

# JONG WOOK KIM

SOFTWARE ENGINEER · DATA SCIENTIST · MUSIC INFORMATICIST

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## Employment

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### Pandora Media Inc.

Oakland, CA

RESEARCH SCIENTIST INTERN IN MUSIC INFORMATION RETRIEVAL

Jun 2017 - Aug 2017

- **Developed a recommender system using listener embeddings obtained by aggregating collaborative filtering results**, based on the latent embeddings obtained from user interaction data. The model was built in Apache Spark and was able to model the multimodal tastes of the listeners and produce clusters of their favorite music genres, yet the algorithm was efficient enough to be able to run on Pandora's entire user base within hours.

### Kakao Corporation

Seongnam, S. Korea

RECOMMENDER SYSTEM ENGINEER & DATA SCIENTIST

Jun 2014 - Aug 2015

- **Developed Apache Spark applications for the company's recommender systems** which were gradually being migrated from Apache Hive, and built a framework around Spark called CueSheet, which helps simplify the development cycle of Spark jobs by automating the application packaging and separating the concerns of the implementation and the configuration.
- **Developed a distributed API server in Scala that delivers personalized recommendations** in various domains, which were pre-computed and stored in the databases such as HBase and Couchbase. The deployment and scaling was managed using Marathon, and the system supported bucket testing for evaluating different recommendation algorithms on-line.
- **Designed and developed a distributed and fault-tolerant stream processing framework** built atop Apache Kafka, providing stream manipulation primitives such as filter, transformer and joiner for the modular implementation of streaming jobs. Joiner, in particular, leveraged in-memory data grids to combine two input streams which may have arbitrarily ordered data in real-time.
- **Made a core utility library in Scala** for the API servers and Spark applications being developed in the team, focusing on the simple and thread-safe usage. In addition to the basic IO and JSON conversion utilities, the library enabled easier nonblocking access to various endpoints that the team was using, including Elasticsearch, ZooKeeper, OpenTSDB, HBase, Couchbase, and HTTP servers.
- **Leveraged OpenTSDB and Grafana to record and visualize the real-time statistics** of the various kinds of applications running in the distributed architecture. Using ring buffers, the systems were able to publish real-time metrics without affecting the performance, and they were reflected in the report within seconds, helping quickly identify the trends as well as any unexpected behaviors.
- Built and maintained a Jenkins cluster that runs mission-critical Hadoop jobs for the company's recommender systems.

### NCSOFT Corporation

Seoul & Seongnam, S. Korea

GAME SERVER PLATFORM DEVELOPER

Aug 2012 - Jun 2014

- **Designed and developed a distributed server platform for Lineage Eternal**, the company's upcoming massively multiplayer online role-playing game (MMORPG). The platform was composed of a number of fault-tolerant clusters of Java and C++ servers, built using Netty/RxJava and Boost ASIO for the asynchronous and nonblocking IO. Its goal was to make the game playable without requiring the users to select and be limited to only one among many game servers.
- Built a cross-platform logging library in C++ that resembles SLF4j, to be used in Lineage Eternal's game servers.
- Managed the Perforce source control server, which had millions of files being shared among the team of 100+ members.

### NCSOFT Corporation

Seoul, S.Korea

GAME DEVELOPER INTERN

May 2011 - Aug 2011

- Developed the pathfinding engine of Lineage Eternal, used in both the game client and server, built on top of Havok AI.

### University of Michigan

Ann Arbor, MI

EDUCATIONAL SOFTWARE DEVELOPER

May 2010 - Aug 2010

- Developed interactive educational software visualizing molecular movements in Processing, for the thermodynamics class.

### Techno Press

Daejeon, S. Korea

WEB DEVELOPER & SYSTEM ADMINISTRATOR

Jan 2009 - Jun 2009

- Developed a website for Techno Press, a publisher of international journals in the field of civil engineering.

## Education

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### New York University

PH.D. (ANTICIPATED MAY 2019) IN MUSIC TECHNOLOGY

New York, NY

Sep 2011 - May 2012, Sep 2015 - Present

- Advised by Dr. Juan Pablo Bello, expected graduation in 2019. GPA 3.76/4.00
- Research interests include automatic music transcription using deep generative models and music recommendation.
- Relevant coursework: Probabilistic Graphical Models, Statistical Natural Language Processing, Convex Optimization, Deep Learning

### University of Michigan

M.S. IN COMPUTER SCIENCE AND ENGINEERING

Ann Arbor, MI

Sep 2009 - Apr 2011

- Advised by Dr. Georg Essl, focusing on intelligent systems and interactive music environments. GPA 7.76/9.00
- Relevant coursework: Machine Learning, Information Theory, Advanced Compilers, Advanced Computer Network

### Korea Advanced Institute of Science and Technology

B.S. IN ELECTRICAL ENGINEERING WITH A MINOR IN MATHEMATICAL SCIENCES

Daejeon, S. Korea

Sep 2006 - May 2009

- GPA 3.83/4.30, with 3.97/4.30 in electrical engineering and 4.03/4.30 in mathematical sciences.

### Imperial College London

UNDERGRADUATE RESEARCH OPPORTUNITY PROGRAM IN THE DEPARTMENT OF MECHANICAL ENGINEERING

London, UK

Jul 2006

- Developed tools for preprocessing data to be used in finite element method software

### Korea Science Academy of KAIST

Busan, S. Korea

Mar 2004 - Aug 2006

## Publications

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### CREPE: A Convolutional Representation for Pitch Estimation

J. W. KIM, J. SALAMON, P. LI & J. P. BELLO, IN *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing*

April 2018

### Fast Music and Audio Processing Using the Julia Language

J. W. KIM, S. RUSSELL, & J. P. BELLO, IN *Proceedings of the AES Conference on Semantic Audio*

June 2017

### Concepts and practical considerations of platform-independent design of mobile music environments

J. W. KIM & G. ESSL, IN *Proceedings of the International Computer Music Conference*

Jul 2011

## Teaching

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### New York University

INSTRUCTOR - MPATE-GE 2634 ADVANCED TOPICS IN MUSIC TECHNOLOGY: APPLICATIONS ON iOS PLATFORM

New York, NY

Sep 2017 - Dec 2017

- Gave a lecture focusing on mobile audio application development on iOS, using the Swift programming language

### New York University

LAB INSTRUCTOR - MPATE-GE 2617 C PROGRAMMING FOR MUSIC TECHNOLOGY LAB

New York, NY

Jan 2017 - May 2017

- Taught a lab class accompanying C programming lecture, covering the language basics and real-time audio programming in C.

### New York University

TEACHING ASSISTANT - MPATE-GE 2623 MUSIC INFORMATION RETRIEVAL, EL9173 AUDIO CONTENT ANALYSIS

New York, NY

Sep 2015 - May 2016

- Assisted in teaching the concepts of music informatics, held office hours, and graded written and programming assignments.

### University of Michigan

GRADER - EECS492 INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Ann Arbor, MI

Jan 2011 - Apr 2011

- Graded written and programming assignments.

## Korea Advanced Institute of Science and Technology

TEACHING ASSISTANT - CS101 INTRODUCTION TO PROGRAMMING

Daejeon, S. Korea

Sep 2008 - May 2009

- Taught the basic concepts of object-oriented programming in Java and graded programming assignments.

## KAIST Global Institute for Talented Education

HEAD TEACHING ASSISTANT - INFORMATION CLASSES

Daejeon, S. Korea

Dec 2006 - Jan 2008

- Developed materials and taught college-level computer science and electrical engineering to high school students.

## Presentations

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### No More “sbt assembly”: Rethinking spark-submit using CueSheet

SPARK SUMMIT EAST 2017

Boston, MA

Feb 2017

### MusicProcessing.jl: Music Information Retrieval in Julia

JULIA CON 2016

Cambridge, MA

Jun 2016

### Functional Reactive Programming with dart:async

GDG DEVFEST KOREA 2014

Seoul, S. Korea

May 2014

### Building High Performance Servers with Rx and Functional Reactive Programming

NEXON DEVELOPER CONFERENCE 2014

Seongnam, S. Korea

May 2014

## Honors & Awards

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- 2010 **Samsung Scholarship** USD 50,000 per year, for 5 years of the Ph.D. program
- 2009 **Kwanjeong Scholarship** USD 50,000 per year, for 2 years of the M.S. program
- 2008 **Meritorious Winner** in the COMAP Mathematical Contest in Modeling 2008
- 2006 **Korea Presidential Scholarship** KRW 10,000,000 per year, for 4 years of the B.S. program

## Software Projects

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- Apache S2Graph** Contributing to the Apache Incubator project, a distributed OLTP graph database.
- MusicProcessing.jl** A Julia library for music and audio processing.
- spark-ranking-metrics** Spark implementations of common evaluation metrics for ranking algorithms.
- eval-archiver-loader** A simple utility for compiling Scala code on-the-fly into a byte array and loading it dynamically.
- lyomiTerm** A MacOS telnet client and VT100 emulator for legacy Korean bulletin board services (BBS).
- Pie** An iOS telnet client and VT100 emulator for legacy Korean bulletin board services (BBS).

## Online Courses

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### An Introduction to Functional Analysis with distinction

ÉCOLE CENTRALE PARIS

Coursera

Mar 2014 - May 2014

### Principles of Reactive Programming with distinction

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Coursera

Nov 2013 - Jan 2014

### Functional Programming Principles in Scala with distinction

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Coursera

Mar 2013 - May 2013

## Skills

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- Programming** Contributed to Apache S2Graph, Hazelcast, LightFM, and other open source projects  
Scala, Python, Java, C/C++ professionally, and Julia, ObjC, PHP, JS, TS, Matlab for personal/research projects
- Music** Have played the oboe in many orchestras and the piano in bands; also have played the viola and taepyeongso
- Languages** English, Korean (native), Japanese (limited working proficiency)