SEMINAR NOTICE:

Peer-to-Peer Interactive 3D Media Dissemination in Networked Virtual Environments

TIME & LOCATION:

ADSC
Tuesday, 26 June 2012, 9AM.
@ ADSC - Level 8, Fusionopolis, Connexis North

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Abstract: Recent years have witnessed a significant growth in interactive media streaming applications in networked virtual environments (NVEs) which are increasingly popular and represent a range of applications. Some online virtual worlds have a dedicated purpose, such as Massively Multiplayer Online Games (MMOG), while others implement more of foundational frameworks which are not necessarily applications per se, but form platforms to create applications, such as Metaverses (e.g., Second Life).

The interactive media streaming applications in NVEs can provide more immersive experience for users by enabling the users to interact with each other through 3D audio, and 3D objects in a real-time manner. Unlike the traditional live or on-demand media streaming applications where all the to-be-streamed data are delivered from the dedicated content provider to all the users (i.e., one-to-many dissemination), the interactive media streaming applications can be regarded to as the many-to-many dissemination applications where every user can be a content provider and send the interactive data to multiple users at will.

However, the state-of-the-art client-server architecture requires a significant amount of network resources to deliver the interactive data (e.g., 3D audio and 3D objects) as the number of participating users scales up. In addition, current peer-to-peer (P2P) or peer-assisted dissemination systems designed for the live or on-demand media streaming applications cannot be applied to the interactive media applications due to (1) the strict latency constraints of the interactive data, (2) system dynamics (e.g., churn, mobility of users in NVEs), and (3) unpredictable sending/request patterns of 3D audio/objects.

In this talk, we discuss our recent work in the design of P2P-based streaming systems for interactive 3D audio and 3D objects in NVEs that can satisfy the demanding real-time requirements under constraints of network bandwidth of heterogeneous users, and system dynamics. Extensive simulation results based on the realistic data collected from Second Life show that the proposed P2P-based streaming systems can achieve near-optimal performance in terms of end-to-end latency (for both 3D audio and 3D objects), reachability (for 3D audio), and server bandwidth cost (for 3D objects).

Brief Biography: Ke Liang received the Ph.D. degree in Computer Science from School of Computing, National University of Singapore in 2012. He received the M.E. from Tsinghua University, China, in 2006, and the B.E. from Beihang University, China, in 2003.

During his master's studies, Ke mainly worked on power-aware video coding and transmission technologies for smart devices that are deployed in wireless sensor networks or ad hoc networks. Currently, his research interests focus on the design of large-scale peer-to-peer interactive media streaming systems in networked virtual environments, such as online games and 3D virtual worlds. In particular, he enjoys applying mathematical tools in neighboring fields such like economics, game theory and machine learning to model open network and system problems and propose feasible solutions for real systems in practice. Since 2005, He have authored and coauthored several academic papers in referred journals and conference proceedings in the area of multimedia systems, and computer networks.