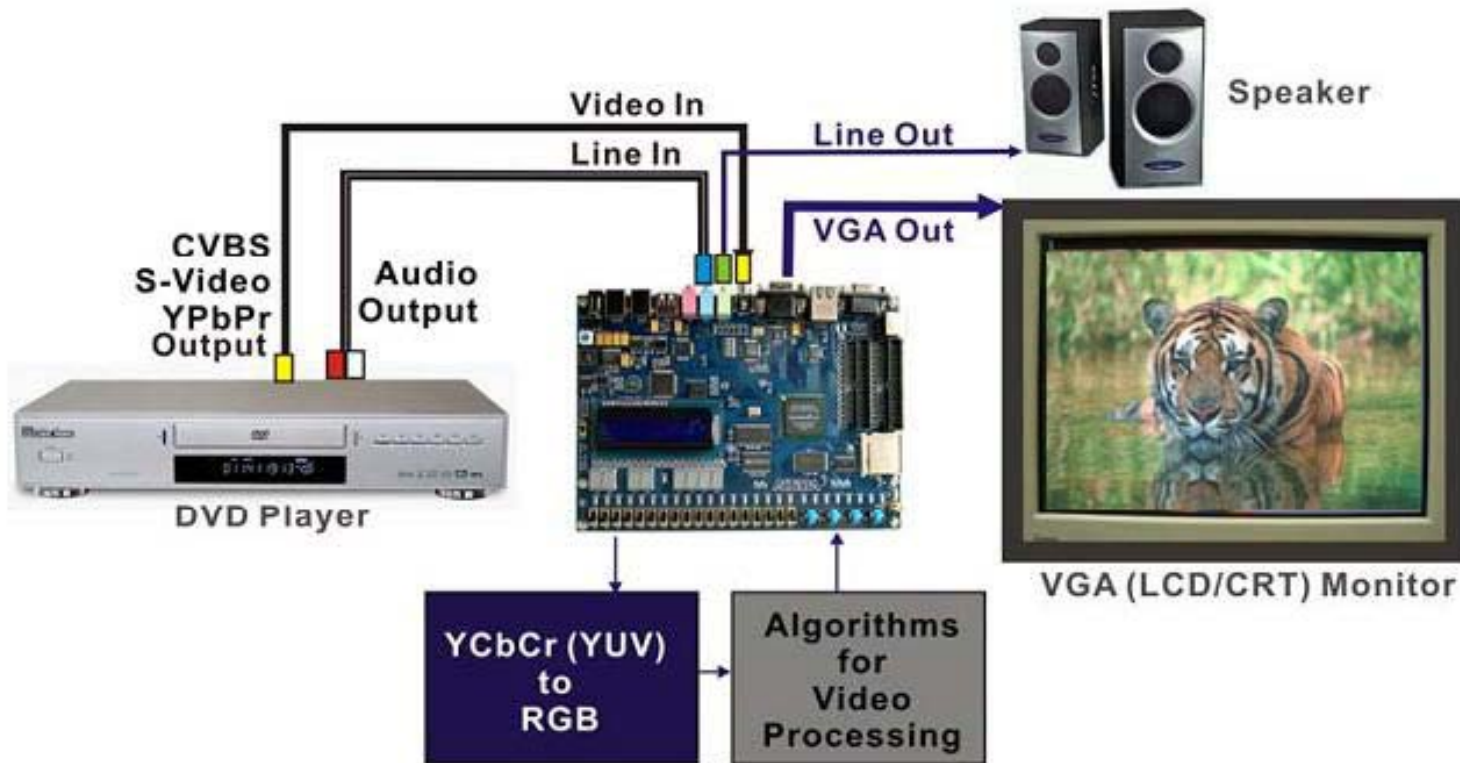


سمینار تخصصی پردازش تصویر دیجیتال با FPGA



فهرست موضوعات

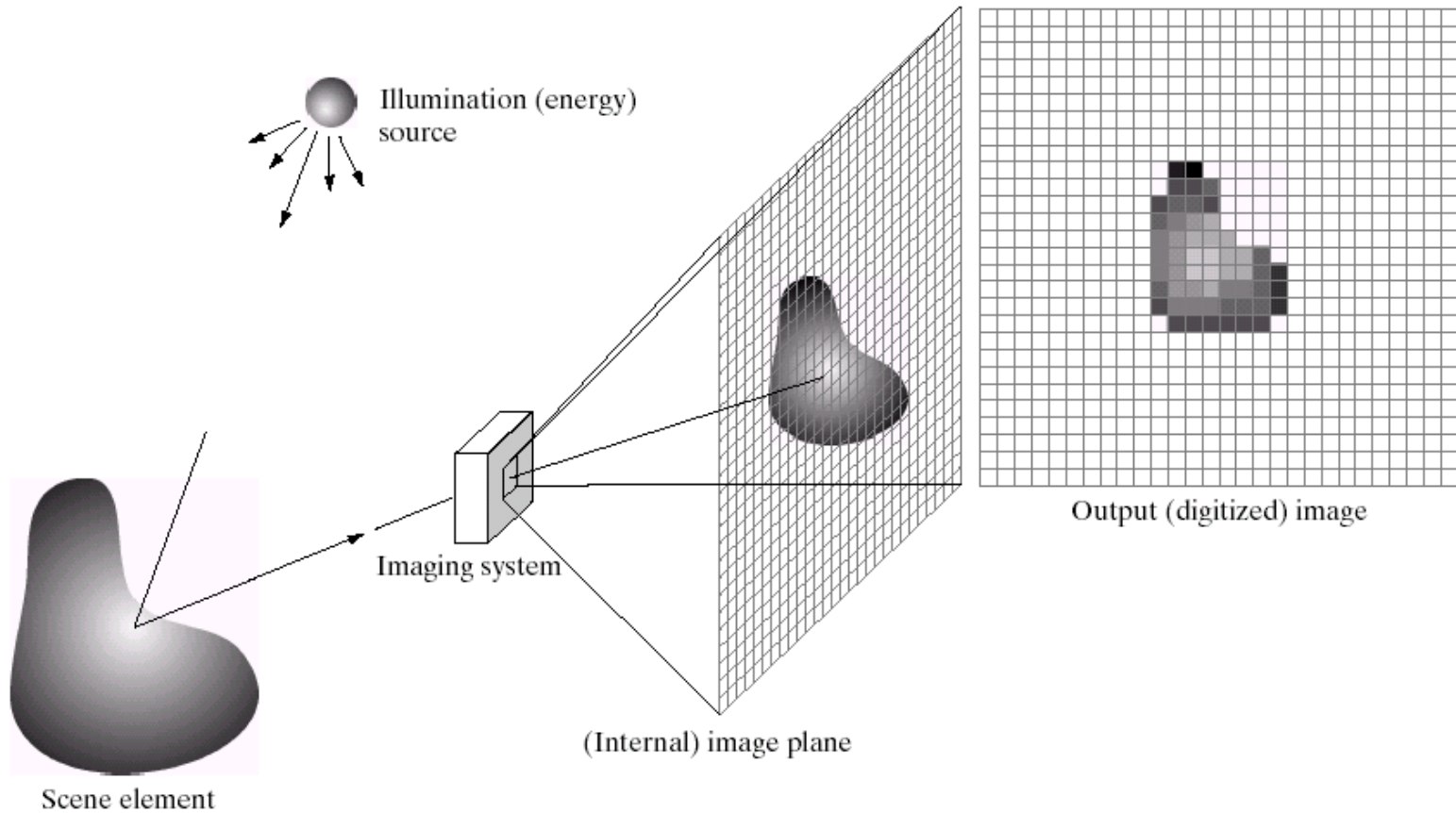
معرفی

کاربردها

روش ها

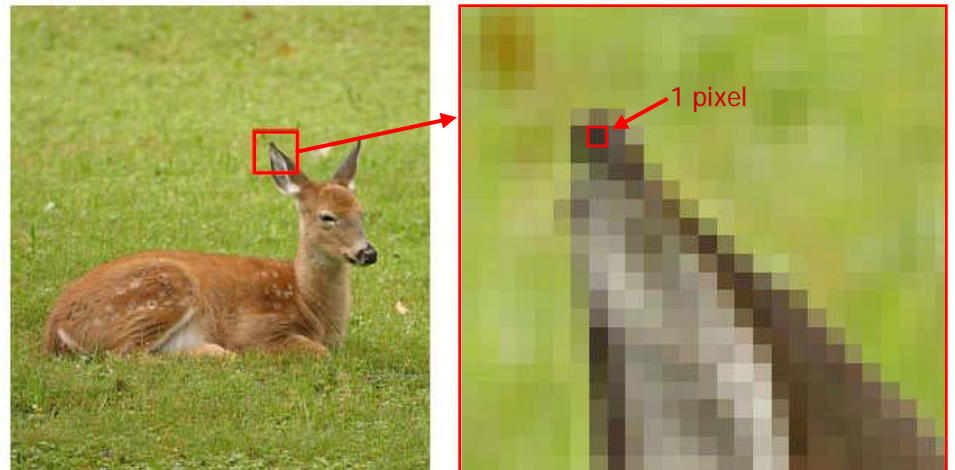
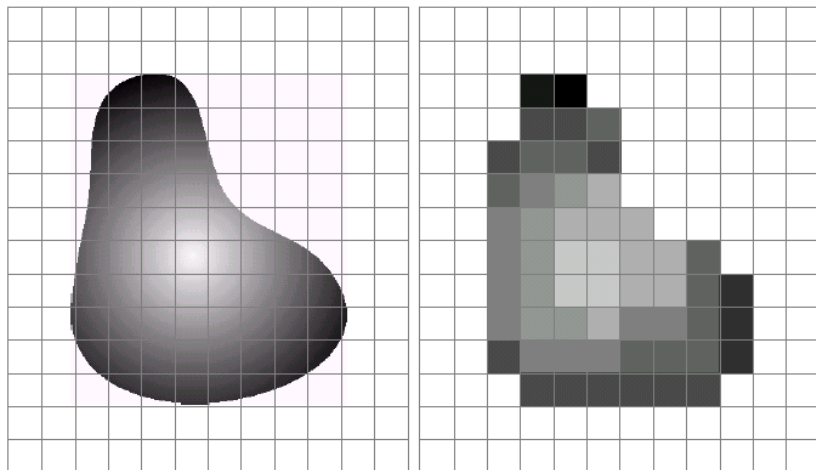
حوزه های فعالیت

تصویر دیجیتال



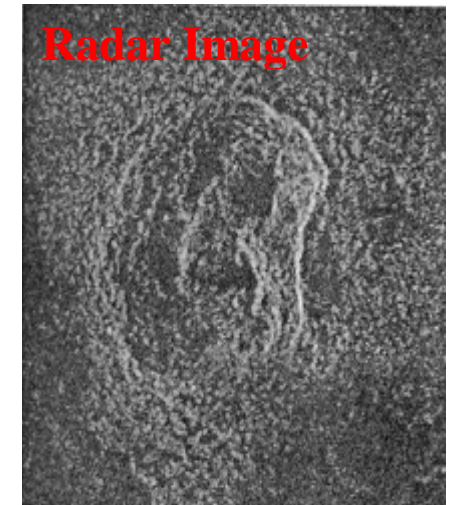
تصویر دیجیتال

- Pixel values typically represent gray levels, colors, intensity, ...
- Digitization implies that a digital image is an approximation of a real scene



منابع تصویر دیجیتال

- Transmission Images
- Sonic Images
- Radar Images
- Pressure Map Images
- Range Images
- Infra-red Images
- X-ray CT Images
- 3-D MRI Images
- Ultrasound Images
- Radar Image



ضرورت های پردازش تصویر

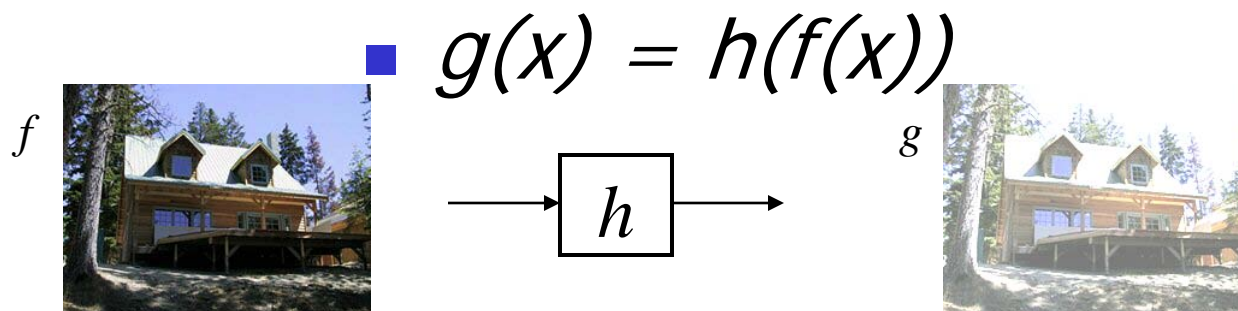
- Geometry Transformations : enlargement, reduction, and rotation
- Color corrections : brightness and contrast adjustments, color mapping, color balancing, quantization, or color translation to a different color space
- Image Fusion of Multiple Cameras, High dynamic range imaging
- Interpolation, demosaicing, and recovery of a full image from a raw image format using a Bayer filter pattern
- Image registration, the alignment of two or more images
- Image differencing and morphing
- Object recognition, Moving object recognition, Feature Classification
- Object tracking
- Video Coding/Decoding , Video Compression

مفاهیم پردازش تصویر

- Introduction
- Image data representation and structure
- Image Transformation
- Image Enhancement
- Image Segmentation
- Image Representation & Description
- Measurements on image
- Color image processing
- Morphology
- Texture

مفاهیم پردازش تصویر

- image filtering: change *range* of image



- image warping: change *domain* of image

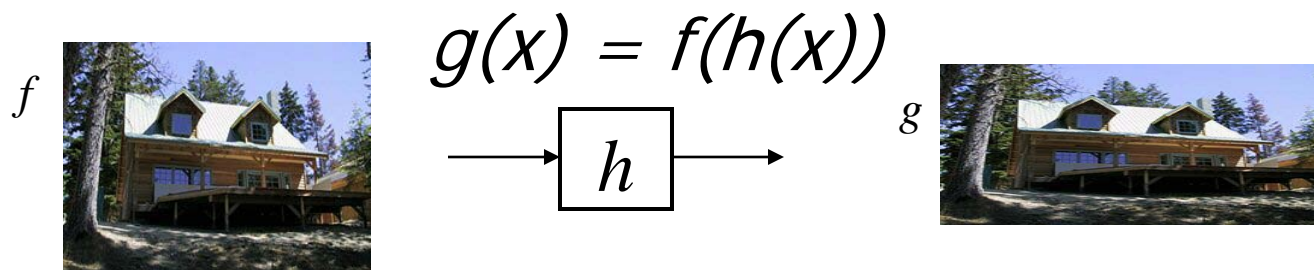


Image Enhancement

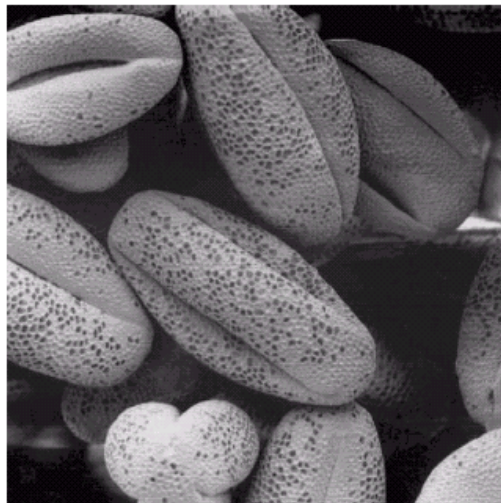
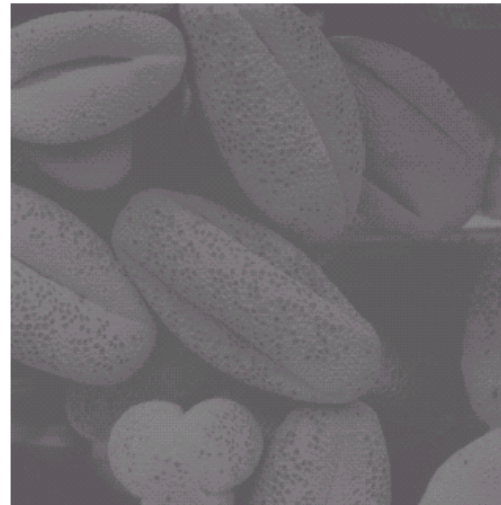
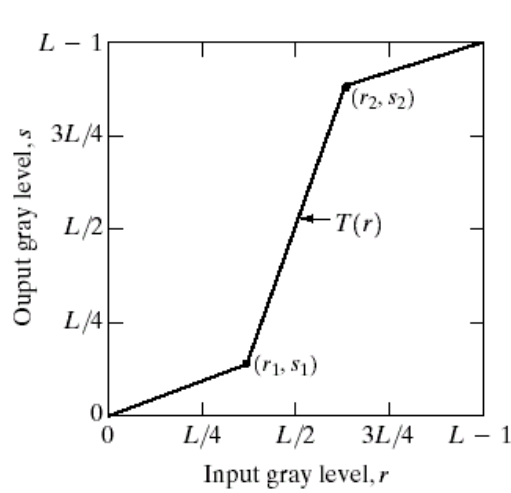
a b
c d

FIGURE 3.9

(a) Aerial image.
(b)–(d) Results of applying the transformation in Eq. (3.2-3) with $c = 1$ and $\gamma = 3.0, 4.0,$ and $5.0,$ respectively. (Original image for this example courtesy of NASA.)



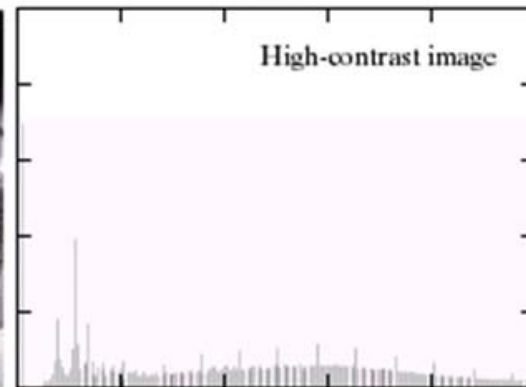
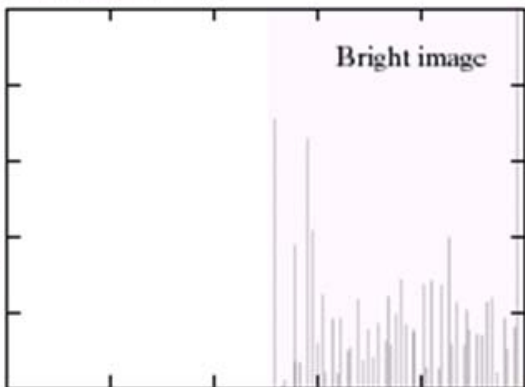
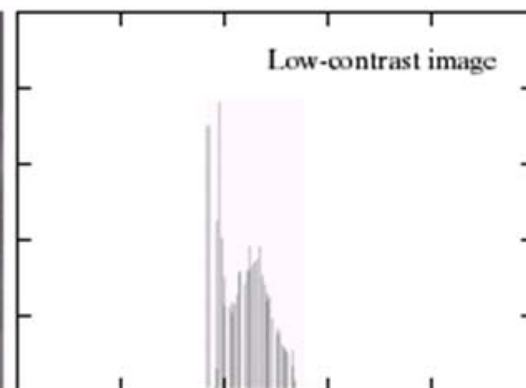
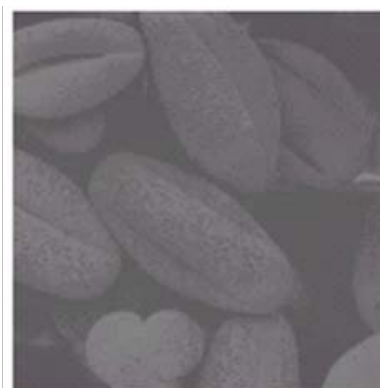
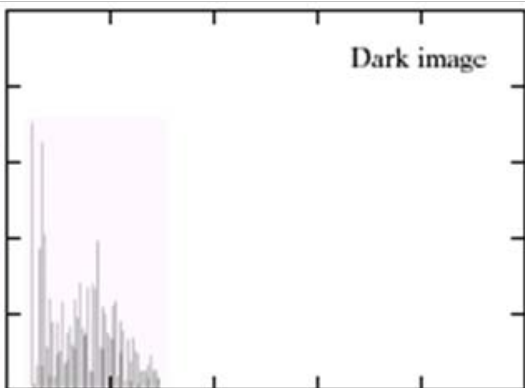
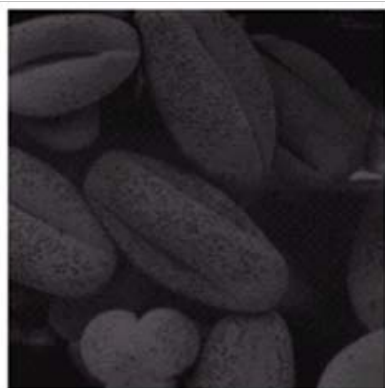
Contrast Stretching



a b
c d

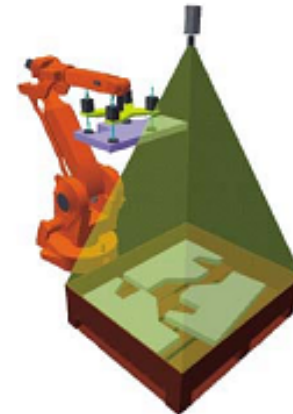
FIGURE 3.10
Contrast stretching. (a) Form of transformation function. (b) A low-contrast image. (c) Result of contrast stretching. (d) Result of thresholding. (Original image courtesy of Dr. Roger Heady, Research School of Biological Sciences, Australian National University, Canberra, Australia.)

Image Histograms



کاربردهای پردازش تصویر

- Industrial Inspection
 - Surface Measurement or Mapping
 - Fault Detection
 - Recognition Systems
- Robot Vision
 - Assembly lines
 - Guided Robots
- Autonomous Vehicles
 - Transportation
 - Guided Missiles

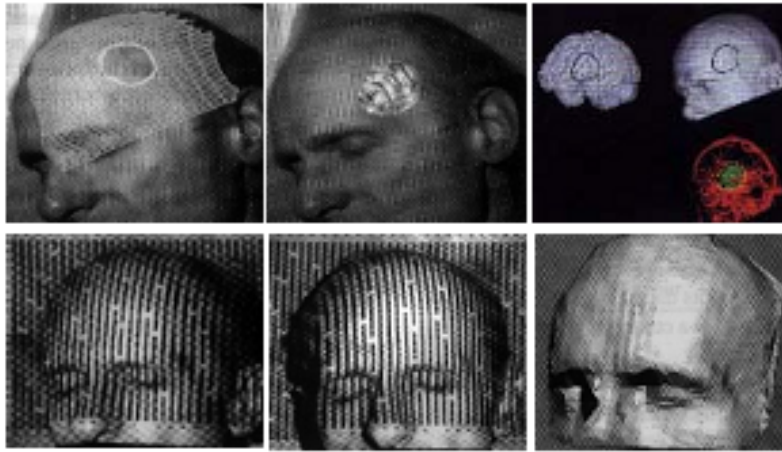


کاربردهای پردازش تصویر

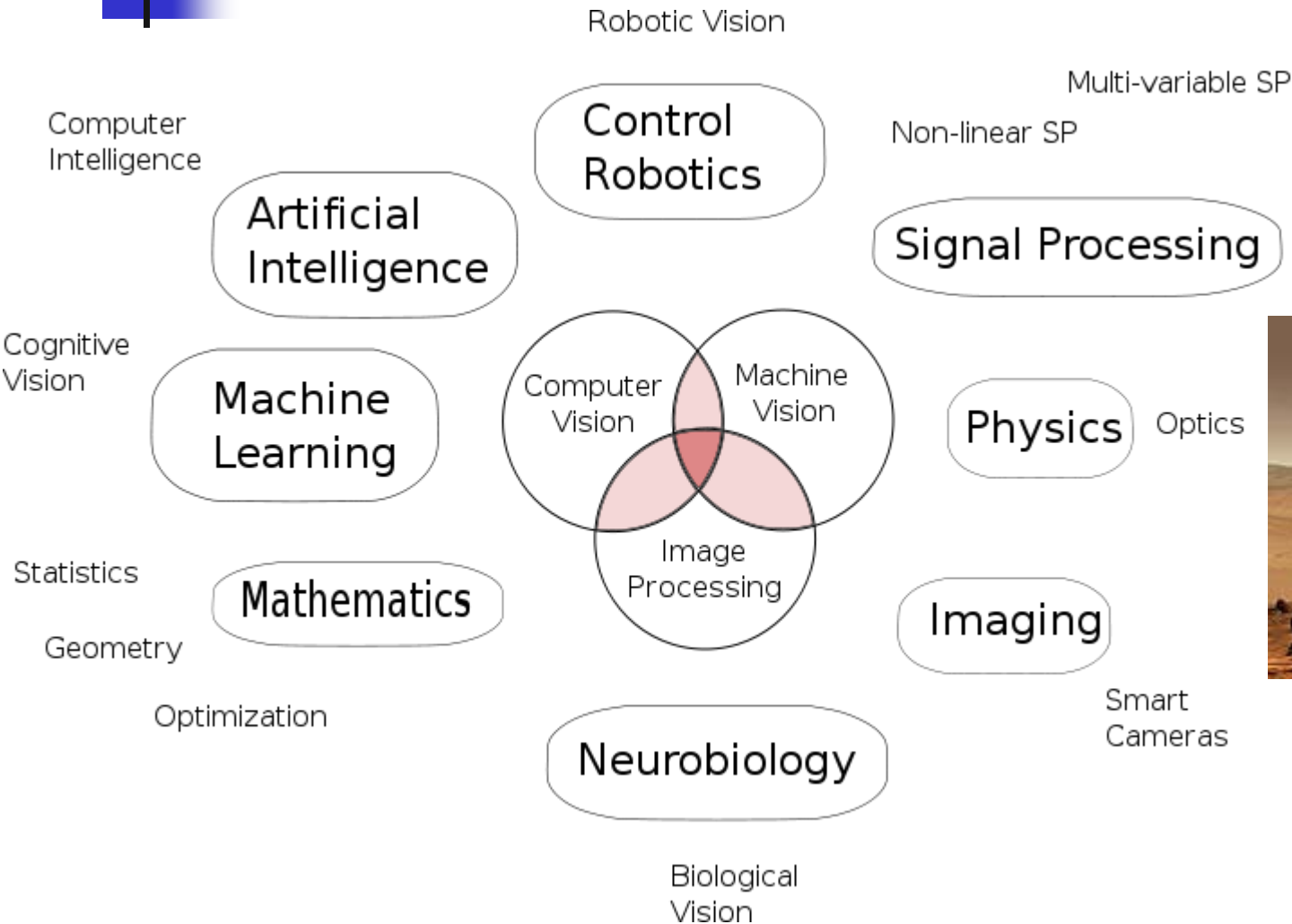
- Remote Sensing
- Land Management
- Crop Classification
- Military Surveillance

- Medical Applications
 - 3-D Medical Imaging
 - Remote Surgery
 - Image Analysis

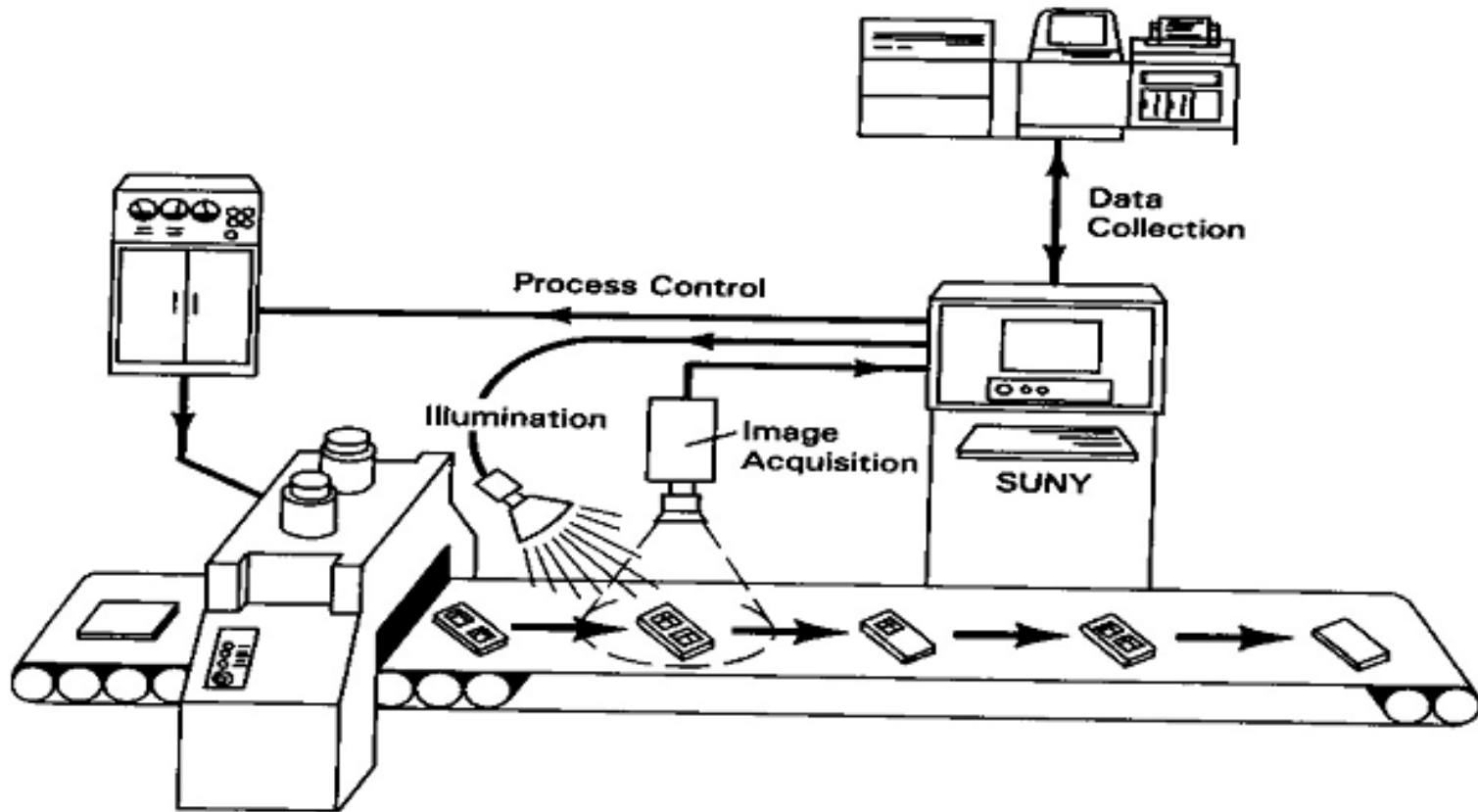
- Identification
 - Facial
 - Fingerprints
 - Iris



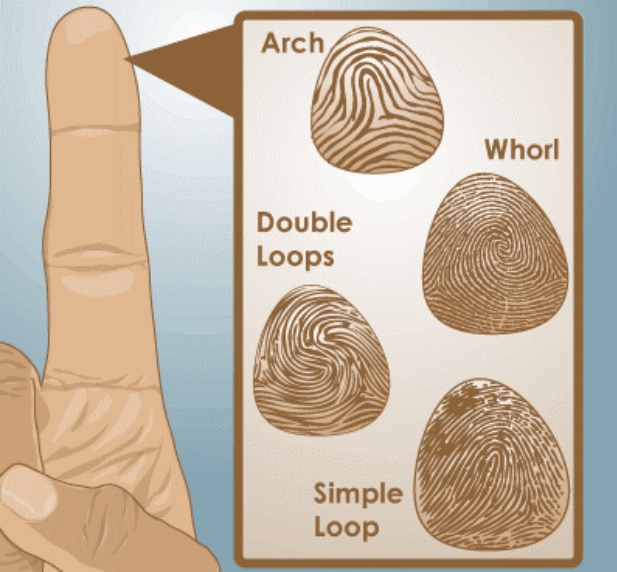
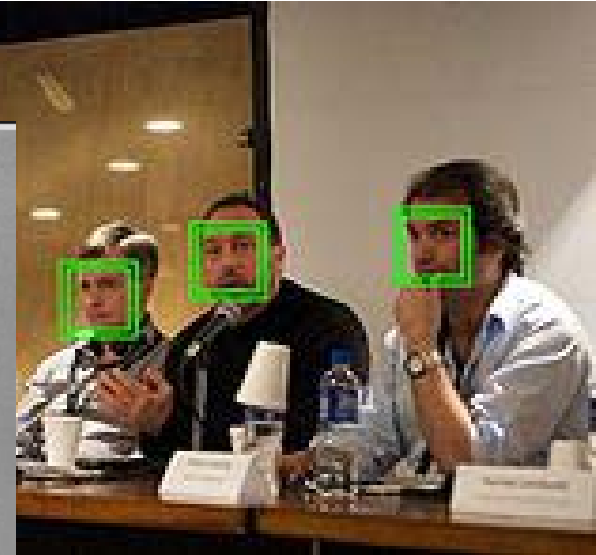
کاربردهای پردازش تصویر



کاربردهای پردازش تصویر



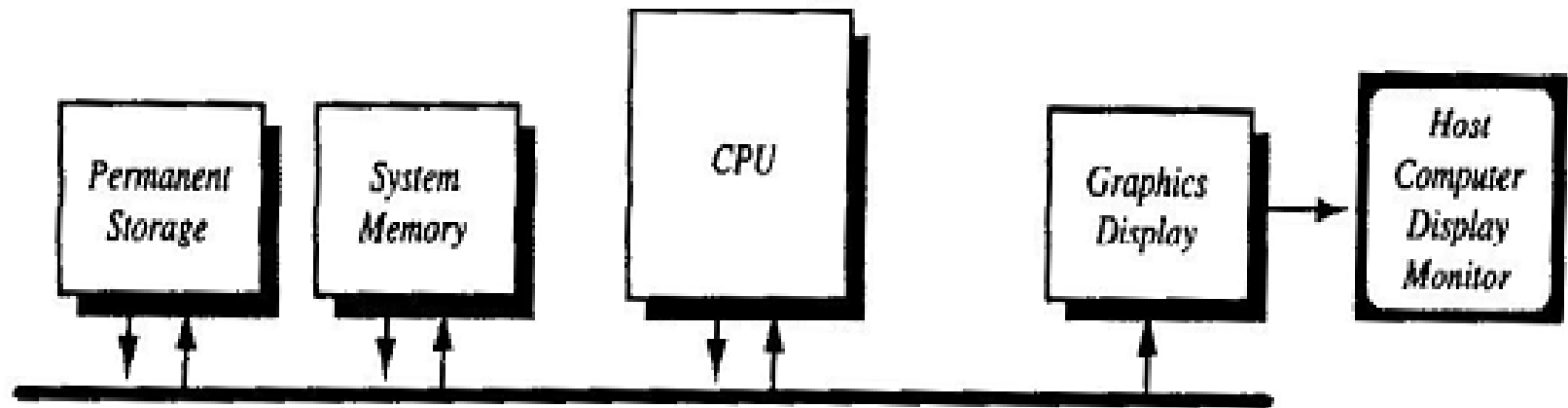
کاربردهای پردازش تصویر



پردازنده های تصویر

Host :

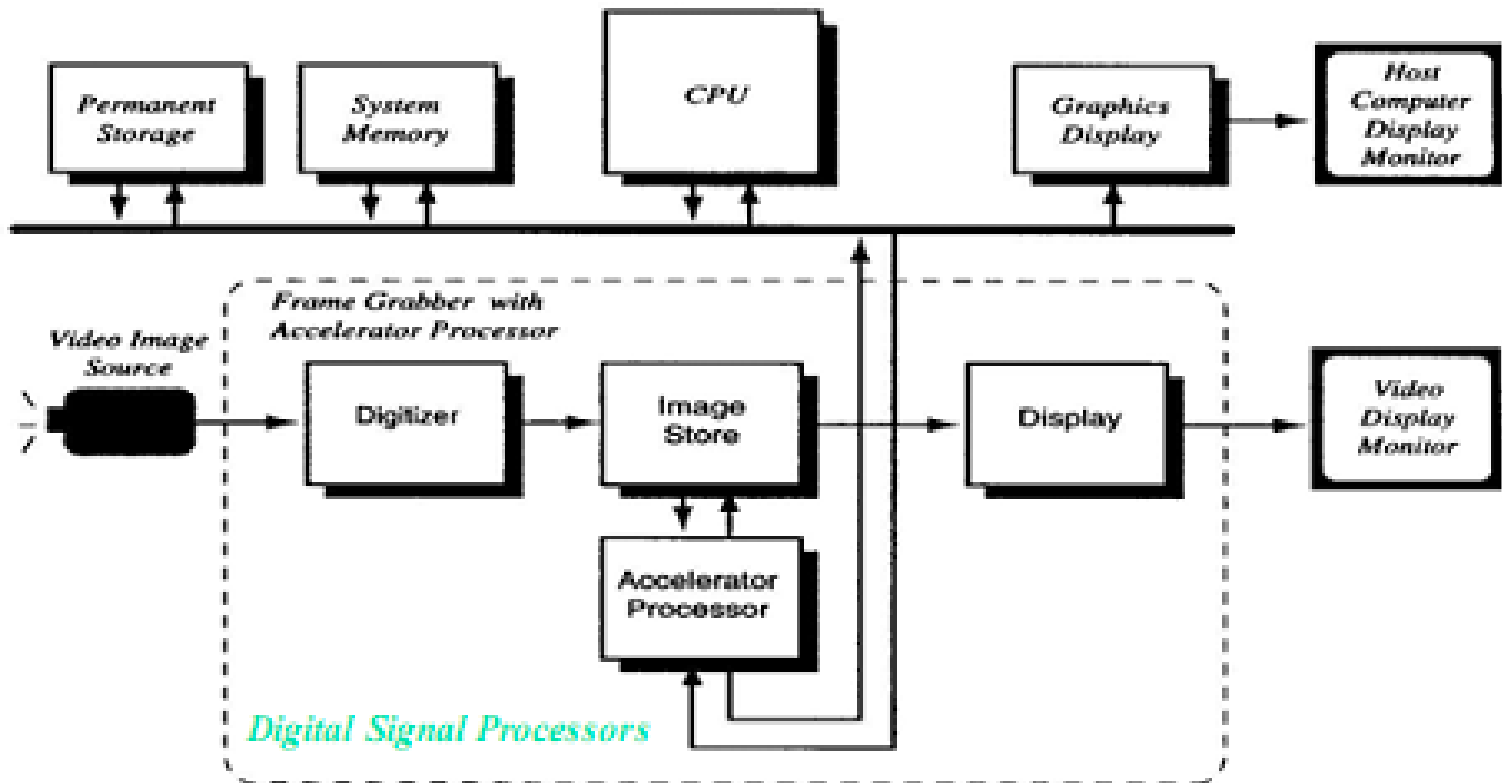
Computer in which an application or database resides.



A digital image processing system containing only a host computer for image data processing.

پردازنده های تصویر

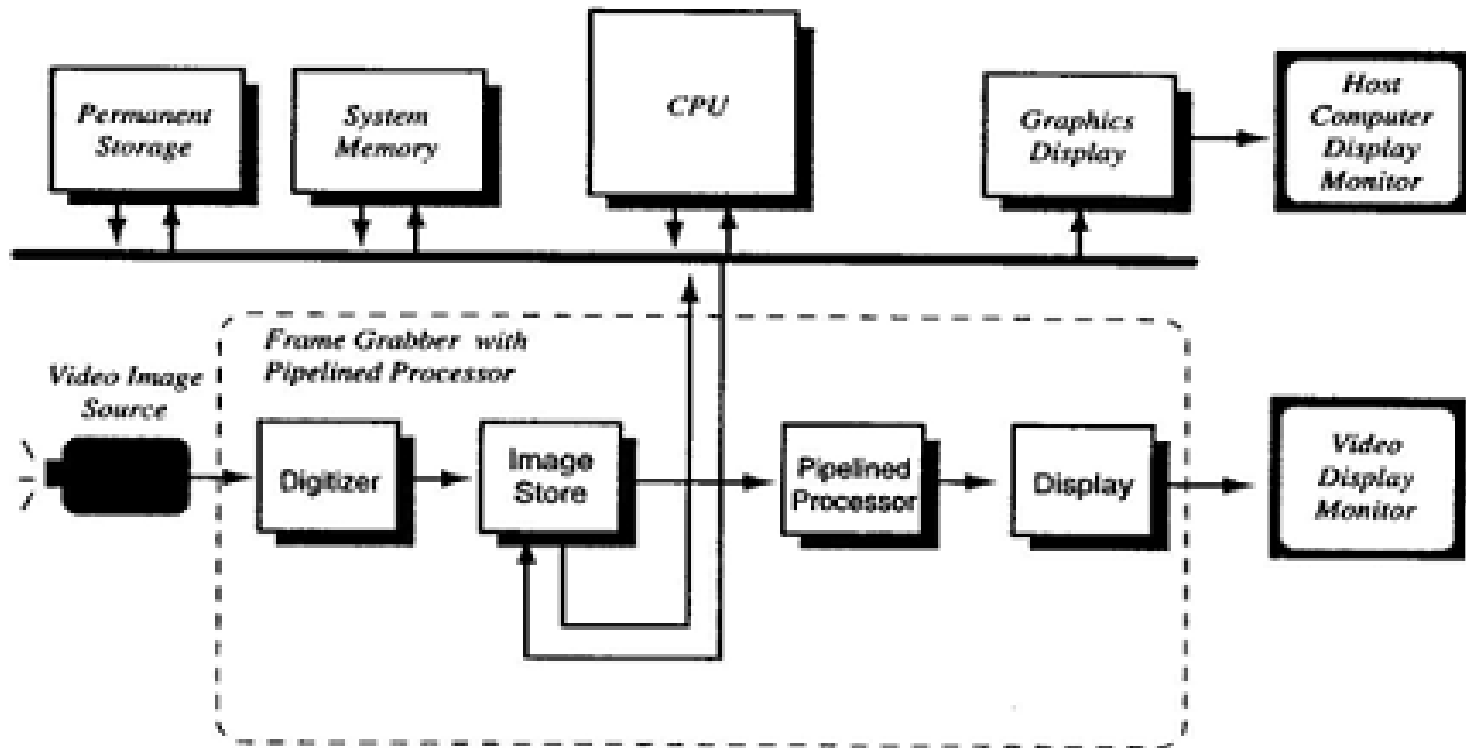
Accelerator Processors



An accelerator processor speeds up image data processing by using direct image store access, thus relieving the host computer to handle higher-level system activities.

پردازنده های تصویر

Pipelined Processors

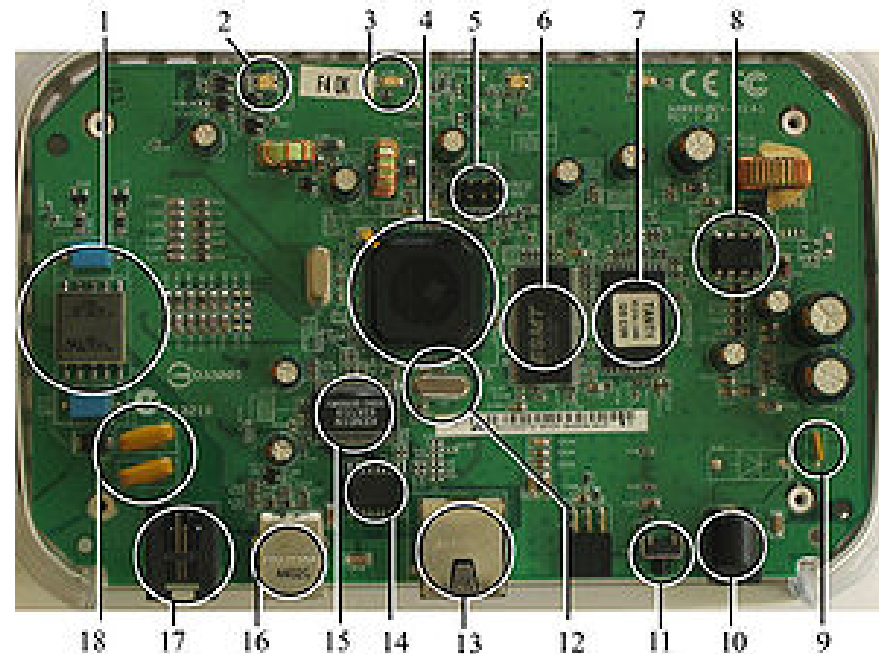


The addition of a pipelined processor in the display out path of the image store provides real-time image data processing.

پردازنده های تصویر

Embedded Systems

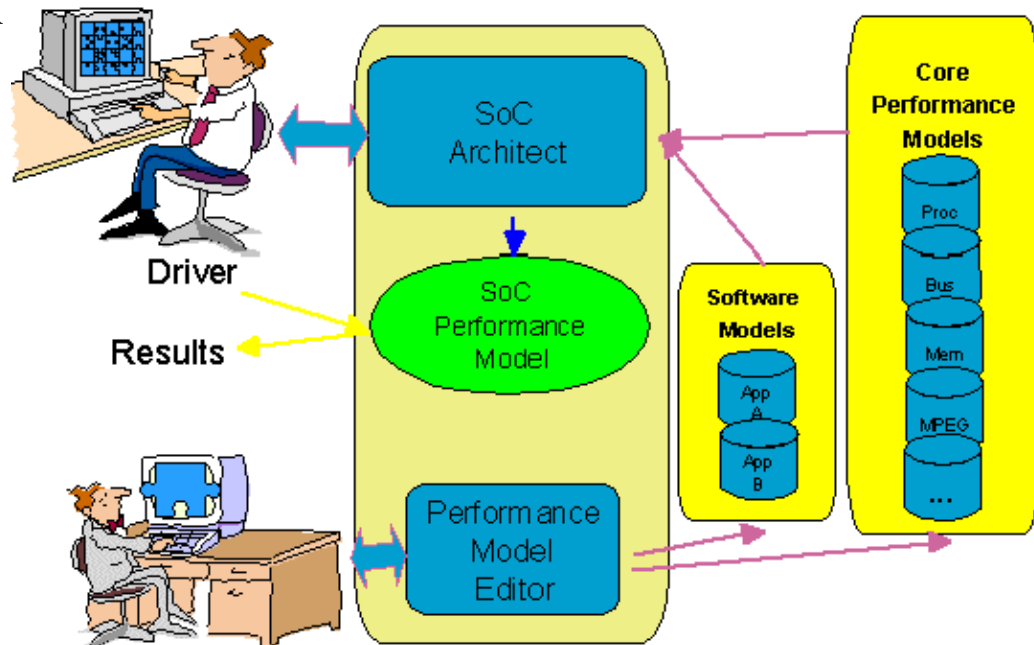
- a computer system designed to perform one or a few dedicated functions
- real-time computing constraints
- flexible, wide range of end-users needs, common use as PCs
- designed to do specific tasks
- embedded processors
 - 1) Microcontrollers → AVR
 - 2) Microprocessors → DSP
 - 3) System on Chip(SoC) → FPGA



پردازنده های تصویر

We Use SoC Solution Because...

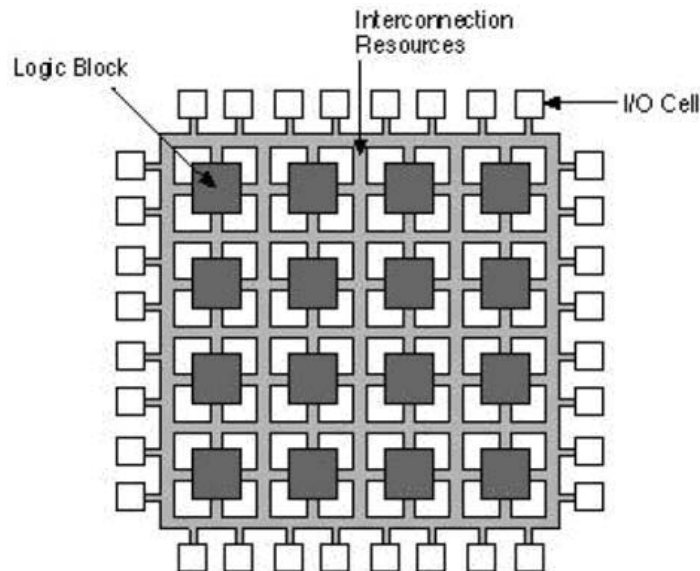
- It's a complete system consisting of multiple processors, multipliers, caches and interfaces
- It's a common array of n configuration for very-high-volume embedded systems
- It's parallel-performance-based



پردازنده های تصویر

We Use FPGA-based chips Because...

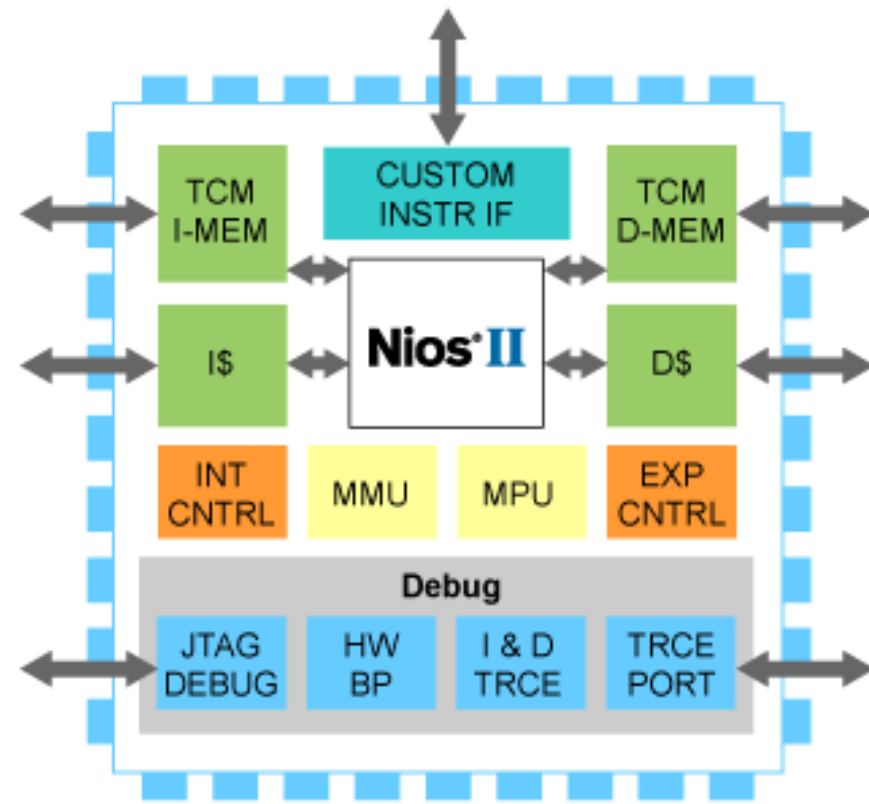
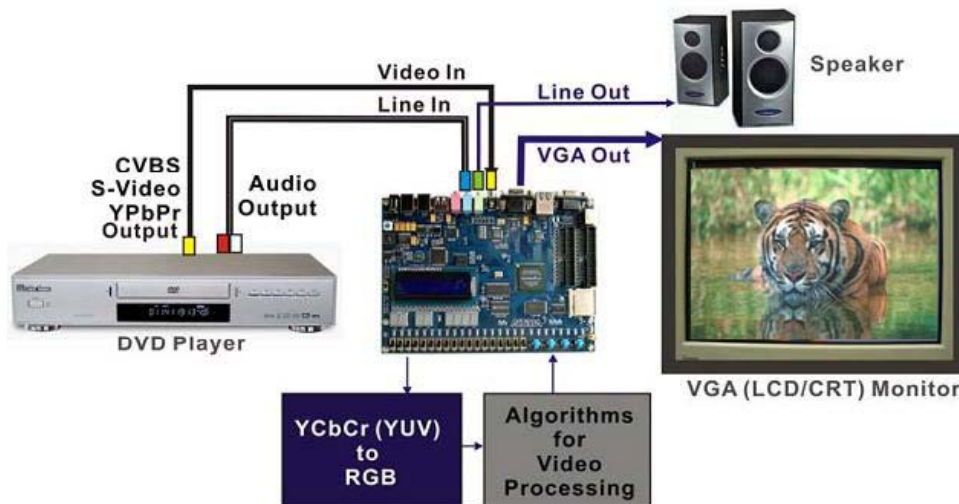
- It's a reconfigurable field of logic arrays
- It's a fast hardware system with range of MHz and GHz clock frequency
- It has so many various I/O pins with tiny packages
- It has hardware and software ability for wide-range designers



پردازنده های تصویر

We Use embedded-processing-based Because...

- It uses popular C language programming
- It is easy and fast to learn, design and perform
- It uses a high-tech design method



حوزه های فعالیت

همکاری در تعریف، اجرا و ارائه مقاله در خصوص
پایان نامه های کارشناسی ارشد و دکترا

برگزاری دوره های تخصصی پردازش تصویر مبتنی بر
Embedded Processors

طراحی ماژولهای سخت افزاری و نرم افزاری
پردازش تصویر