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UBIQUITOUS COMPUTING BASED ON SYNCHRONOUS CODING OF THE VIDEO BY EMBEDDING AUDIO INTO VIDEO

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The versatility of media devices and the distribution networks makes it necessary to adapt into different playback scenarios as the quality and amount of available media is continuously increasing. The objective of this project is to develop a novel and efficient framework for ubiquitous computing with video and audio streaming over diverse communication networks.

The main goal is to improve the audiovisual quality and to provide the client with smooth and synchronized playback. To meet these requirements, our research focuses on media coding schemes used in the server, clients and the network in between.

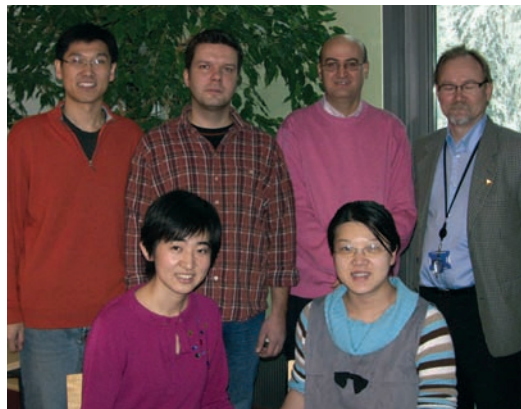
Traditionally, audio and video signals have been processed separately and synchronized at the receiver with the aid of some additional timing information and processing. Failures in this process result in severe impairment in the visual quality.

The aim of this research is to develop novel methods for combining different media components into a single hybrid signal. Thus, the synchronization of the me-

dia components is preserved throughout the transmission. No additional synchronization is required, since media extracted from each packet is already synchronized. Besides synchronization, joint processing may bring about more efficient compression schemes.

In addition to optimizing the performance in the endpoints of the transmission, the channel itself has potential for improvements. Traditionally, the network merely routes the data, which means that each data packet is delivered from a server to a client as such. In this work, a network with nodes capable of performing data processing is utilized and a method known as network coding is used for maximizing the throughput. In the nodes, the outgoing streams are a mixture of incoming streams, which spreads the information more efficiently over the network.

Currently, embedding audio information into video content is being developed. Preliminary results have shown that synchronous playback is possible with negligible quality degradation. Linear network coding has proved to be useful for the network optimization task. Further development of the network coding methods will be pursued with emphasis on error tolerance and adaptive media quality.



KEY PUBLICATIONS TO DATE:

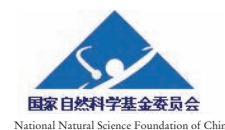
- *Multimedia Streaming Through Multi-Rates Network Coding, Master Thesis, by Xizhi Zhu, to be submitted to the Faculty of Computing and Electrical Engineering, Tampere University of Technology, February 2010.*
- *Novel coding methods for synchronous audio/video coding, Master Thesis, by Weiwei Chen, to be submitted to the Faculty of Computing and Electrical Engineering, Tampere University of Technology, May 2010.*

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