



THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

# Department of Electronic & Computer Engineering

電子及計算機工程學系

## ELEC 1020

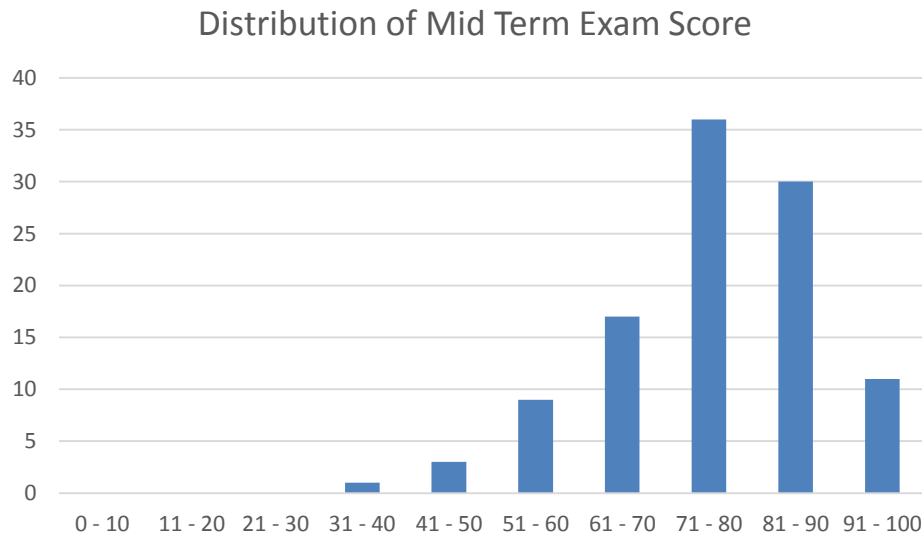
### Media Production: Technology and Design

#### Lecture 6



# Announcement - 1

1. Mid-term Exam Results and Sample Answer will be released soon.
2. For any inquiry, approach the lead TA, Ming, within this week, but think twice before doing that.

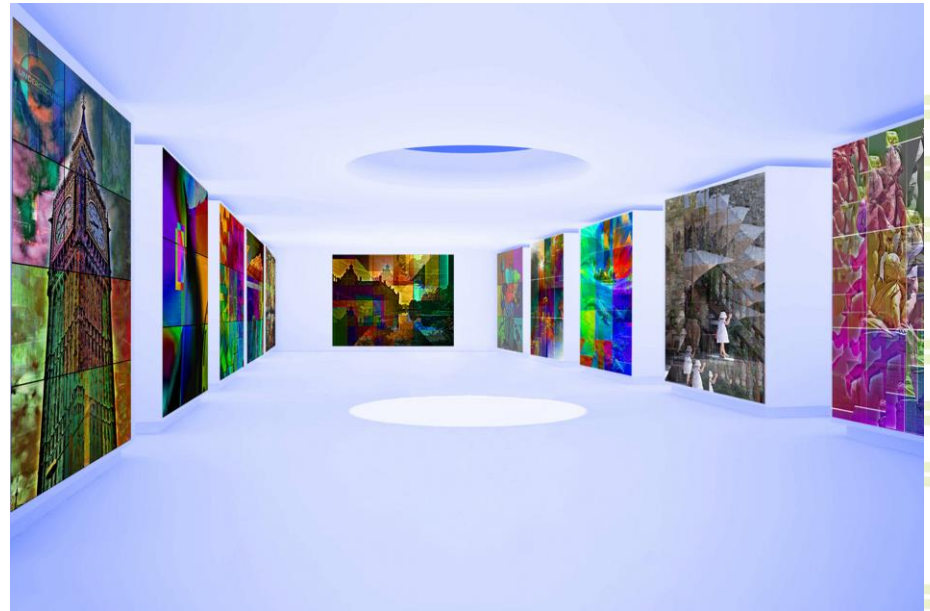
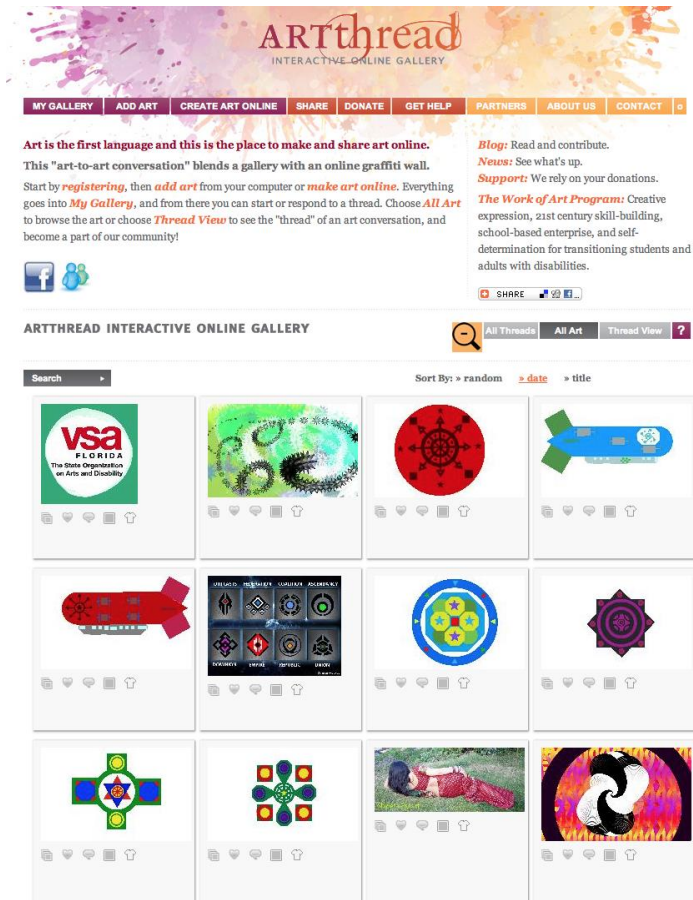


min: 31% (1)  
max: 100% (1)  
mean: 75.6% (60+)

## Announcement – 2 - Midterm Project

- **Topic: 1020 Online Interactive Gallery**
  - an online gallery on mobile to show the works by yourself or classmates
- **Audiences: UST students who are interested in ELEC1020**
- **Design Goals:**
  - allow audiences to understand ELEC1020;
  - allow audiences to explore and learn from the student works;
  - utilize media design and technologies to create cool online experiences;

# Announcement – 2 - Examples



## Announcement – 2 – Basic Requirements

Details available tomorrow

Deadline: 29-Mar (2 wks from now), last day for the holiday

### Evaluations:

- Design principles – mapping design, technologies and purposes
- Interactivity – does the site allow students to do something other than read text?
- Visual/audio Stimulating – does the site draw the student to explore more?
- Coolness factor – would this be a site would talk about and share with others?



## Announcement – 3: Guest Speaker (Next Lecture)

**Victor Kam**

Technology & Media  
Contributor

New Sight (目養計劃)

The story of New Sight

Get messages/inspiration  
you need for your lab video  
project



# Last Lectures

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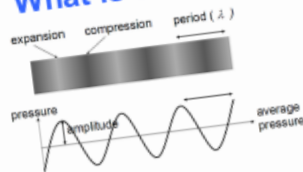
## 1-page Mid-Term Exam

15:10 – 16:10  
\*lecture after exam

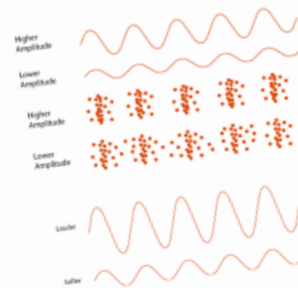
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## Basic physics of waveform

### What is a wave?



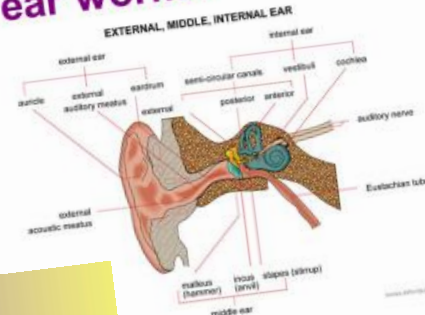
- Amplitude  $\rightarrow$  Loudness



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## How ear works?



z..z...Z

utilizes the multimedia...  
[www.youtube.com/watch?v=qgdqp-oPb1Q](http://www.youtube.com/watch?v=qgdqp-oPb1Q)

9

# Selected Tasks



<https://www.youtube.com/watch?v=ErKEJaT5YgM>

- Great acting
- Good use of interesting background music
- Good use of echo



<https://www.youtube.com/watch?v=5Ps8qaxiKIM>

- Good use of sound effects
- Great acting

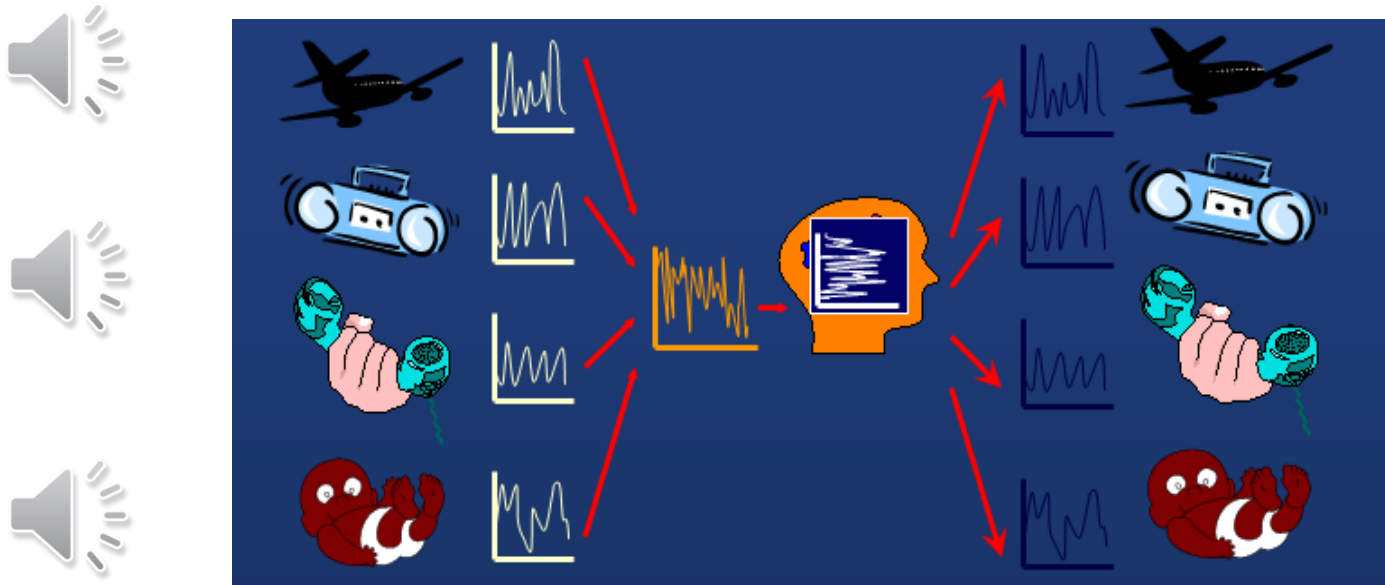


# Outcomes from this Lecture

1. Sound Effects
2. Interactivity
3. Interaction Design

# Recall-Human Perception and Sound Effects

## The magic of human brain



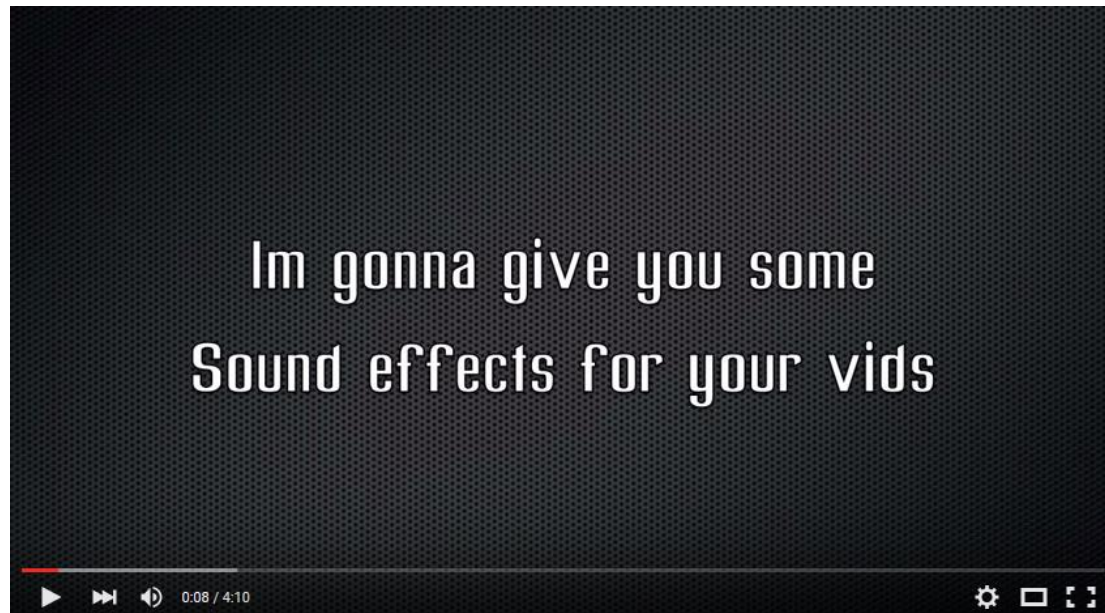
**Magical brain capability:** map a collection of perceived sound waveforms (sound effects) to some known objects, memories, feelings, scenes, messages, etc.

- We can **manipulate** this on your audience to convey a **marketing message** more effectively

# Recall - Audio Processing, Human Perception, Design Principles

## What is Sound Effect?

<http://www.youtube.com/watch?v=fbDFAaPfl28>



# Audio, Human Perception, Design Principles

## Sound Effects, Why?

1. Enhance your artistic visual presentations/design
2. Proper/ professional/creative sound effects to convey your message (intended feeling) to the audience more effective

# Audio, Human Perception, Design Principles

## Copyrights

Without a proper right granted, you may be illegal to use a sound effect:

1. Pay for sound effects if affordable
2. Use the royalty/license-free sound effects
3. Create (produce/modify) your own sound effect, especially more creative, personalized or unique ones.



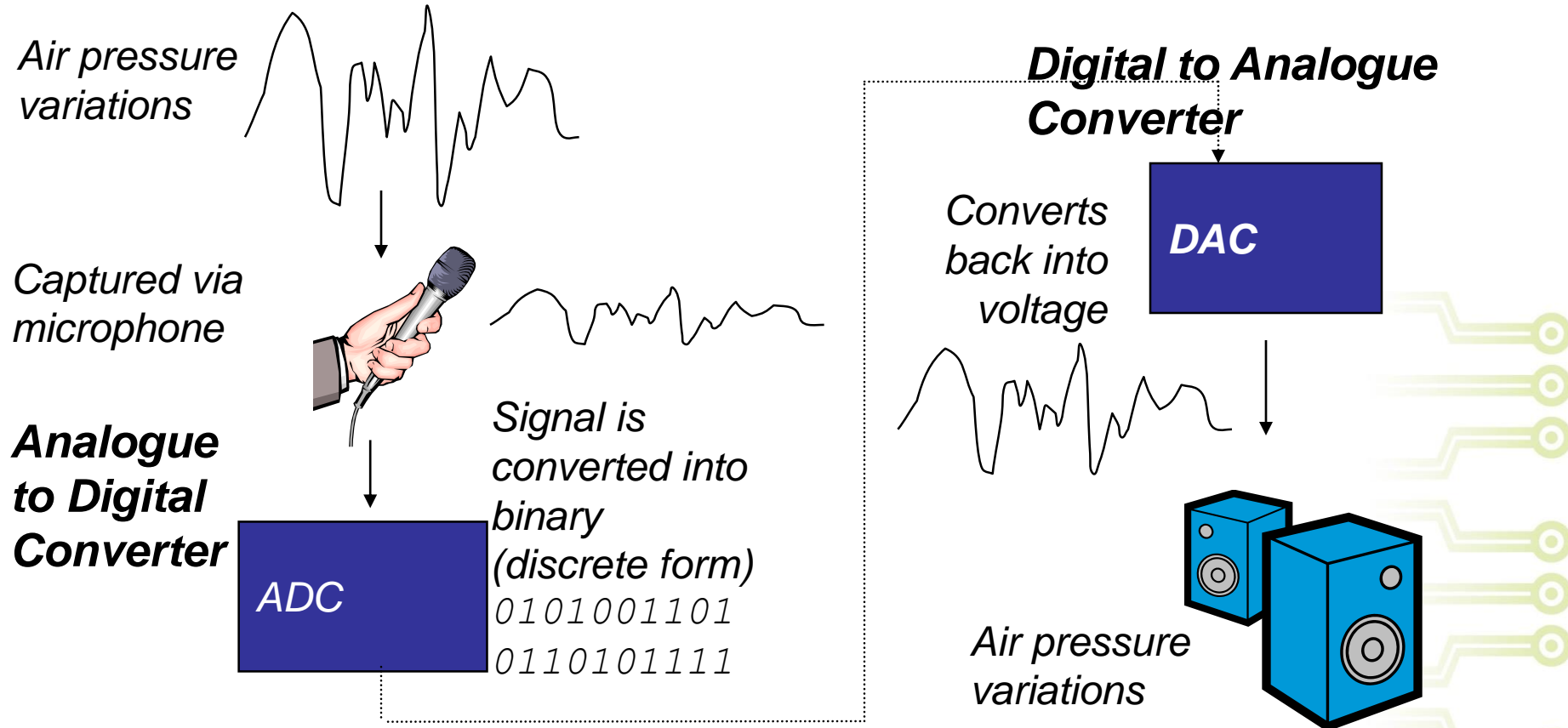
# Audio, Human Perception, Design Principles

## Sound Effects – created from the sources

1. Record sounds naturally from the sources in nature, environments , objects, animals, devices, etc.
2. Synthesize from the scratch through software
3. Combine above, and apply various audio processing techniques on existing sound tracks you found

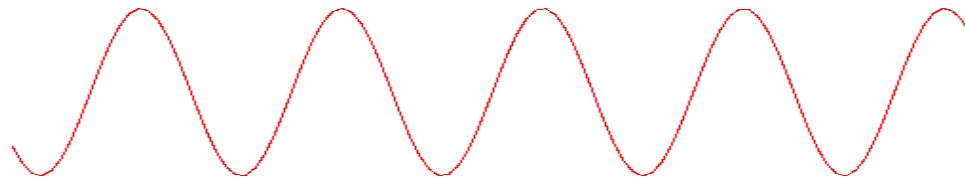
Example: (<http://www.youtube.com/watch?v=IMgovfQjxUA>)  
(00:18:00 -00:40:00)

# Capture and playback of digital audio



- **Sampling rate** (frequency)
- Resolution: **number of bits**/sound sample (recall bit/pixel)

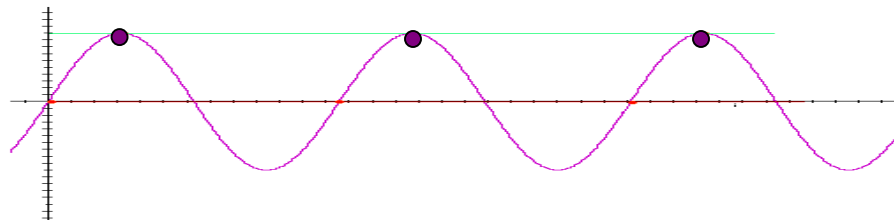
# Sampling Rate (Frequency)



Nyquist sampling theorem:

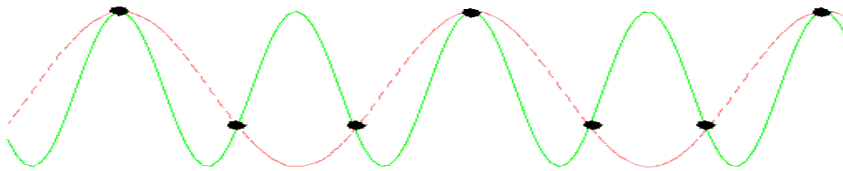
To capture/record a sound signal perfectly, it must be sampled at a sampling rate ( $f_s$ ) greater than or equal to twice its highest frequency component ( $f_c$ )

$$\text{i.e., } f_s \geq 2f_c$$

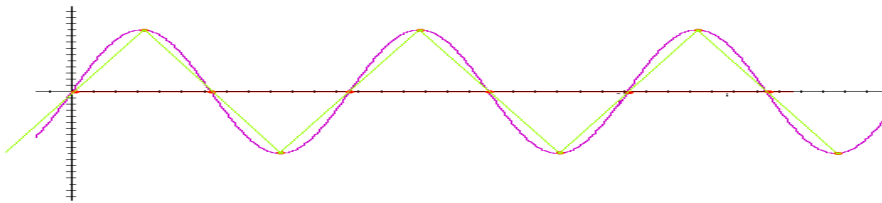


***Sampling at 1 time per cycle***

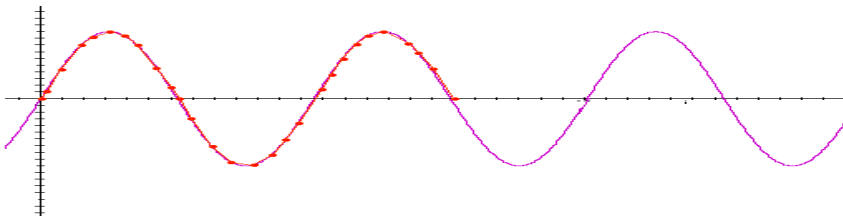
# Sampling Rate



***Sampling at 1.5 times per cycle***



***Sampling at 2 times per cycle***



***Sampling > 2 times per cycle***

*sample at many time per cycle*

## Relationship between Quality (Sampling Rate) and File Size

### Can we make sound quality better with smaller costs?

- Human ear can perceive 10-20 KHz (range used in music)
- CD quality audio:
  - sample rate with 44,100 samples/sec
  - sample size of 16-bits

For an hour music:

- $60 \text{ min} \times 60 \text{ s/min} \times 44,100 \text{ samples/sec}$   
x 2 bytes/samples x 2 channels (stereo)  
= 635,040,000, about 600 Mbytes (typical CD)



# Audio Formats

- Similar to compressing image, use some compression techniques to reduce the file size

| Audio Format               | File Extension | Advantages  | Disadvantages  | Applications  |
|----------------------------|----------------|---|--|---|
| Wave                       | .wav           | <ul style="list-style-type: none"><li>• Best sound quality</li><li>• Supported without a plug-in</li></ul>                                | <ul style="list-style-type: none"><li>• <b>Uncompressed</b></li></ul>                                  | <ul style="list-style-type: none"><li>• Background music</li><li>• Musical E-greeting card</li></ul>        |
| MP3                        | .mp3           | <ul style="list-style-type: none"><li>• Good sound quality even though <b>compressed</b></li><li>• Can be streamed over the Web</li></ul> | <ul style="list-style-type: none"><li>• Requires standalone player or browser plug-in</li></ul>        | <ul style="list-style-type: none"><li>• Short voice greetings</li><li>• Music</li><li>• Streaming</li></ul> |
| Advanced Audio Compression | .aac           | <ul style="list-style-type: none"><li>• <b>Compressed</b> while keeping good sound quality</li><li>• Used on iTunes</li></ul>             | <ul style="list-style-type: none"><li>• Copy protected</li><li>• Limited to approved devices</li></ul> | <ul style="list-style-type: none"><li>• Music on iOS devices</li></ul>                                      |

**Adobe Audition can convert among most of the common audio formats!** 19

# Interactivity of Media (or Interactive Media)

# Animation vs. Interactive Media



<https://www.youtube.com/watch?v=v3hN6PBDSxU>

<http://m.theatlantic.com/magazine/archive/2013/04/the-touch-screen-generation/309250/>

# Active Control

## Voluntary Information Flow

- Voluntary and instrumental actions that directly influences the controller's experiences
- Users can change the info. flow, jump from one info. point/source to another one.
- Possible for non-linear flow of info.

# Active Control

## Examples of voluntary control

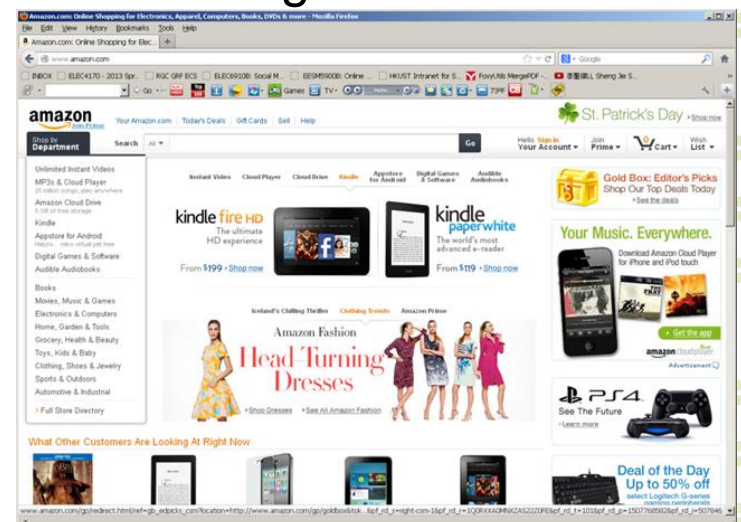
### Advertising on TV

- Interrupt viewings
- Involuntarily switch channels to avoid commercials



### Banner Advertising

- Banners ad on the same page with other content
- Click for more info. if an ad is interesting





# Two-way Communication

## React

- Traditional media: only effective in transmitting company messages to consumers in one-way.
- 2-way: able to react/feedback the info.
- 2-way: able to complete a task

# Two-way Communication

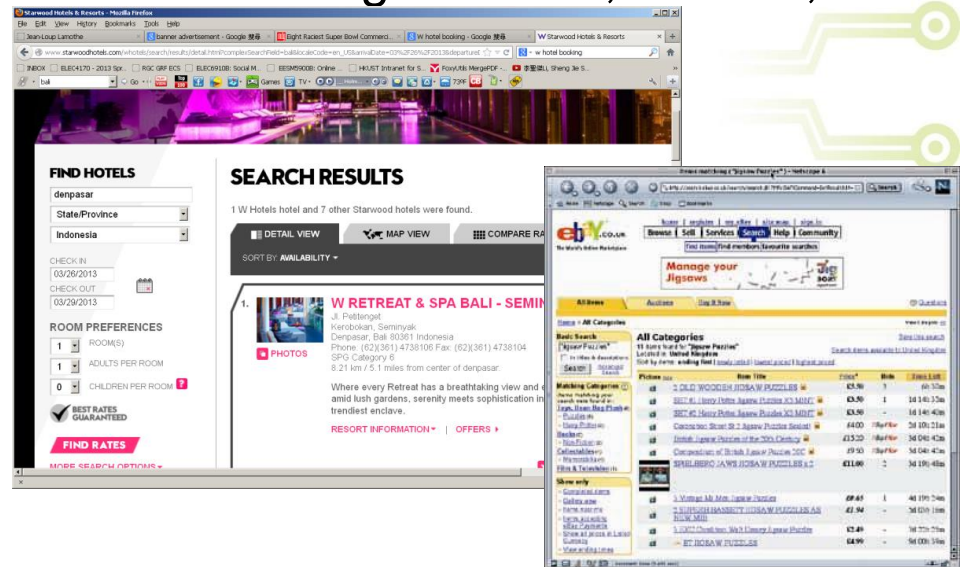
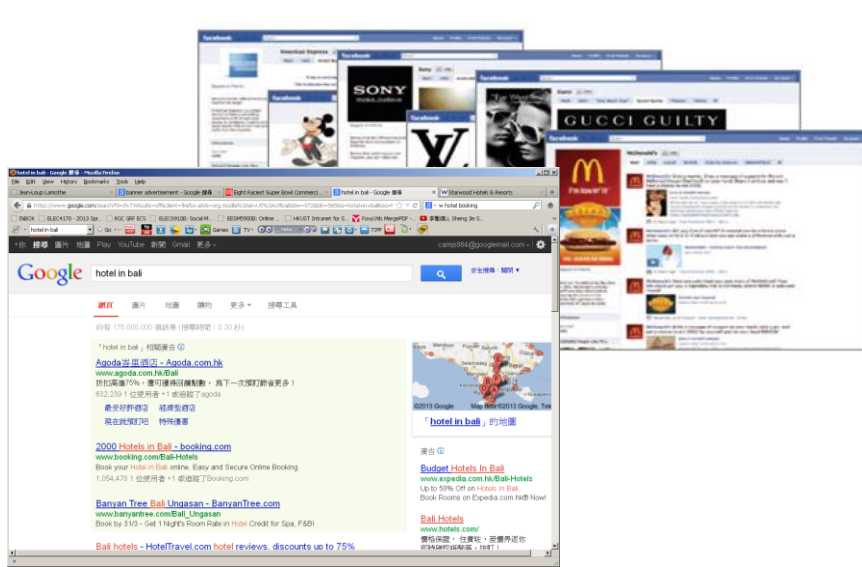
## Examples of reacting/completing a task

### Brand communications

- Consumer can give feedbacks (implicitly or explicitly)
- Learn users behaviors/preferences to adjust content

### Online transaction

- Complete a task online that is not possible by other media.  
e.g., purchase order/payment, course registrations, auction, etc.



# Synchronicity

## Duration to react users inputs

- Degree and/or time to which a user input into a communication and the responses they receive
- Traditional media: few channel for user inputs (e.g., reader's letters or phone), the time elapsed for a responses could be long
- Users can indicate what content and layout they like, and immediately see the page exactly as they want it

# Synchronicity

## Timely, cohesive and reliable manner

### Systems responses

- A user click on a link and receive nothing more than a “Page Not Found”
- Computational performance to complete a transaction within a reasonable time reliably

### Associating other media responses

- All associated media files for a presentation (e.g., background music for a document) must be in place in time before playing
- The sound effects should be started at the right timing.

# Why Interactive?

## Value 1: User Learning

- Users engage a deeper cognitive processing to understand and remember the messages or additional info. better.
- Higher interactivity: lead to better learning by enhancing users self-efficacy (Mitchell et. al 1994)

## Value 2: User Satisfaction

- Feeling of being in control has been considered a desirable psychological state leading to increased self-efficacy beliefs
  - Gist and Mitchell 1992



# Recall: Animation vs. Interactive Media



<https://www.youtube.com/watch?v=v3hN6PBDSxU>

<http://m.theatlantic.com/magazine/archive/2013/04/the-touch-screen-generation/309250/>

# Applications of Interactive Media

## Amplifying the impacts of your media

**Advertising/ Marketing/ Learning**

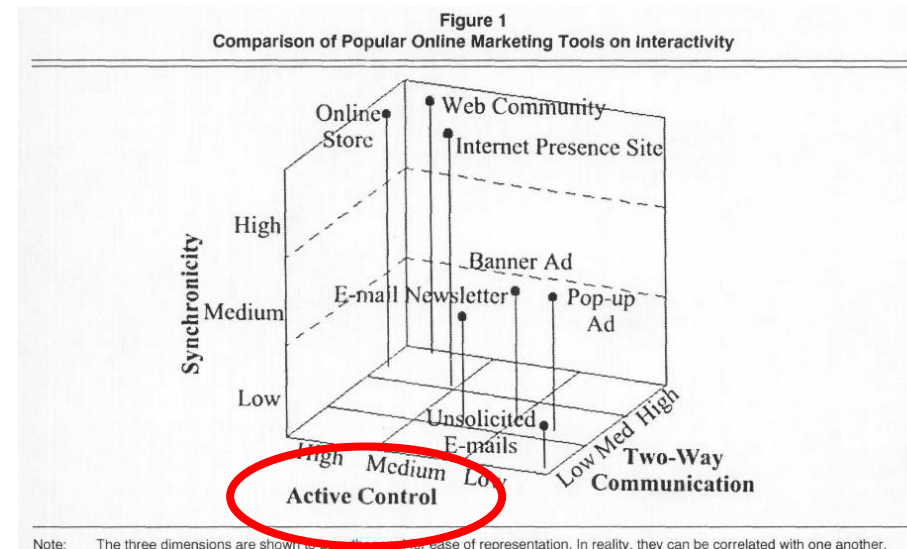
# Techniques for Interaction Design

# Multiple Timelines

## Active Control

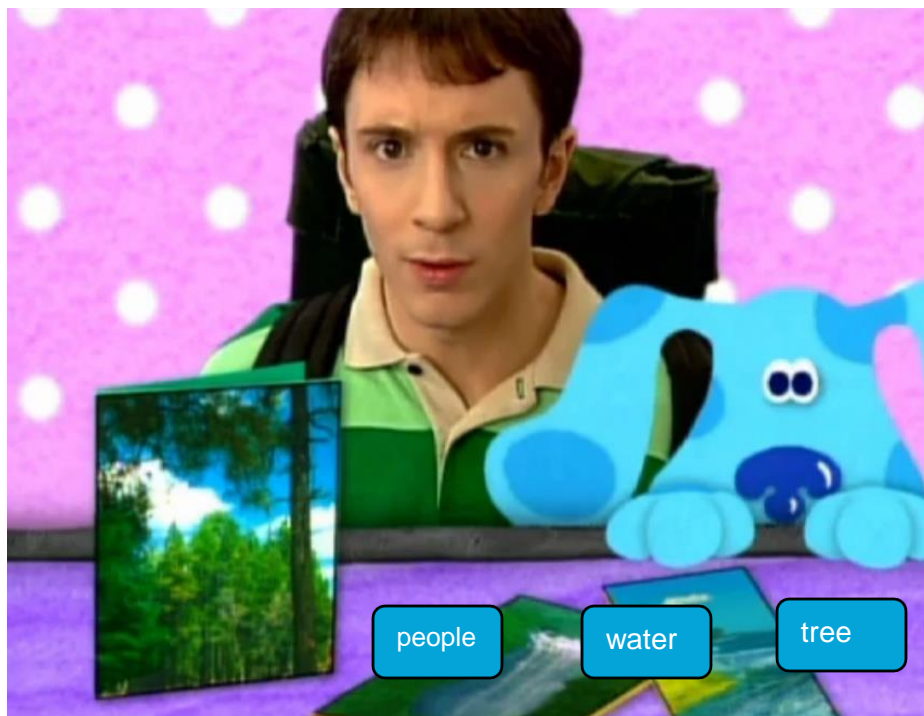


<http://www.cite-sciences.fr/au-programme/expos-permanentes/cite-des-enfants/jeux-2-7-ans/jeux/animaux/animaux.html>



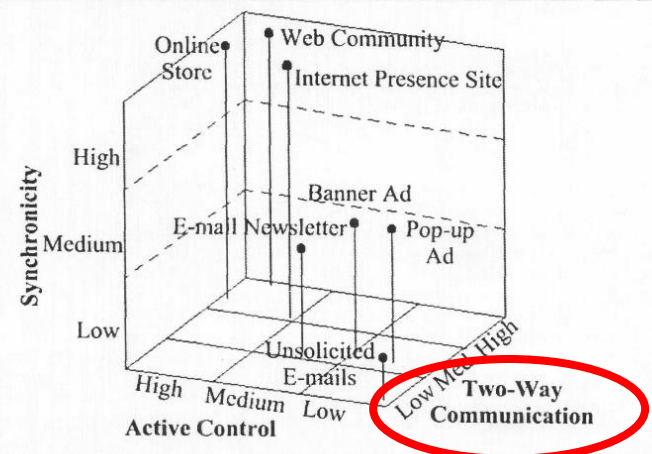
# Interaction with a Pause and Logic

## 2-way Communication



wow, looks at this forest environment.  
It's full of \_\_\_\_\_. What does it full of?

Figure 1  
Comparison of Popular Online Marketing Tools on Interactivity



Note: The three dimensions are shown to be orthogonal for ease of representation. In reality, they can be correlated with one another.



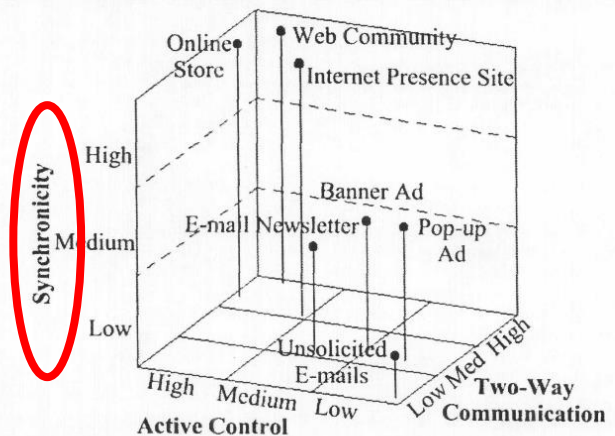
# Multiple media/ Objects

## Synchronicity

- Example:  
<http://ihome.ust.hk/~pcng/hideSeek/>



Figure 1  
Comparison of Popular Online Marketing Tools on Interactivity



Note: The three dimensions are shown to be orthogonal for ease of representation. In reality, they can be correlated with one another.



# Animated Object (AO) & Animation of Animated Object (AAO)

- Animations multiple objects as one, you can:
  - edit the group animation as one object
  - edit the animation for each individual object in the group



AO

+

AAO



# Active Control with AAO

- Button – Click to trigger the AAO animation
  - Hover – Hover to animate the individual AO
- 
- Demo: <http://ihome.ust.hk/~pcng/ChromeVSIE/>

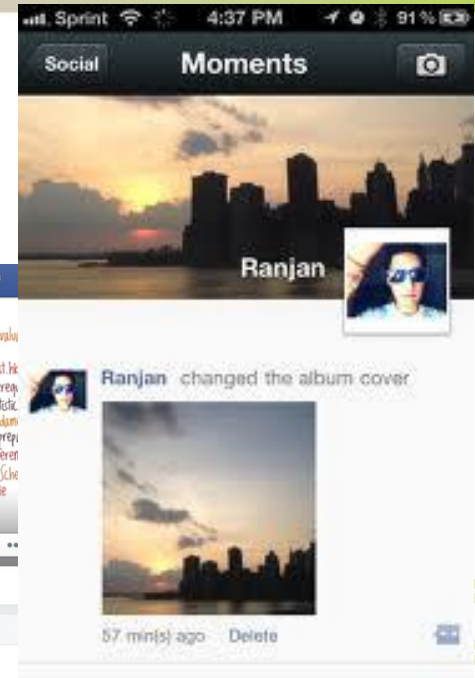
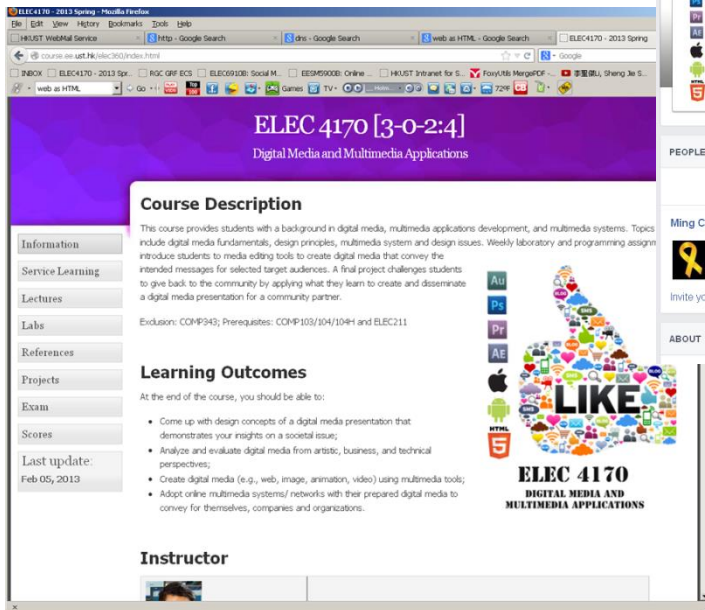


# Web as a media

## HTML

# Web as a Medium

Accessible by various smart devices



# Behind the Medium

Similar to the sounds and images,  
what you see physically is not what you actually see

*What actually behind is...*

**ELEC 4170 [3-0-2:4]**  
Digital Media and Multimedia Applications

**Course Description**

This course provides students with a background in digital media, multimedia applications development, and multimedia systems. Topics include digital media fundamentals, design principles, multimedia system and design issues. Weekly laboratory and programming assignments introduce students to media editing tools to create digital media that convey the intended messages for selected target audiences. A final project challenges students to give back to the community by applying what they learn to create and disseminate a digital media presentation for a community partner.

Exclusion: COMP343; Prerequisites: COMP103/104/104H and ELEC211

**Learning Outcomes**

At the end of the course, you should be able to:

- Come up with design concepts of a digital media presentation that demonstrates your insights on a societal issue;
- Analyze and evaluate digital media from artistic, business, and technical perspectives;
- Create digital media (e.g., web, image, animation, video) using multimedia tools;
- Adopt online multimedia systems/ networks with their prepared digital media to convey for themselves, companies and organizations.

**Instructor**

```
1 <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
2 <html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">
3 <head>
4 <meta http-equiv="content-type" content="text/html; charset=utf-8" />
5 <meta name="description" content="" />
6 <meta name="keywords" content="university, course, elec, 4170, electronic, computer, engineering, digital, media, multimedia, app
7 <meta name="author" content="ELEC 4170 ECE HKUST" />
8 <link rel="stylesheet" type="text/css" href="variant-creative.css" media="all" />
9 <title>ELEC4170 - 2013 Spring</title>
10 </head>
11 <body class="twocolumn">
12 <div id="wrap">
13 <div id="header">
14 <h1>ELEC 4170 [3-0-2:4]</h1>
15 <p>Digital Media and Multimedia Applications</p>
16 </div>
17 <div id="leftside">
18 <h2 class="hide">Menu:</h2>
19 <ul class="avmenu">
20 <li><a class="current" href="index.html">Information</a></li>
21 <li><a href="service.html">Service Learning</a></li>
22 <li><a href="notes.html">Lectures</a></li>
23 <li><a href="lab.html">Labs</a></li>
24 <li><a href="reference.html">References</a></li>
25 <li><a href="project.html">Projects</a></li>
26 <li><a href="exame.html">Exam</a></li>
27 <li><a href="score.html">Scores</a></li>
28 </ul>
29 <div class="announce">
30 <h2>Last update:</h2>
31 <p><strong>Feb 05, 2013</strong></p>
32 </div>
33 </div>
34 <div id="content">
35 <h1>Course Description</h1>
36 
37 <p>This course provides students with a background in digital media, multimedia applications development, and multimedia
38 <p>Exclusion: COMP343; Prerequisites: COMP103/104/104H and ELEC211</p>
39 <br>
40 <h1>Learning Outcomes</h1>
41 <p>At the end of the course, you should be able to:</p>
42 <ul>
43 <li>Come up with design concepts of a digital media presentation that demonstrates your insights on a societal issue;
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46 <li>Adopt online multimedia systems/ networks with their prepared digital media to convey for themselves, companies a
47 </ul>
48 <br>
49 <h1>Instructor</h1>
50 </div>
```

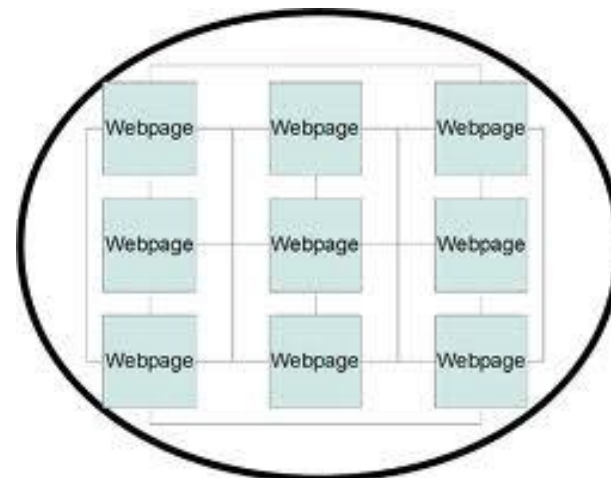
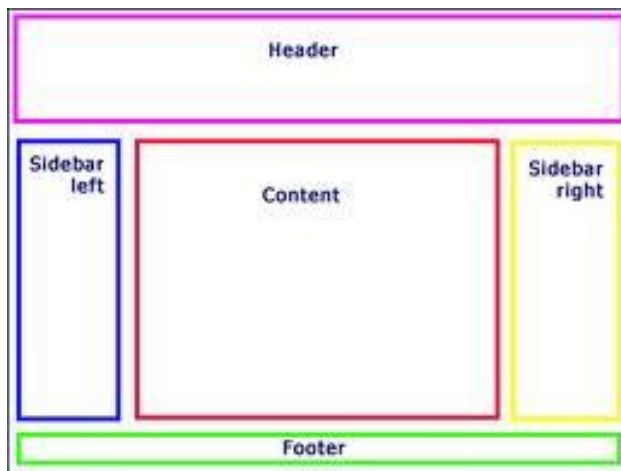
# Web as a type of Media Content

A Web(page) is

- HTML elements (headers, tables, etc.)
- multimedia elements (sound, images, video, etc.)

The HTML (HyperText Markup Language):

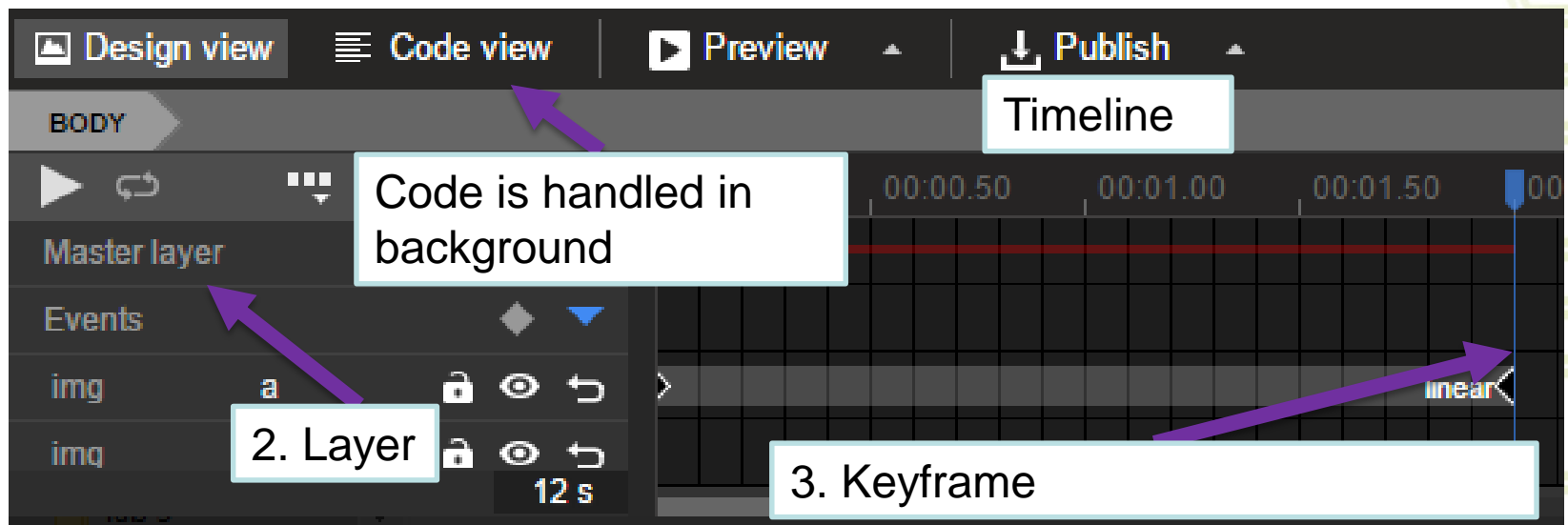
- create and organize info. within the page
- connect info. inside and outside the page





# What's New in HTML5?

- 5<sup>th</sup> version of HTML
- lots of new features for interactive media without plug-ins
  - <canvas>, <audio>, <video> and other new media features
- A user-friendly HTML 5 editing tool -> Google Web Designer



# HTML 5 – *<images> + <embedded youtube>*

HKUST-NIE Social Media Lab



The  
appl

**Result:**

```
43 <body>
44   
45 </body>
46
47 </html>
```

Design view

Code view

Preview

Publish

HKUST-NIE Social Media...



**Result:**

```
41 <link href="gwdyoutube_style.css" data-version="11" data-exp
42 <script data-source="googbase_min.js" data-version="3" data-
43 <script data-source="gwd_webcomponents_min.js" data-version=
44 <script data-source="gwdyoutube_min.js" data-version="11" da
45 </head>
46
```

Design view

Code view

Preview

Publish

Code view

Preview

Pu

**- End of Lecture 6 -**