

Kundan Singh

Objective

Looking for a full time technical leadership or research scientist position in peer-to-peer systems, multimedia communications, IP telephony or video conferencing.

Summary of qualifications

Software Development

- 39 peers: This is my ongoing open source Python based peer-to-peer Internet telephony software project. The project implements several IP telephony related drafts and RFCs such as SIP, SDP, RTP and XMPP, and has example prototype applications such as DHT display, VoIP test client and SIP server.
- TokBox: I designed and implemented Flex-based TokBox client for video conferencing. I also did several prototype implementations for PC to phone calling, shared media viewing, distributed server infrastructure for low latency and automatic fail over of video calls.
- Adobe: I implemented a SIP stack and a P2P library in ActionScript and built several prototype Flash-based applications such as integrated SIP+XMPP communicator, click-to-call Flash component, browser extensions for Firefox and IE for PC to phone calling, and a P2P-SIP user agent. My P2P implementation is based on Bamboo DHT and incorporates authenticated data storage, secure transport and reliability.
- Columbia: During the initial years, I wrote an object-oriented SIP user agent library in C++, using our underlying SIP transaction and parsing library. I developed other components such as unified messaging voice mail and answering machine server, multimedia conference server, interactive voice response server and SIP-H.323 signaling gateway. I wrote reusable object oriented modules for the conference library and media-streaming library. Later, I built scalability and reliability mechanism for SIP servers that provide PSTN-grade availability (five nines) and scalability (ten million BHCA), albeit at much lower cost. I also developed techniques and built systems for robust and scalable peer-to-peer Internet telephony without incurring any server maintenance cost.
- Bell Labs: I worked on MobileNAT that provides IP mobility for devices in private address spaces. I wrote the client application that implements DHCP client and server, and the driver that traps and alters IP packets on Windows XP. I also wrote the server application that runs on the Linux router, implements DHCP server and alters the NAT mapping.
- Motorola: In a team of two, I developed a complete H.323 video conferencing client for Windows using external components for Q.931 and media codecs. I also helped in various other ongoing projects such as H.323-H.324 gateway, H.320-based video conferencing and debugging tools for embedded systems.

Project Mentoring

- In the 5+ years as a PhD student in the Internet Real Time Lab., I supervised many student projects such as active badges, event notification and scheduling system, screen sharing, floor control, file sharing, interworking between instant messaging and voice calls, phone announcement service, application level gateway for NAT and firewall support, email by phone, audio quality measurement for conferencing, location service for 911 calls in SIP proxy server, and integrating MPEG support in our media server.

- Education
- PhD/Computer Science (Columbia University, New York, Jan'01-Jun'06)
- Thesis title "Reliable, Scalable and Interoperable Internet Telephony"
 - Advisor: Prof. Henning Schulzrinne
- MS/Computer Science (Columbia University, New York, Sep'99-Dec'00)
- Emphasis in Internet telephony and multimedia communications
 - Classes of interest: computer networks (A+), internet systems programming (A), advanced internet services (A), web enhanced information management (A)
 - Cumulative GPA – 4.066/4.0
- BE (Hons)/Computer Science (BITS Pilani, India, Aug'93-Jun'97)
- Cumulative GPA – 10.0/10.0 (University Gold Medalist)
- Professional experience (12 years)
- TokBox, San Francisco/CA, Senior Software Engineer, Jan'08-till date
- Design and Implementation of Flex based video call and conferencing client using Adobe Flex/ActionScript, Adobe Flash Media Server (FMS) and XMPP.
 - Prototype implementation of PC to phone call using SIP, shared media viewing such as *youtube* video and *slideshare* shows, distributed server infrastructure for low latency using Red5 and SIP, and automatic failover of video calls.
- Adobe Systems, San Francisco/CA, Senior Computer Scientist, Aug'06-Sep'07
- Prototype implementation of Flash-based VoIP applications such as communicator for presence, instant messaging and voice using SIP and XMPP.
 - Prototype implementation of a Flash-based peer-to-peer Internet telephony (P2P-SIP) application with secure communication, authenticated data storage and reliability. I implemented the Bamboo P2P algorithm with enhancements for authenticated interface and super-node distinction.
- Bell Labs/Lucent, Holmdel/NJ, Member of Technical Staff, May'06-Aug'06
- Design of a scalable and robust server-less infrastructure for mobile carriers to support gaming and other services in a distributed peer-to-peer manner.
 - User interface for attack detection software for mobile carriers.
- Columbia University, New York, Research Assistant (student), Sep'99-May'06
- Research in IP telephony, SIP-PSTN interworking, SIP-H.323 signaling gateway, SIP/RTSP-based unified messaging system, comprehensive multimedia collaboration, VoiceXML-based IVR server, SIP/RTP-based conference server and SIP protocol stack.
 - Focus of my thesis is on scalability and reliability of IP telephony systems in peer-to-peer as well as server-based architectures using existing standards.
- Bell Labs/Lucent, Holmdel/NJ, Summer Intern, Jun'02-Aug'02
- Research, design and implementation of MobileNAT (a mobility solution for IP devices across heterogeneous address spaces as part of the project on integration of 802.11 and 3G technologies.)
- Motorola, India, (Senior) Software Engineer, Jun'97-Jul'99
- Worked on H.323 systems, VoIP gateways, embedded systems and other multimedia communication projects.
 - Also did internship from Jan 1997 to Jun 1997 for six months.
- Bhabha Atomic Research Center, India, Summer Intern, Jun'95-Jul'95
- Worked on image file formats and data compression for digital images.

Computer skills	I have extensive programming experience in C, C++, Python, ActionScript (Flex), Java, Tcl and Perl. I have worked on both Unix and Windows platforms, as well as on real time OS. I am familiar with various tools such as MySQL, Apache, TomCat, gcc/make, VC++, CGI, servlet, Flex Builder, Eclipse, LAMP/WAMP, git, cvs and svn. I have worked with various hardware and software tools such as Cisco router 2600 series, Cisco IP phone, Nortel MCS 5100 system, Intel/Dialogic IP telephony, MySQL replication, Vovida's SIP and TRIP stacks, DNS SRV and NAPTR, DHCP server and client, FMS and Red5 media servers, and SER/OpenSER servers. I have working knowledge of software process including CMM quality levels and software design models. I have also worked briefly with Linux kernel module programming, Windows driver programming and MacOS audio module programming.
Technologies	I have extensive experience with various Internet protocols such as Session Initiation Protocol (SIP), Real-time Transport Protocol (RTP), Real Time Streaming Protocol (RTSP), Session Description Protocol (SDP), Extensible Messaging and Presence Protocol (XMPP), Real-time messaging protocol (RTMP), VoiceXML, Simple Object Access Protocol (SOAP), ITU-T recommendations H.323, H.225.0, cryptography, security protocols, wireless/mobility protocols such as Mobile IP and some intra-domain mobility protocols for fast handoff, IP-PSTN interworking for telephony and related protocols. I have worked extensively on server scalability and reliability, and peer-to-peer systems and algorithms.
Awards and honors	Three US patents: #7,453,852, #7,257,201 and #7,266,091. Extraordinary Teaching Assistant Award for Fall 2001 at Columbia University. University Gold Medalist for graduation batch of 1997 at Birla Institute of Technology and Science (BITS), India. Second rank in 10th and 12th Maharashtra (India) state board exam among lakhs of students. Coordinator, Department of Hindi Press, APOGEE 1996, BITS. Ph.D. student representative, 2001, Department of Computer Science, Columbia University Proudest and persistent achievement: I have never lost an academic grade in my bachelors, masters or PhD study; always got A or A+ grade in all subjects.
Expected salary Visa status	Industry standard for a research position; and \$150K for a technical leadership position. I am U.S. permanent resident.
Publications References	Complete list of my academic publications including my PhD thesis can be found on my web page at http://kundansingh.com/#papers . Please visit http://39peers.net for my open source P2P-SIP effort. Please visit my web page for professional references.