-power machine vision server.

Second, using Wind River Systems' Tornado development environment, developers can create high-performance embedded applications from a user-supplied host PC or UNIX workstation. When application programming is complete, the mvTD system can be easily reconfigured in a networked or stand-alone environment as a target, run-time machine vision system. The finished application can be deployed on the newly configured mvTD running the VxWorks operating system.

Simplified Integration

mvTD offers integrators and OEMs a versatile development and deployment platform for motion guidance, accurate measurement, and fast, reliable inspection in any of a wide variety of machine vision applications. The system approach simplifies integration requirements, and the development tools included in this package put application design control in the hands of the customer.

Other machine vision solutions from Datacube include *mvPower*, sold at the component level, with or without an enclosure. Customers may also purchase fully-developed, black-box vision systems designed to meet the specific needs of their applications. For more information, see the related documentation listed on the back of this data sheet, or contact Datacube directly.

- Low-cost, single-board design of *mvPower* delivers high performance and precision.
- MaxVision Toolkit provides a suite of exceptionally accurate, easy-to-use machine vision tools.
- Remote Procedure Call (RPC) facility enables easy, transparent development from a host computer.
- Optional Tornado development environment creates powerful embedded applications for stand-alone target systems.
- Ideal system for placement of surface mount devices, wire and die bonding, wafer steppers, robot guidance, label inspection, etc.

Specifications

Software

Development Tools

- Datacube's MaxVision Toolkit
  - Integrates software for image acquisition, preprocessing, object finding (correlation or blob analysis), metrology, and camera calibration
  - Minimizes programming time for machine vision applications
  - Supports enhanced pixel data depth to economically provide superior precision
  - Metrology tools and correlation provide sub-pixel accuracy
- Remote Procedure Call (RPC) Facility
  - Transparently links PC or UNIX workstation to mvTD
  - Preserves code development investment
- Serial file cross loader utility
- Optional Wind River Systems' Tornado
  - Integrated development environment
  - Includes a source-level debugger
  - Supports both C and C++
- Optional SMT Package from Datacube
  - Fiducial and general pattern recognition
  - Component recognition and inspection
  - Adaptive algorithms

Operating System

- VxWorks
  - Real-time, deterministic operating system
  - Proven in industrial applications

Hardware

- *mvPower* image processing board
  - 100 MHz PowerPC 603e microprocessor
  - Supports MaxACQ high-performance acquisition modules
  - High Speed Image Access (HSIA) for the PowerPC
  - Four image processing ASICs
  - 16x16 LUTs for general 8-bit dyadic operations
  - Binary and gray-scale morphology
  - 0, 2, 4, or 8 MB flash storage
  - Monochrome RS-170 display with two bitplanes of graphics overlay
  - PMC connector for future expandability
- Ethernet card

System Components

System Chassis

- Compact box with two 6U VME (Eurocard standard) slots
  - One occupied by *mvPower*
  - One free for future expansion
- Built-in power supply and cooling fan
- System footprint:
  - 10" wide
  - 9" deep
  - 2.5" high

Front Panel Connectors

- Four standard Hirose-type camera inputs
- Four auxiliary connectors
- Two serial ports
- One PCI mezzanine card carrier connector
- One display connector

- One acquisition connector

Electrical Specifications

- 70 W power supply powers one cooling fan, two loaded VME slots, and four 500 ma +12 V camera ports
- AC input: 90-240 V
- Power supply meets all FCC, UL, CSA, and CE specifications for emissions and safety

Additional Information

For more information about the products mentioned in this document, please refer to the following Datacube literature:

***mvPower* Data Sheet**
MaxACQ Module Data Sheets (various)
MaxVision Toolkit Data Sheet
SMT Package Data Sheet
ImageFlow Data Sheet

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