

9-11-2001

559 DAY 3

~~CALL BACK~~

Help from Vis Shd'ed

Trade homework / survey for books  
↳ at least surveys

Direct Link to  
Example

Programs? HAND-IN DIRECTORIES? Everyone OK?  
LINK -

TODAY - DISPLAYS AND THE BASICS OF SIGNAL  
PROCESSING

LAST TIME  $\equiv$  EYES

How do we fake out the eye?

Phenomena in the world

CONTINUOUS IN TIME, POSITION, VALUE

BUT, INCONVENIENT FOR COMPUTER

DISCRETE IN TIME SINCE P.O.V.

# DISPLAYS BASED ON PERSISTENCE OF VISION

Movie Projector = 48 flashes / minute  
 24 frames / minute  
 rotating shutter  
 Flicker Rate

CRT (TV) - not always flashing  
 but nowadays

electron  
gun  
(cathode)

aiming  
device



phosphor - glows briefly when charged

Long persistence phosphor - old days  
 couldn't update fast

Storage Tube - explicitly clear

Raster Scan vs. Vector Scan

Pen plotters vs. Dot Printers

PIXELS - what is a pixel

Caligraphic Display

Use raster devices to simulate vector devices

Draw in Raster vs. Vector

↳ 1st part of course

Raster Scan CRT

Interlace

Twitter and other anomalies

Frame Buffer (memory per pixel)

vs. storing text, ....

# Discretization in Space - SAMPLING

① Displays as small regions

what happens when we draw?

draw a line

jaggies, crawlies, and worse!

halve a checker board

white or black answer

really bad - algorithm details matter!

Problem: want to map continuous phenomena  
onto discrete rep

Need tools to think about this

## SIGNAL PROCESSING

## SAMPLING THEORY

9/12/00

Day 3

SWITCH TO 559 - 73014  $\equiv$  CALL #

Books

DIRECTORIES

ASSIGNMENTS

TODAY: What is a Pixel?

RECAP:

2D IMAGES (ON MONITOR, EYE, ....)

RASTER  $\leftarrow$  BREAK IMAGE INTO SMALL REGIONS

DISCRETIZE

DISCREET VS. CONTINUOUS

Continuity in  $x, y$ , brightness, darkness

Computers don't do continuous

- DISCRETIZATION IN SPACE
- DISCRETIZATION IN VALUE

# Lecture 6

## SAMPLING AND RE-SAMPLING

### OR What is a Pixel Anyway

#### Procedure:

no help session

tiff program on Thursday

preliminary version of project

← Last time - what values to put into "pixels"

Today - "What is a pixel"

Today - Basics of Image Processing - highlight of a 2 semester course

An image is a 2D signal - easier to learn w/ 1D

#### MOTIVATION -

① pixel is little square  
draw a line

jaggies  
crawlies

where do these come from?  
how do we make them go away?

② halve an image  
chessboard - solid white or dark

doesn't seem to do the trick

Problem: trying to take continuous world  $\rightarrow$  discrete

A signal  $f(t)$  or  $f(x,y)$

Time Domain (Spatial Domain)

set of questions that we can answer

view of signal - time domain is just one

- need another view to analyse problems we had.