Bin Yu

906 1/2 South Vine, #103
Urbana, IL 61801

Cell Phone: (217)721-4849
E-mail: binyu@uiuc.edu
URL: "Bin Yu" at Google

INTEREST AREA

Multimedia Collaboration; Multimedia Content Analysis, Distribution and Presentation.

EDUCATION

- Ph.D. Aug. 00 -- Present
  Research Assistant, MONET Group, CS@UIUC
  Advisor: Professor Klara Nahrstedt
  GPA: 3.96/4.0

- B.S. Sep. 96 – Jul. 00
  Computer Science Department,
  Tsinghua University, Beijing, People's Republic of China
  GPA : 3.95/4.0. GPA RANK: 3rd among 155

HONORS and AWARDS

- **"Emerging Leaders in Multimedia", IBM Research, 2005**
- **Microsoft ConferenceXP RFP Winner, 2005-2006**
- **"Best Graduate of Year 2000", Computer Science Department, Tsinghua University**

INDUSTRIAL EXPERIENCES

- Researcher Intern, Microsoft Research USA, June 2005 to August 2005, Redmond WA, U.S.A
  - Communication and Collaboration Systems Group
  - Mentor: Cha Zhang and Yong Rui
- Researcher Intern, Microsoft Research USA, May 2004 to August 2004, Redmond WA, U.S.A
  - Communication and Collaboration Systems Group
  - Mentor: Yong Rui
- Researcher Intern, Microsoft Research Asia, June 2002 to August 2002, Beijing, P.R.China
  - Information Management and System Group
  - Mentor: Wei-Ying Ma and Hong-Jiang Zhang

PUBLICATIONS

- **Journal**
  1. Klara Nahrstedt, **Bin Yu**, Jin Liang, Yi Cui, "Hourglass Content and Service Composition Framework for Pervasive Environments", inaugural issue of Elsevier Pervasive and Mobile Computing, 2005
  2. **Bin Yu** and Klara Nahrstedt, "Internet-based Interactive HDTV", in ACM/Springer Multimedia Systems Journal, 2003

- **Conference**

1. **Bin Yu** and Klara Nahrstedt, “AVPUC: Automatic Video Production with User Customization”, to appear in Twelfth Annual Multimedia Computing and Networking Conference (**MMCN '05**)
2. **Bin Yu** and Klara Nahrstedt, “A Scalable Overlay Video Mixing Service Model”, **Doctorial Symposium**, **ACM Multimedia 2003**, November 2003
3. **Bin Yu**, Wei-Ying Ma, Klara Nahrstedt and Hong-Jiang Zhang, “Video Summarization Based on User Log Enhanced Link Analysis”, in Proceedings of **ACM Multimedia 2003**, November 2003
4. Xiaohui Gu, **Bin Yu,** Klara Nahrstedt, "SpiderNet: An Integrated Peer-to-Peer Service Composition Framework", In Proceedings of IEEE International Symposium on High-Performance Distributed Computing (**HPDC-13**), 2004.
5. **Bin Yu** and Klara Nahrstedt, “A Real-time Software Solution for Re-synchronizing Filtered HDTV MPEG2 Transport Stream”, in Proceedings of IEEE Fourth International Symposium on Multimedia Software Engineering (**MSE 2002**), December 2002
6. **Bin Yu** and Klara Nahrstedt, “Real-time Software Information Embedding for HDTV Stream”, in Proceedings of IEEE International Conference on Multimedia and Expo (**ICME 2002**), August 2002
7. Yixin Zhao, **Bin Yu**, and Jianping Wu, "Intelligent Online BGP-4 Analyzer", in Proceedings of the 8th International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (**MASCOTS 2000**).

PROJECTS

- **Visual Information Management for High Quality Distributed Conferencing**
  - **Time** Sep. 03 – Present
  - **Context** Ph.D. Thesis Research, MONET-UIUC
  - **Advisor** Professor Klara Nahrstedt
  - High quality distributed conferencing often involve multiple visual information channels, such as multiple video camera streams, slideshow, whiteboard, desktop/application sharing, etc. When presenting these channels to the users (live attendants or individual desktop viewers), the screen real estate needs to be properly allocated for the visual information windows. Tiling all windows onto the screen will reduce the presentation resolution, and since users focus on one channels most of the time, a large portion of the screen space is wasted to display uninteresting (or even disrupting) channels. On the other hand, having the users to manually switch between different channels will be tedious and may disrupt their collaboration tasks. In this project, we propose an intelligent visual information management framework that intelligently and automatically manages the presentation of high quality visual information channels. A three tier viewer interest model is proposed to model the interest of viewers in terms of their long term preference among all channels, short term interest in visual/audio events, and momentary interest in particular channels. Based on this interest model, a score-based screen layout management algorithm is proposed to make automatic visual information presentation decisions. Compared with previous finite state machine based approach, the score-based approach can support multiple types of visual events and multiple camera streams at the same time, and it is easier to be customized based on viewer’s individual interest. Part of the results has been reported as a paper in MMCN 2005.

- **Tele-immersive Virtual Environment for High Quality Video Conferencing**
  - **Time** Sep. 04 – Present
  - **Context** Ph.D. Thesis Research, MONET-UIUC
  - **Advisor** Professor Klara Nahrstedt
  - The goal of this project is to support high fidelity tele-conferencing in a virtual tele-immersive environment. Specifically, surrounding camera array is setup that captures and reconstructs the 3D image of the user at each site, and a 3D virtual world is constructed by merging the 3D models of all distributed users with a virtual environment. We have spent a year setting up the infrastructure, and

we have been working on research issues like real-time streaming of high bit-rate 3D video data and smart display of 3D virtual world.

- **WorkLounge: an Interactive Virtual Team Worksite**
  - **Time** May 04 – Aug. 04
  - **Context** Internship at Microsoft Research Redmond.
  - **Mentor** Yong Rui
  - Despite various collaboration systems that have been developed, we find almost no system widely accepted by distributed information workers for their daily collaboration tasks. Particularly, the authors have identified the following problems that are still not well handled in existing collaboration systems: (1). The transition between the three modes of working - "working alone", "ad hoc meeting" and "scheduled meeting" - is not convenient because of the transition overhead and communication barrier between teammates. (2). The key elements essential to a project's life cycle - data, people and interactions tools - are separated. (3). The tradeoffs between privacy and awareness and between awareness and disturbance are not well solved, so the presence information of other users is hardly accurate to be useful. (4) "Unintended interactions" are reduced because of lack of real-time presence information and convenient light-weight conferencing tools. (5). Recording and playback functionalities are very limited in that only video based approach is adopted that consumes too much storage while hard to browse or search. To solve these problems, we propose the idea of a virtual worksite that combines data storage, people's presence information, conferencing tools and past history log into one virtual team environment. Everything a team member would need to work on a particular project can be found in this integrated site, so a user only has one working mode - "in lounge" - for each project that he is in. So long as he wants to work on that project, he logs into the lounge; when he is done, he logs out. Furthermore, the chance for "unintended interactions" will be greatly increased because all teammates that are in lounge have detailed and real-time presence information of other teammates and are one click away from an ad hoc conversation with each other. Two patents have been applied for the Worklounge work, and a report has been submitted to MMCN 2006.

- **Survey on Web Conferencing Systems**
  - **Time** May 04 – Aug. 04
  - **Context** Internship at Microsoft Research Redmond.
  - **Mentor** Yong Rui
  - Web conferencing systems (WCSs) grew rapidly in the past five years, as evidenced by more than a dozen commercial products and an expanding consumer population. WCSs have revolutionized the way people communicate and collaborate. However, there is still a lot of potential in improving user experience in today's WCSs. In this paper, we summarize the latest achievements in WCS design and implementation from both scientific research and engineering enhancements, identify open questions and key challenges that deserve more research attention, and discuss interesting directions to explore. The report is submitted to ICME 2005.

- **Video Summarization based on User Log Enhanced Link Analysis**
  - **Time** June. 03 – Aug. 03
  - **Context** Internship at Microsoft Research Asia.
  - **Mentor** Wei-Ying Ma and Hong-Jiang Zhang
  - Traditional video summarization relies on low level feature analysis techniques, but the results have been unsatisfactory because of the unrealistic assumption of the mapping between these low-level features to high-level semantics. In our work, we borrow the techniques of link-analysis to mine user interests directly from user access log. Specifically, a “ShotRank” is proposed to represent the subjective interest rating of each video shot by the viewers, and this ShotRank is deducted from an “Interest-guided Walk” model constructed from user access log. We have implemented a video summarization/browsing tool in VC, and extensive user study has confirmed the practicality of our approach. The results are reported in

our ACM Multimedia 2003 paper titled “Video Summarization based on User Log Enhanced Link Analysis”.

- **Interactive HDTV**
  - **Time** Jul. 01 – Jun 03
  - **Context** Ph.D. Research, MONET-UIUC
  - **Advisor** Professor Klara Nahrstedt
  - We designed and implemented a scalable and flexible Internet-based Interactive TV architecture that supports high quality real-time video while open for third-party video editing services. The system core is based on real-time Information Embedding (IE), and we have developed a fast algorithm that enables real-time software Information Embedding even for mpeg2-encoded HDTV streams. To make up for the discrepancy resulted in intermediate editing, a real-time software re-synchronization algorithm is also developed that re-timestamps each transport-layer video packet. We have built our test-bed as part of the Active Space project.

- **BGP v4 Protocol Conformance Testing Toolkit**
  - **Time** Nov. 99 – Jul. 00
  - **Context** Bachelor's Thesis Project, Tsinghua, Beijing,
  - **Advisor** Professor Jianping Wu
  - We developed a Conformance Test Toolkit for testing routers' implementation of Border Gateway Protocol version 4 (BGP-4) based on RFC 1771. The toolkit consists of multiple routing packet senders and one routing packet receiver. The senders send packets to the tested router in a cooperative way to simulate various network conditions changes. The receiver then intercepts the packets sent out by the tested router to analyze whether it responds to these changes in the way conformant to the BGP4 protocol.

SOFTWARE/TOOLS

- **PlanetVAM**
  - A desktop video conferencing system with Java-Media-Framework as the front-end user interface and PlanetLab nodes as the intermediate overlay transport proxy. To be used for panel discussion of PlanetLab Consortium.
  - Language: Java/JMF, C
  - Platform: Windows and Linux

- **MyVideo++**
  - A desktop video summarization/browsing system enhanced from previous work of “MyVideo” from Microsoft Research Asia. It accepts full video clips as input files and generate video summary based on user browsing log analysis.
  - Language: Visual C++
  - Platform: Windows

- **HDTV On-line Editor**
  - A network gateway that intercepts HDTV video broadcasts in LAN, edits the video stream in real-time and then Multicasts the resulting stream. Currently it supports QoS control operations such as Low Pass Filtering and Color-Component Dropping, and also Information Embedding operations such as embedding video streams and images like Picture-in-Picture for TV sets. We are still working on embedding text information onto the background stream.
  - Language: Visual C++, Assembly/MMX
  - Platform: Windows

- **SpiderNet**
  - I worked with Xiaohui Gu (IBM Research) in design and implementation of this overlay service composition network. Pastry is adopted as the underlying for overlay network construction, and we implemented service probing, routing and fault-tolerance. Some example video editing operations are implemented for evaluation, such as video mixing and rate adaptation operations.
  - Language: Java
  - Platform: Windows and Linux

- **QoS-aware Video Streaming**
  - This is a video streaming application suite containing one video server and multiple versions of video clients. The video server runs on a desktop PC that serves video streams on demand, and the video player client may run on different devices, such as desktop PC, laptop computer and hand-held device (HP Jornada and iPAQ). Because of the heterogeneity in resource availability (computation and bandwidth), the video quality is dynamically adapted (in terms of frame rate, resolution, compression format) to ensure smooth playback of the video. User mobility is supported because the user can migrate between these devices for continuous video playback.
  - Language: Embedded Visual C++, Visual C++
  - Platform: Windows and Windows CE

- **BGP_Sender and BGP_Watcher**
  - These are a suite of tools for BGP v4 Protocol Conformance Testing. Multiple BGP_Senders simulates a pseudo AS (Autonomous System) level network and send BGP packets to the target router being tested, and a BGP_Watcher captures the outgoing BGP packets from the target router and analyze its protocol conformance. The BGP_Watcher is also deployed onto the core routers of China Education Network for surveillance purpose, and it automatically generates an AS level topology diagram from the data it intercepts.
  - Language: C, Tcl/Tk
  - Platform: Linux

PROFESSIONAL SERVICES

- Conference Reviewer for **ICDCS** 2002/2003/2004, **NOSSDAV** 2002/2003/2004, **ACM Multimedia** 2003/2004, **MMCN** 2003/2004, **ICME** 2002/2003/2004, **PerCom** 2003/2004/2005
- Journal Reviewer for **ACM/Springer Multimedia Systems Journal** and **ACM Transactions on Multimedia Computing, Communications and Applications (ACM TOMCCAP)**
- Organizing Assistant for **NSF Workshop on Broadband Residential Networks**, October 2003, Chicago
- Organizing Assistant for **PerCom 2005**, March 2005, Kauai, Hawaii

SKILLS and HOBBY

- Programming Language: C++/C#/C, Java/JavaScript, Visual Basic, X86 assembly language, Matlab, Tcl/Tk, Perl, HTML
- Programming framework: Directshow, Java Media Framework, COM/DCOM, CORBA, OpenGL
- For fun: Table Tennis, Soccer, Basketball, Tennis, Swimming, Chinese Checker