# Jong Yul Kim

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## Education

**Columbia University**. . . . . New York, NY
Ph.D. in Computer Science. . . . . .Expected December 2013
M.S. in Computer Science. . . . . .May 2006
GPA: 3.9/4.3

**Seoul National University**. . . . . .Seoul, Korea
B.S. in Computer Science and Engineering. . . . . February 2005
GPA: 3.0/4.3

## Research Interests

Emergency communications, scalability and availability of SIP services, augmenting cloud computing platforms for value-added services, validation of network protocols.

## Research Experience

2010, 2011 **AT&T Labs - Research**
Summer Intern

*Scalability and high availability of SIP servlet containers*
Vendors of SIP servlet container clusters use different architectures and techniques to reach a similar set of scalability and high availability requirements. We identified four abstract elements that are common to SIP servlet container clusters and used it to build an evaluation framework [3], which allows us to reason about scalable, highly available properties of the clusters.

2005-2013 **Columbia University**
Graduate Research Assistant

*Deploying SIP server clusters on cloud computing platforms*
Elasticity of resources is an attractive platform trait for applications that need to scale in real time. My focus was on applying elasticity to SIP server clusters, beginning with a cluster of proxy servers that that scale dynamically based on real time load. I used Cassandra NoSQL database as a backend for added scalability [2]. In addition, I addressed the latency problem in cloud computing platforms due to VM resource contention. Latency can be masked using smart load distribution to multiple VMs [1]. I also experimented with simple primary-backup server failover and dynamic reconfiguration on a full commercial-grade SIP service [8].

*Emergency text communication*
As more people use Instant Messaging and SMS for daily communications, it becomes another potential way for the public to ask for help or report an emergency. We looked at ways that these media can be integrated with the emergency SIP infrastructure. We found that SIP methods such as SIP MESSAGE, which does not establish an end-to-end session, resembles the behavior of SMS and that there needs to be a way to send these messages to the same call taker consistently. We proposed and tested a timer-based state keeping mechanism in the proxies. More information is available in [4] and [10].

*IP-based emergency calling systems*
For emergency calling systems deployed on an IP network, new features not previously feasible on a PSTN network become possible but some of the easy problems (e.g. determination of caller location and location-based call routing) become a challenge. We implemented a SIP-based emergency calling system [6] with features such as location determination, delivery, and display;

location-based routing; language-based call distribution; and interactive voice response in case of "flash crowd" calls about the same incident. For the US Department of Transportation Next Generation 9-1-1 initiative, the system was improved with complex features like failover between call centers, call queues, and call taker status management and became the centerpiece of the proof-of-concept trials [7]. We presented a demo of the system at ACM SIGCOMM 2008 [5].

## Industry Experience

2000-2002 **Great Human Software Co., Ltd**
Software Engineer

Developed a server to facilitate web collaboration between caller and call takers; managed testing, customization, integration, and deployment in five call centers including banks and insurance companies.

## Teaching Experience

2009-2010 **Columbia University**
Preceptor

*CS/EE W4140 Networking Laboratory (Spring 2009, Spring 2010)*
Taught a graduate-level course where students gain an understanding of IP networks through observation and measurement of network protocols using Cisco routers and linux PCs. Course consists of a one-hour lecture and three hours of laboratory work every week.

*CS W1003 Introduction to CS and Programming in C (Fall 2009)*
Taught a freshmen-level course for non-CS majors, mostly in the STEM field. Emphasis was on learning how to program in C and an introduction to basic data structures such as lists, stacks, and queues. Three hours of lecture per week.

## Awards and Grants

2013 *Winner of Juniper/Comcast Software-Defined Networks competition*
Member of 1st place team that presented an application-aware routing platform for SDN networks

2011-2015 *Amazon AWS Research Grant*
$7,500 credit for research on elastic Voice over IP services using cloud computing platforms.

2001 *IR52 Jang Young Shil Award*
Awarded by the Minister of Science and Technology, Korea, for the development of NAT traversing Voice over IP solution

## Community Service

2010-2012 Technical Report Czar at the Computer Science Department
2007-2009 Graduate Student Advisor for Columbia University ACM

## Conference Publications


[1] **Jong Yul Kim** and Henning Schulzrinne. Cloud Support for Latency-sensitive Telephony Applications. In *Proceedings of the International Conference on Cloud Computing Technology and Science (CloudCom)*, IEEE, Dec 2013. 6 pages.

[2] **Jong Yul Kim** and Henning Schulzrinne. SipCloud: Dynamically Scalable SIP Proxies in the Cloud. In *Proceedings of the Conference on Principles, Systems and Applications of IP Telecommunications (IPTComm)*, ACM, Aug 2011. 6 pages.

[3] **Jong Yul Kim**, Gregory W. Bond, Eric Cheung, Thomas M. Smith, and Henning Schulzrinne. An Evaluation Framework for Highly Available and Scalable SIP Server Clusters. In *Proceedings of the*

*Conference on Principles, Systems and Applications of IP Telecommunications (IPTComm)*, ACM, Aug 2011. 9 pages.

[4] Wonsang Song, **Jong Yul Kim**, Henning Schulzrinne, Piotr Boni, and Michael Armstrong. Using IM and SMS for Emergency Text Communications. In *Proceedings of the Conference on Principles, Systems and Applications of IP Telecommunications (IPTComm)*, ACM, Jul 2009. 7 pages.

[5] **Jong Yul Kim**, Wonsang Song, Henning Schulzrinne, Anna Zacchi, Anupam Jain, Harshavardhan Chenji, Chris Magnussen, Walt Magnussen, Ian Schworer, and Ken Trinh. The Next Generation 9-1-1 Proof-Of-Concept System. In *Proceedings of ACM SIGCOMM (demo session)*, Aug 2008. 1 page.

[6] **Jong Yul Kim**, Wonsang Song, and Henning Schulzrinne. An Enhanced VoIP Emergency Services Prototype. In *Proceedings of Information Systems for Crisis Response and Management (ISCRAM)*, May 2006. 8 pages.

## Other Publications

[7] John Chiaramonte, Gordon Vanauken, Wonsang Song, and **Jong Yul Kim**. Research Projects and Pilots: US Department of Transportation's NG 9-1-1 Pilot Project. In Henning Schulzrinne, Hannes Tschofenig (Eds.), *Internet Protocol-based Emergency Services* (1st edition, pp. 298-317), Chicester, UK: John Wiley & Sons. 2013.

[8] **Jong Yul Kim** and Henning Schulzrinne. High Availability for Carrier-Grade SIP Infrastructure on Cloud Platforms. Computer Science Technical Report CUCS-024-12, Columbia University, Mar 2012. 33 pages.

## Patents

[9] Henning Schulzrinne, Wonsang Song, and **Jong Yul Kim**. Systems, methods, and media for connecting emergency communications. US Patent 8,565,384. October 2013.

[10] Piotr Boni, Michael Armstrong, Henning Schulzrinne, Wonsang Song, and **Jong Yul Kim**. Emergency Text Communication. US Patent 8,401,154. March 2013.

## References

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