

Kunwoo Kim

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Interests: Artful Design, Augmented and Virtual Reality, Auditory Perception, Human Sentiments

EDUCATION

STANFORD UNIVERSITY

Doctor of Philosophy – Computer-based Music Theory and Acoustics

Sep.2019 – Jun.2024

- Advisor: Ge Wang

STANFORD UNIVERSITY

Master of Arts – Music, Science, and Technology

Sep.2017 - Present

- Denning Family Fellowship for the Arts (2018 – 2019)

- Advisor: Ge Wang

JOHNS HOPKINS UNIVERSITY

Master of Science in Engineering – Electrical and Computer Engineering

Aug.2012-Dec 2013

- Thesis: “Design and Analysis of a Respiratory Sound Simulator for Testing Auscultation Stethoscopes”

- Advisor: James E. West

JOHNS HOPKINS UNIVERSITY

Bachelor of Science in Engineering – Mechanical Engineering

Aug.2008-May.2012

Minor in Music – Piano Performance

- Member of Pi Tau Sigma – International Mechanical Engineering Honor Society

PROFESSIONAL EXPERIENCE

SENA TECHNOLOGIES, INC.

Researcher in Acoustics Engineering

Mar.2014 – Mar.2017

- Analyzed speakers and microphones of motorcycle headsets – frequency analysis, spectral analysis, Fourier analysis, timbre analysis, distortion analysis, equalization, etc.
- Used Audio Precision and acoustic chambers to make detailed measurements
- Trained in using the HEAD and Klippel
- Implemented echo cancellation technology for noise cancelling helmets
- Designed the Bluetooth speaker measuring tool and documented the testing procedures
- Executed hearing tests of every headset model’s speakers

JOHNS HOPKINS UNIVERSITY

Teaching Assistant - Circuits

Aug.2013 – Dec.2013

- Held 1 hour lecture every week on electronic circuit analysis
- Held problem solving sessions and office hours

RESEARCH/PROJECT

MIDI.CITY.

Designer

Mar.2019



- Designed an interactive mapping software of generative drum machine and granular synthesis into an aesthetic visual cityscape.



- Designed virtual reality (VR) audiovisual narratives of human perspectives on needs, time, and empathy
- Composed, synthesized, and implemented computer music algorithms and interactions
- Designed and animated 3D models, textures, and materials for characters and objects

PROCESSING HARMONIC CONTEXT: AN ERP STUDY

Author

Jan.2018 - Present

- Designed stimuli and experiment for an EEG study on how humans perceive tonality
- Pilot behavioral study and EEG experiment will be executed starting Jan. 2019

INTRINSIC JAZZ

Designer

Apr.2018 – May.2018

- Designed a virtual reality (VR) learning tool for beat, rhythm, and chord tracking in Jazz
- Designed musical algorithms and 3D models in VR

STRIA AND BRAIN

Designer

Feb.2018 – Mar.2018



- Designed a 3D visual representation of John Chowning's *Stria* (1977)
- Implemented EEG signals to control the parameters of visual effects



- Designed an interactive audiovisual essay on the parallel interplay between the evolution of human physiology and the development of music
- Composed and synthesized music and sound effects within the essay
- Designed and animated 3D models of characters, environment, and objects

ACOUSTIC MONITORING SYSTEM AND METHODS – PATENT US20140126732

Co-inventor

Feb.2010 – Dec.2013

- Designed a prototype of infant chest auscultation stethoscope to be used in the Third World Countries, collaborating with the Johns Hopkins Medical School
- Implemented microphone arrays
- Designed a microphone bias, pre-amplifier, microphone summation, Bluetooth transmission circuit.
- Used CAD to process the mechanical components of the design

DESIGN AND ANALYSIS OF A RESPIRATORY SOUND SIMULATOR FOR TESTING CHEST AUSCULTATION STETHOCOPES

Author

Jan.2013 – Dec.2013

- Designed a testing device using a loudspeaker and ballistic gelatin to create a stable auscultation environment
- Analyzed the performance of the device using frequency analysis and distortion analysis

VISUAL SOUND DETECTOR FOR THE HEARING IMPAIRED

Inventor/Author

Aug.2013 – Dec.2013

- Used sound localization technique to visualize the direction and intensity of a sound source to aid people with hearing impairment.
- Designed the circuit board, created the mechanical prototype, and programmed sound localization signal processing by level difference using ARDUINO.

MUSICAL INSTRUMENT CLASSIFICATION SYSTEM USING MEL-FREQUENCY CEPSTRAL COEFFICIENTS

Author

Nov.2013 – Dec.2013

- Classified 8 different instruments using vector quantization of the first four MFCCs.
- Trained the computer to classify them automatically after obtaining a sufficient set of data.

SPEECH ANALYSIS AND SYNTHESIS USING LINEAR PREDICTIVE COEFFICIENTS

Author

Oct.2013 – Nov.2013

- Created a programmed LPC Vocoder based on an all-pole model of speech production using MATLAB.
- Obtained LPC coefficients of a sample speech, and used them to synthesize the speech sample.

TWO TUBE SHAPE VOCAL TRACT SIMULATOR

Author

Mar.2013 – May.2013

- Simulated a human vocal tract by two cylindrical tubes using MATLAB.
- Estimated the formant frequencies with given lengths and areas and vice versa.

LOUDSPEAKER DESIGN

Inventor

Sep.2012– Oct.2012

- Designed and created a crossover and enclosure for a set of loudspeakers consist of two woofers and one tweeter.

THE DEVELOPMENT OF RELATIVE PITCH

Author

Feb.2011 – May.2011

- Used anthropological perspective to explain the human evolution in music
- Investigated if birds have relative pitch, and used the comparison to explain human development of relative pitch

STRING INSTRUMENT DESIGN

Inventor

Mar.2010 – Apr.2010

- Invented a trapezoid shaped string instrument with metal strings and a wooden enclosure.

MUSIC EXPERIENCE

Stanford Laptop Orchestra Performance – rU10

Co-composer

Feb.2018 – Mar.2018

- Composed an audiovisual piece for the Laptop Ensemble that conceptualizes potential influences of the digital network on human individuality
- Designed and animated a 3D Model that responds to the musical parameters of the performers

Stanford Laptop Orchestra Performance – rU01

Co-composer

Jan.2018 – Feb.2018

- Composed an audiovisual piece for the Laptop Ensemble that uses facial expressions to control parameters of granular synthesis
- Designed a visual projection algorithm to display facial changes of the performers on the mannequin

JAZZ PIANO PERFORMANCES

Performer

Aug.2015, Dec.2015, Feb.2016, Oct.2016, Dec.2017, Mar.2018

- Jazz Trio recital at Stanford's Campbell Recital Hall
- Jazz Combo performance at Stanford's Coffee House
- U. Hiromi – *Tom and Jerry Show*
- O. Peterson – *Over the Rainbow*
- B. Evans – *Nardis, Peri's Scope*

CLASSICAL PIANO RECITALS AT THE PEABODY CONSERVATORY

Performer

Mar.2009, Mar.2010, Mar.2011

- F. Lizst – *Paganini Etude No.6 A minor*
- F. Lizst – *Au bord d'une source from Anees de Pelerinage*
- B. Bartok – *Six Dances in Bulgarian Rhythm*
- F. Schubert – *Piano Prelude*

CONDUCTOR OF THE YOUTH CHOIR OF H.K.M CHURCH

Conductor

Feb.2010 – May.2010

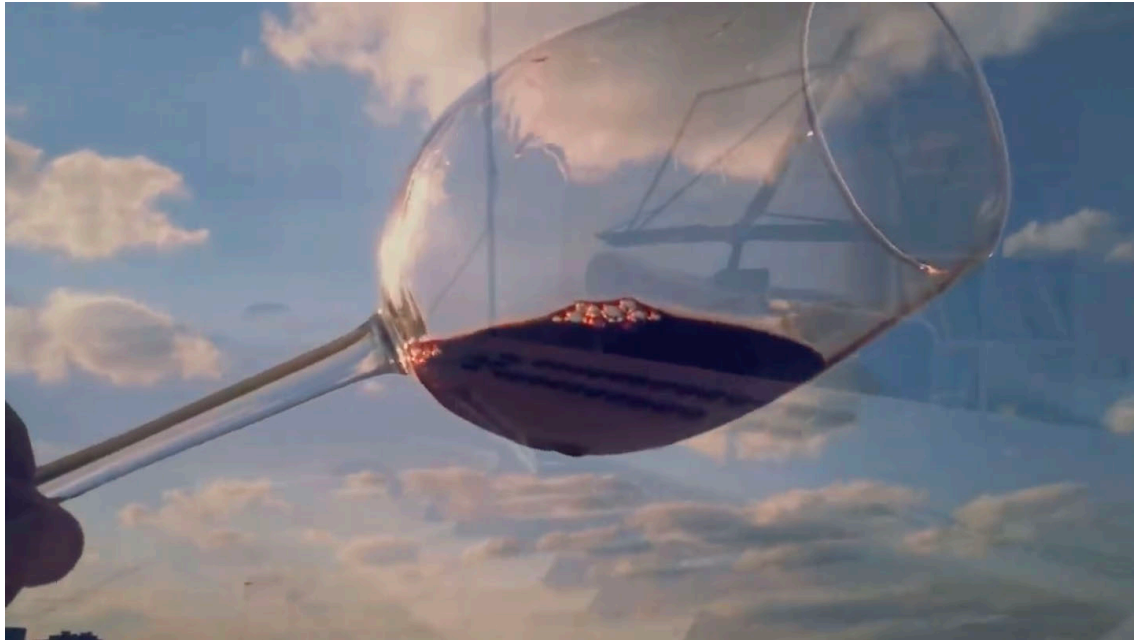
- Conducted the youth choir of Holy Korean Martyrs Church in Maryland.
- Held 2 hour practice sessions every week, and performed at weekly Saturday mass.

PIANO MOVIES

Director/Performer

May.2012 – Sep.2012

- Filmed abstract videos that overlaps with my piano performances. Scenes were selected to visualize my inspirations of the music.



- Y. Tiersen – *Comptine d'Un Atre Ete*
- P. Piper – *Frank Mills*
- J. Jung – *To the Lovers*
- B. Lee – *Irrevocable Footsteps*
- K. Kim – *About Thirty*

CONDUCTOR OF THE PORTSMOUTH ABBEY SCHOOL ORCHESTRA

Conductor

Mar.2006 – May.2008

- Conducted the high school orchestra at spring concert of 2007 and 2008.
- Held 3 hours of practice sessions every week.
- Performed *W. Mozart Symphony No.40 1st Movement*, *J.Strauss Voices of Spring Waltz*, etc.

FLUTE RECITALS AT PORTSMOUTH ABBEY SCHOOL

Performer

Mar.2005, Mar.2006, Mar.2007, Mar.2008

- P. Taffanel – *Andante Pastoral et Scherzettino*
- F. Prokofiev – *Sonata in D Major for Flute and Piano*
- G. Enesco – *Cantabile et Presto*
- F. Doppler – *Fantasie Pastorale Hongroise, Op.26*
- G. Faure - *Fantasie*

PIANO RECITALS AT PORTSMOUTH ABBEY SCHOOL

Performer

Mar.2007, Mar.2008

- F. Chopin – *Etude No.4 in C-sharp minor*
- L. Beethoven – *Piano Sonata No.14, Op.27*

PORTSMOUTH ABBEY SCHOOL MUSICAL THEATER

Flutist

Sep.2004 – May.2008

- Played flute for musical theater orchestra in 4 musical performances

SKILLS

AUDIOVISUAL DESIGN

Unity, Chunity

ACOUSTICS AND MUSIC SOFTWARE TOOLS

ChucK, Max/MSP, Supercollider, Audio Precision, Audition, Audacity, Finale, Octave

GRAPHIC SOFTWARE TOOLS

Blender, Sculptris, Mixamo

PROGRAMMING

JAVA, C, C++, C#, Python, MATLAB

ENGINEERING SOFTWARE TOOLS

AutoCAD, Solidworks, Eagle, Arduino

MULTIMEDIA SOFTWARE TOOLS

Adobe Premiere, Adobe After Effects, Final Cut Pro, Adobe Photoshop, Wordpress

ACTIVITIES

NOEXCUSES – TRIATHLON TEAM

International Affairs Chair/Member

May.2015-May.2018

- This is a triathlon team of 620 members that train and compete in triathlon races in South Korea.

- Finished 2017 Saipan Ironman 70.3 – Swimmer
- Finished 2016 Tongyeong ITU Triathlon World Cup
- Finished 2016 Sejong Triathlon Competition
- Finished 2016 Suwon Triathlon Competition
- Communicated with international companies to sponsor our team such as cycling products, health products, etc.
- Trained in swimming, cycling, and running every week for 3~5 hours.

MY ATELIER – VISUAL ARTS GROUP

Student/Member

Aug.2015 – May.2018

- This is a visual arts academy that offers daily lessons in water color/illustrations/pen art.

- Drawn around 20 water color/pen art/illustrations over the year.

KIM KWAN JIN JAZZ PIANO ACADEMY

Student/Member

Jan.2015 – Aug.2018

- This is a jazz piano academy that offers weekly lessons in jazz piano.

- Studied licks, copies, improvisations, chord usages of various artists such as Bill Evans, Oscar Peterson, Uehara Hiromi, Keith Jarrett, Chick Corea, Herbie Hancock, etc.
- Studied comping techniques, rhythm patterns, chord progressions, bass walking, melody faking, improvisations, etc.

JAMSIL SCUBA ACADEMY

PADI Rescue Diver

Dec.2016 – May.2018

- This is an official PADI academy that offers classes in Scuba Diving

- Participated in the diving trip to Boracay, Philippines on Dec.2016.
- Participated in the diving trip to Anilao, Philippines on Feb.2016.
- Finished courses in Open Water Diving, Advanced Open Water Diving, and Rescue Diving.

SEOUL CATHOLIC YOUTH BIBLE ORGANIZATION

Volunteer/Piano Accompanist/Head of Management/Director

May.2013 – Mar.2016

- This is a voluntary Catholic organization that holds 4 days of retreat every summer and winter that consists around 150 members and 30 volunteers.

- Participated as a volunteer for 2013 summer and 2013 winter retreat.
- Participated as the head of management for 2014 summer and 2015 summer retreat.
- Participated as a piano accompanist for 2014 winter retreat.
- Participated as the director for 2015 winter retreat.

KOREAN CATHOLIC COMMUNITY OF THE JOHNS HOPKINS UNIVERSITY

Freshman Representative/Sophomore Representative/President

Sep.2008 – May.2012

- Directed fund raisers and donated \$500 to homeless shelters in Seoul, South Korea.
- Held 2 hour meetings every week.
- Organized two retreats every year.
- Organized various events every month.
- The group grew from 12 members to 110 members by the end of my participation.

AWARDS

Denning Fellowship for the Arts

Full Scholarship for Stanford's CCRMA MST program

Sep.2018

Pi Tau Sigma

International Mechanical Engineering Honor Society

May.2012

Music Award - Instrumental

For excellence in music

May.2008

Cum Laude Society

For excellence in scholarship

May.2008