

# MULTIMEDIA CLASS 2016 TA CLASS

SLIDE 1:

INTRODUCTION TO IMAGE PROCESSING USING MATLAB

# FIRST THINGS FIRST

- EDMODO IS FOR HANDING OUT YOUR HOMEWORK AND ANNOUNCEMENTS
  - GROUP CODE: A6S3AZ
  - EACH HOMEWORK USUALLY HAS ABOUT 7-10 DAYS
- I WILL BE IN SPRL LAB ON MONDAYS, IN CASE YOU HAVE ANY QUESTIONS (3<sup>RD</sup> FLOOR)
- \*\* PLAGIARISM IS "NOT" TOLERATED! (YOU'RE BETTER OFF NOT TURNING IN YOUR HOMEWORK)\*\*
- ABOUT HALF OF YOUR SCORE IS THE HOMEWORK THAT YOU TURN IN
- THE REST WILL BE YOUR FINAL COURSE PROJECT
  - DO SOMETHING COOL, YOU WILL ENJOY IT ;-)
  - START THINKING ABOUT IT
  - TRY NEW FIELDS IN COMPUTER VISION / IMAGE PROCESSING / AUDIO PROCESSING / ...
  - IT TAKES MORE THAN A COUPLE OF DAYS TO LEARN USING MATLAB!!!



# OUTLINE

- INTRODUCTION TO MATLAB
  - BASICS AND EXAMPLES
- INTRODUCTION TO IMAGE REPRESENTATION IN MATLAB
  - BASICS AND EXAMPLES

# WHY MATLAB?

- MATLAB = MATRIX LABORATORY
- MATLAB IS A HIGH-LEVEL LANGUAGE AND INTERACTIVE ENVIRONMENT THAT ENABLES YOU TO PERFORM COMPUTATIONALLY INTENSIVE TASKS FASTER THAN WITH TRADITIONAL PROGRAMMING LANGUAGES SUCH AS C, C++ AND FORTRAN.
- MATLAB IS AN INTERACTIVE, INTERPRETED LANGUAGE THAT IS DESIGNED FOR FAST NUMERICAL MATRIX CALCULATIONS
- A HUGE AMOUNT OF TOOLBOXES AND CODE SAMPLES (CHECK OUT YOUR MATLAB HELP)
- A DE FACTO STANDARD FRAMEWORK FOR ACADEMIC ADVANCEMENTS
  - EXCEPT FOR ITS COMPETITOR IN COMPUTER VISION: OPENCV



MATLAB R2015b - academic use

HOME PLOTS APPS

New Script New Open Find Files Compare Import Data Save Workspace New Variable Open Variable Analyze Code Run and Time Simulink Library Layout Set Path Preferences Add-Ons Help Community Request Support

FILE VARIABLE CODE SIMULINK ENVIRONMENT RESOURCES

E: > University Files > Term13 > Multimedia > Slides > Session 1

**Current Folder**

Name	Git
html	.
2sinus.wav	●
2sinus_alias5000.wav	●
2sinus_alias10000.wav	●
Aliasing.asv	●
Aliasing.m	●
lena.tiff	.
MM2016Slide1.pptx	.
~\$MM2016Slide1.pptx	.

Details

Select a file to view details

**Command Window**

New to MATLAB? See resources for [Getting Started](#).

```
fx >> |
```

**Workspace**

Name	Value
ans	0
duration	0.0625
f1	6200
f2	12400
fs	40000
player	1x1 audioplayer
t	1x2501 double
y	1x2501 double
y0	1x2501 double
y1	1x2501 double
y2	1x626 double
y3	1x313 double

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audioplayer

ON THIS PAGE

Syntax

Description

Input Arguments

Methods

Properties

Examples

More About

See Also

audioplayer

Create object for playing audio

collapse all in page

Syntax

player = audioplayer(Y,Fs)

player = audioplayer(Y,Fs,nBits)

player = audioplayer(Y,Fs,nBits,ID)

player = audioplayer(recorder)

player = audioplayer(recorder,ID)

Description

player = audioplayer(Y,Fs) creates an audioplayer object for signal Y, using sample rate Fs. The function returns a handle to the audioplayer object, player.

player = audioplayer(Y,Fs,nBits) uses nBits bits per sample for signal Y.

player = audioplayer(Y,Fs,nBits,ID) uses the audio device identified by ID for output.

player = audioplayer(recorder) creates an audioplayer object using audio recorder object recorder.

player = audioplayer(recorder,ID) creates an object from recorder that uses the audio device identified byID for output.

Input Arguments

Y

Audio signal represented by a vector or two-dimensional array containing single, double, int8, uint8, or int16 values.

The value range of the input sample depends on the data type. The following table lists these ranges.

Data Type	Sample Value Range
int8	-128 to 127
uint8	0 to 255
int16	-32768 to 32767
single	-1 to 1
double	-1 to 1

Fs

Sampling rate in Hz. Valid values depend on the specific audio hardware installed. Typical values supported by most sound cards are 8000, 11025, 22050, 44100, 48000, and 96000 Hz.

nBits

Bits per sample. Specify only when signal Y is represented by floating-point values. Valid values depend on the audio hardware installed: 8, 16, or 24.

Default: 16

# MATLAB BASICS

- TO FIND OUT THE TYPE AND VALUE OF A VARIABLE YOU ARE USING: WHO, WHOS

```
>> who
```

Your variables are:

ans	f1	fs	t	y0	y2
duration	f2	player	y	y1	y3

```
>> whos y
```

Name	Size	Bytes	Class	Attributes
y	1x2501	20008	double	

- SAVING AND LOADING VARIABLES TO \*.MAT FILES: SAVE, LOAD
- A GOOD PRACTICE TO INCLUDE IN YOUR FILES BEFORE DOING ANYTHING:
  - CLEAR ALL, CLC, CLOSE ALL, FCLOSE ALL;



# MATLAB BASICS

- MAIN MATLAB VARIABLE TYPE: MATRIX
- CREATING MATRICES:
  - $A = [1 \ 2 \ 3; 4 \ 5 \ 6; 7 \ 8 \ 9]$
  - SPECIAL MATRICES: ZEROS, ONES, RAND, RANDN, EYE
  - FINDING SIZE OF MATRIX:  $\text{SIZE}(A) = [3 \ 3]$
  - $\text{SUM}(A)$ ,  $\text{SUM}(A, 2)$ ,  $\text{SUM}(\text{SUM}(A))$
  - CODE
- FINDING SOMETHING IN A MATIX:
  - $\text{FIND}(A < 4)$



# CONTROL STATEMENTS

- IF STATEMENT
- SWITCH STATEMENT
- FOR LOOP
- WHILE LOOP
  - CONTINUE
  - BREAK
  - END
- WHENEVER IN DOUBT, USE MATLAB HELP

# M-FILES

- THERE ARE 2 KINDS OF \*.M FILES
  - FUNCTIONS
    - WELL, YOU SHOULD KNOW WHAT FUNCTIONS ARE, IF NOT, GOOGLE IT 😊
    - WE WILL GET INTO MORE DETAILS LATER
  - SCRIPTS
    - SCRIPTS ARE SIMPLE MATLAB CODE THAT WILL BE RUN LINE BY LINE
    - IT'S LIKE YOU WOULD RUN THEM LINE BY LINE IN COMMAND WINDOW



# ANY QUESTIONS?

BTW, WE HAVE GIT!

CHECK MY WEBSITE FOR DOWNLOADING MATLAB AND GETTING THE GIT LINK

[WWW.NMAHMOUDI.IR/TEACHING.PHP](http://WWW.NMAHMOUDI.IR/TEACHING.PHP)

# LET'S GET TO BUSINESS

- CHECK THE MATLAB CODE