Medical Imaging System

Pictured below is the MD Image System, a true color image processing system that serves as a diagnostic aid and a management tool for storage and distribution of images to hospitals and pathology laboratories. A "spinoff from a spinoff," the system is being developed by Medical Image Management Systems, Huntsville, Alabama, a cooperative venture of three Alabama companies: Crystal Image Technologies and Crystal Data Systems, both of Huntsville, and Delta Technologies, located in Birmingham.
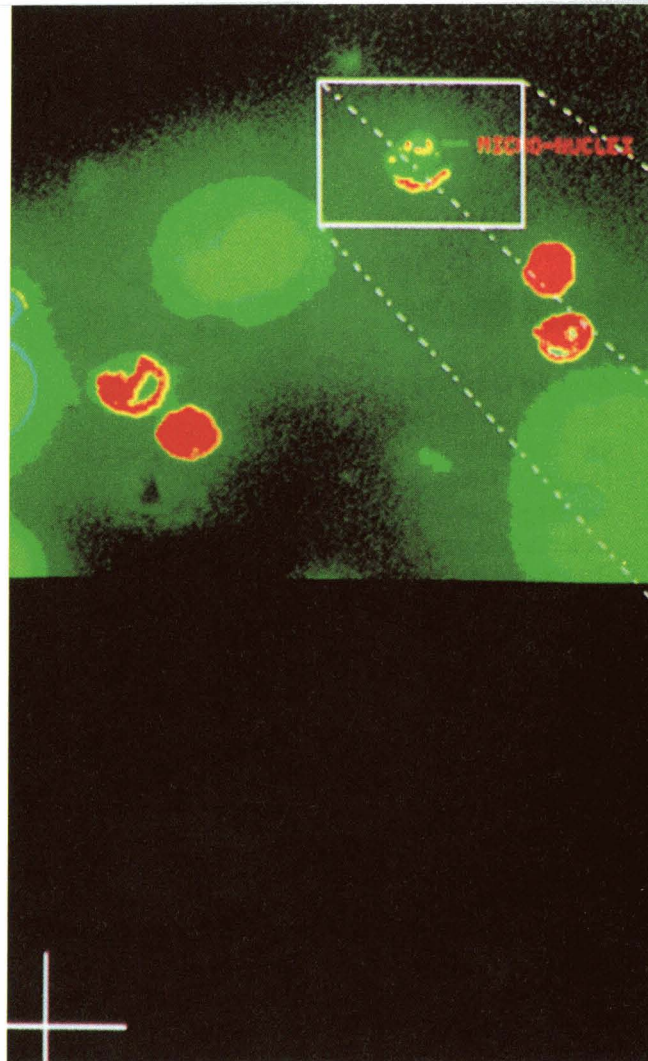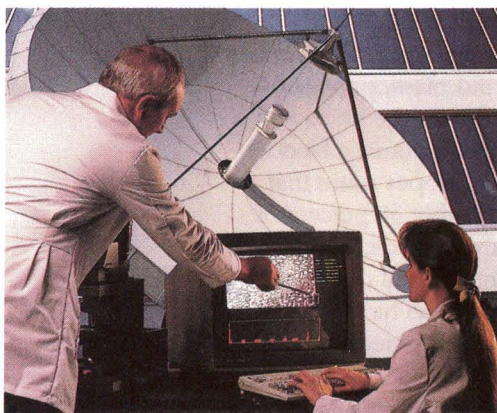
The system incorporates satellite image processing technology

The MD Image System stemmed from an earlier development by Crystal Image Technologies: a general image processing/geographic information system designated GeoStation 88000. This system, now commercially available and in use by government laboratories and imaging firms, includes both hardware and software for remote sensing and image processing.

GeoStation 88000 incorporates enhanced UNIX versions of ELAS, an image processing software package developed by NASA's Earth Resources Laboratory for analysis of Landsat satellite images and now widely used in general purpose image processing. For geographic information applications, ELAS is integrated with the Army Corps of Engineers' GRASS software.

About four months into the development of GeoStation 88000, Crystal Image Technologies officials were introduced to principals from Delta Technol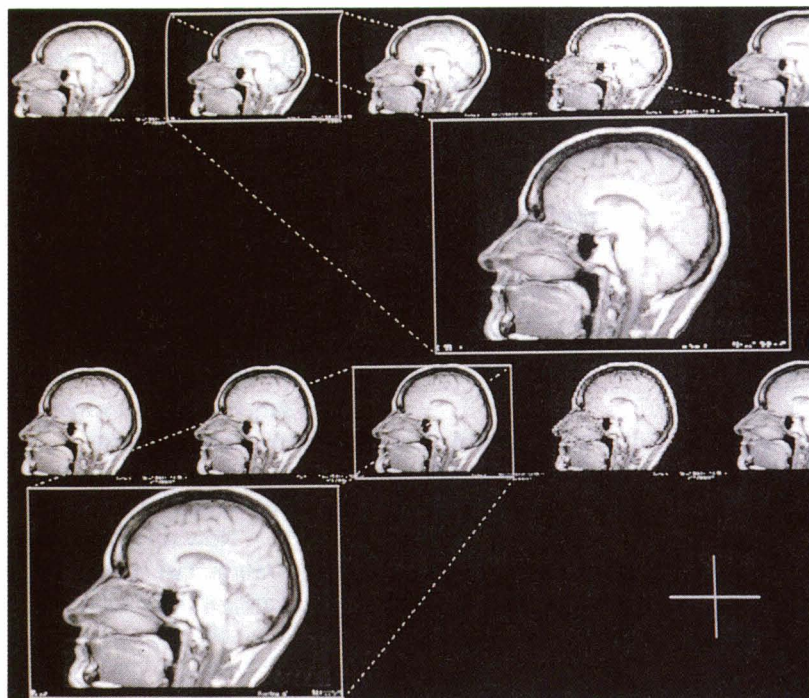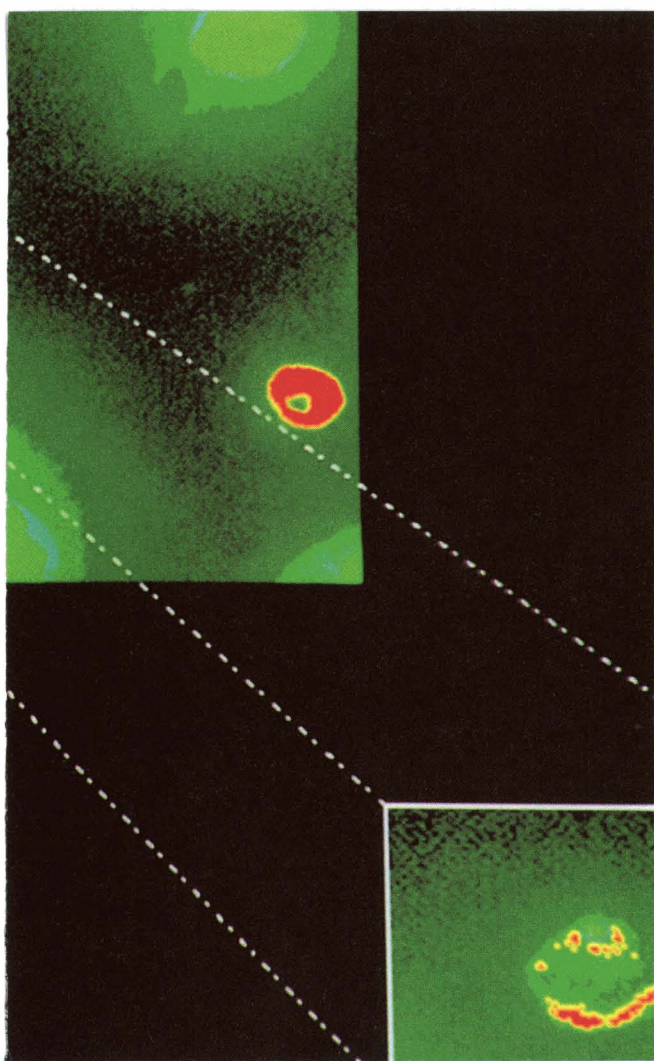ogies. The latter company had for several years been conducting research on computer analysis of images digitized from pathology slides. The meeting led to a collaborative effort, involving the two firms plus Crystal Data Systems, a supplier of computer hardware and communications systems, to apply GeoStation 88000 technology to a medical imaging system.
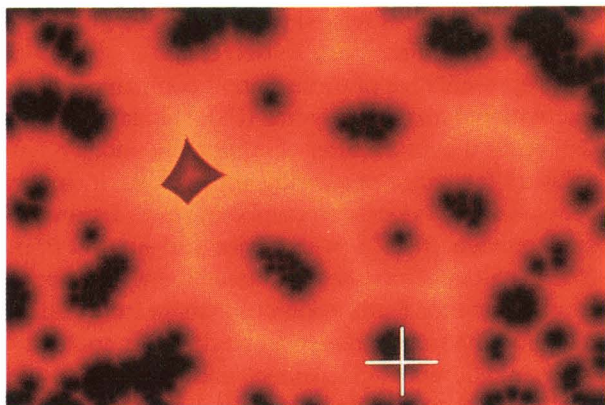
The result was the MD Image System. Externally similar to GeoStation 88000, MD Image includes a microscope, color video camera, a computer and a workstation for image processing, data storage and data communications. The computer software is a proprietary implementation of the NASA ELAS package.

The system is designed to aid in the diagnosis of cancer and other diseases, highlighting specific characteristics to help physicians recognize specific patterns. For immunochemistry applications, MD Image uses its true color capabilities to quantify multiple antibodies simultaneously. For DNA analysis, MD Image complements the flow cytometry technique in the identification of malignant cells. Generally, the system acquires microscope-based images, performs statistical analysis on them, stores them in standard database format, and transmits them to other remote sites for consultation.

A particular area of research interest is the identification and quantification of micronuclei. In this environment, the investigator stains a sample using a fluorescent stain and looks for the existence of micronuclei by searching for those regions that have the same "color density" as the nuclei. The system allows the user to magnify and highlight the area of interest **(above).**

The image **below** illustrates the system's flexibility in classifying an image. In this case the user has specified a classification based on a set of predetermined levels of color intensity and assigned a unique color map for the classification. This flexibility allows a user to highlight graphically minute changes that might otherwise go unnoticed.

The system can accept, store and analyze images from other sources, such as a Magnetic Resonance Imaging system **(above).** These images can be attached as records in the common database format and assimilated to form a complete patient image database that incorporates images from multiple sources such as pathology, radiology and cardiology.

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