# CTP431- Music and Audio Computing Course Introduction

Graduate School of Culture Technology KAIST Juhan Nam

### Who We Are

- Instructor: Juhan Nam (남주한)
  - Assistant Professor in GSCT, KAIST
  - Music and Audio Computing Lab: <u>http://mac.kaist.ac.kr</u>
- TA: Soonbeum Choi (최순범)
  - M.S. Student in GSCT, KAIST





For fun: <u>https://www.youtube.com/watch?v=G2Rhh\_4GZmU</u>

## Music Technology!

 A set of technologies that have changed the way that people are engaged in music as composer, performer and listener



### **Music Instrument and Performance**



Cristofori's FortePiano (1722)





Steinway Model D (1884 - )

#### **Music Instrument and Performance**



### **Music Composition**

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**Gregorian Chant** 







Xenakis "Pithoprakta"

### **Music Composition**

- MIDI-based Notation
- Compose music by algorithms
  - By rules or learning



MIDI (Piano roll) & Step Sequencer



Audio Programming (Max)



Automatic Composition (Jukedeck)

### **Music Production**



Recording in the early 20<sup>th</sup> century



Multi-track recorders

## **Music Production**

- DAW: recording, editing, processing and mixing
  - Digital audio effects





Digital Audio Workstation (DAW)

### Music Listening



Phonograph



LP



Cassette Tape





**Record Shop** 

# **Music Listening**

- MP3, streaming
- Music search and recommendation, Internet Radio



Smartphone



**Online Music Services** 



Shazam (Music Search)

#### **Music Communication Framework**



### Music Communication Framework (Today)



## **Course Goals**

- Understanding theoretical backgrounds in music technology today
  - Acoustics / Psychoacoustic
  - Digital Representations
    - Digital Audio
    - Spectrogram
    - MIDI
  - Algorithms
    - Digital Filters and Audio Effects
    - Sound Analysis and Synthesis
  - Interface
    - Visualization
    - Interaction Design

# **Course Goals**

- Practicing with sound examples and code
  - Collecting sounds by recording or searching on Internet
  - Analyzing, modifying and synthesizing sounds
  - Use of Audio Tools
    - Audacity, Adobe Audition (free on campus network)
  - Programming
    - HTML/CSS/Javascript and Web Audio
    - Matlab / Python (TBD)

# Why Web Audio?

- HTML5 standard
- Contain a number of audio signal processing components used in modern DAWs
- Easy to integrate with other multimedia components (e.g. WebGL)
- Free and no installation
- Platform-independent (but browser-dependent)
- Slow but keep being improved
- Many more ...

### Why Web Audio?



#### New GitHub repositories

# **Course Information**

- Course webpage
  - <u>http://mac.kaist.ac.kr/~juhan/ctp431/</u>
  - Basic course info, schedule and resources
- KLMS
  - Announcement
  - Question and Answers
  - Homework
  - Grading

# Grading

- Assignments: 40%
  - Javascript programming using web audio
- Midterm: 20%
  - Paper exam focusing on theories
- Final Project: 40%
  - Proposal / Presentation / Submission (by sharing on the web using Github)

### **Pre-requisites**

- Basic literacy
  - Programming language: variable, control, loop, function, class
  - Signal processing: meaning of x, y, t and f, Fourier transform (hopefully...)
  - Music: basic music theory
- HTML/CSS/Javascript: desired but not required