QUARTERLY REPORT

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PROJECT PERCEPTMEDIA

SCALABLE STREAM CODING FOR ADAPTIVE FOVEATION ENHANCED PERCEPT MULTIMEDIA INFORMATION COMMUNICATION FOR INTERACTIVE MEDICAL APPLICATIONS

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A. STATUS REPORT

After the demonstration in the last quarter, this time we concentrated on documenting the core findings of the research. We continued on extreme adaptation. We have also moved on formalizing the idea of programmable active channels as a proposal for next tier of active network research, which specifically looks into developing software formalism for active networks. The idea has been selected for white paper panel presentation for the Large Scale Networking Vision 2001 workshop jointly organized by the federal funding agencies. We have also continued the integration of the active video transcoder with the real-time eye tracking.

A.1 EXTREME ADAPTATION FOR ADHOC VIDEO NETWORKING

In the last quarter, we indicated our novel work on network resource adaptive active transcoding mechanism. Here we take a fresh look into this problem from a unified perspective of adaptation with respect to fundamental network resources—bandwidth and processing power. This adds few new dimensions in netcentric software engineering. It provides adaptation in two levels. In the first level the transcoder allows video rate adaptation to cope with variations in link bandwidth capacities in a network. In the second level, transcoder shows self-organization to adapt with the variations in the active node processing power.

Not only in battle field situation, in adhoc network built on demand, or even in truly large network (like the global internet), links are expected to have widely varying capacities. These links are shared between various paths thus link capacities and forwarding power are subject to transient congestion. However, not only link bandwidths, the network junction elements (such as switches, routers) those forward, and route packets themselves have unequal computational power. They too are shared, and are equally subject to dynamic fluctuation and contention. While some past research has addressed the former very little work has been done to address the later issue. This is particularly important for active network because it proposed complex processing beyond forwarding and routing inside network.

Following our investigation for scalable video, in this quarter we have begun investigation into extreme scalability—we are looking for possible transcoding architectures, which can provide scalability in the range of 10-100. While traditional transcoding mechanisms suggested so far limits the downscaling capability in the range of 2-10 times, recently we are conducting experiments where live video can be downscaled up to 100 times. This will enable seamless video communication to and between partners with widely asymmetric infrastructure.

A.2 PERSONNEL & STUDENTS

Currently one Ph.D. and two M.S. students are working in the project.

A.3 DELIVERABLES & DOWNLODABLES

The current distribution list is similar to that of last quarter. We just have an upgrade of the video player which is now 32 bit. Thus, our current distributions are as follows:

- Project Website

http://bristi.facnet.mcs.kent.edu/medianet/
http://www.mcs.kent.edu/~javed (follow links to collaboration server)

- netAVTS: Nomadic/Subnet Transcoder System Distribution
- netAVTS User Document
- netAVTS Architecture Document

- AVTS: Resource Adaptive Active Video Transcoding System Distribution (V28)
- User Document
- Architecture Document

- mpAVT Transcoder Source Code: mpAVT1.0.tar
- mpAVT User Document: mpAVT1.0-use.html
- mpAVT Architecture Document: TR2000-08-01

- AVT Source Code: AVT-v1.tar.gz
- AVT Architecture Document: AVT1.0-arch.html
- AVT User Manual: AVT1.0-use.html

- CSS Source Code: css-v1.zip
- CSS Architecture Document: arch-v1.html
- CSS User Manual: user-v1.html

A.4 PUBLICATIONS AND DISSIMINATION OF RESEARCH RESULTS

These 21 months have been quite creative and productive from our perspectives. We have been collecting the technical details of the projects into a set of technical documents (available in our web-site). In this quarter we have continued our focus on presenting our results so that they can be shared with the broader community through publications. Below is a list of accepted publications that resulted from this project. All project related documents will be soon made available in the project web site.

A.4.1 Just published/ Accepted:

1. Javed I. Khan and Qiong Gu, Application Integrated Congestion Control by Made-to-order channel Composition on Active Network, Applications Engineering on Active network, International Conference of Applied Informatics, AI 2001, February 19-22, 2001, Insbruck, Austria, (accepted as full paper).
2. Javed I. Khan and Qingping Tao, Partial Prefetch for Faster Surfing in Composite Hypermedia, 3rd USENIX Symposium on Internet Technologies and Systems, USITS 2001, San Francisco, March 2001 (accepted as full paper).
3. Javed I. Khan and Qiong Gu, PREFETCH SCHEDULING FOR COMPOSITE HYPERMEDIA, IEEE ICC' 2001 (accepted as full paper).
4. Javed I. Khan & S. S. Yang, Resource Adaptive Nomadic Transcoding on Active Network, International Conference of Applied Informatics, AI 2001, February 19-22, 2001, Insbruck, Austria, (accepted as full paper).

5. Javed I. Khan & S. S. Yang, Made-to-order Custom Channel for Netcentric Applications over Active Network, Proc. of International Conference on Internet and Multimedia Systems and Applications, IMSA 2000, November 20-23, 2000 Las Vegas, USA,pp-22-26.

A.4.2 Related

6. Javed I. Khan, Dynamic Partial Prefetch Ranking in Hypermedia Neighborhood, Proc. of International Conference on Internet and Multimedia Systems and Applications, IMSA 2000, November 20-23, 2000 Las Vegas, USA, pp 280-285.
7. Javed I. Khan, Active Streaming in Transport Delay Minimization, First International Workshop on Scalable Web Service, SWS 2000, in the 29th International Conference on Parallel Processing, ICPP 2000, August 2000, Toronto, Canada, pp85-102.
8. Javed I. Khan and Lin Zhang, "Tree-Delta Communication for Serving Dynamic Resources in Asymmetric Internet", 1st Int. Conf. on Internet Computing, IC'2000, June 2000, Las Vegas, USA (accepted as full paper).
9. Javed I. Khan and Asrar Haque, An Active Programmable Communication Harness for Measurement of Composite Network States, Submitted to IEEE International Conference on Networking, ICN' 2001 (accepted as full paper).