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IP Conferencing System on Network

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H.264 is the latest video compression standard that provides the highest compression ratio. The aim of this final year project was to develop a video conferencing system that provides communication through Internet. The H.264 video standard and Adaptive Multi-Rate (AMR) have been implemented in this system. Optimization on speeding up this system was the most important thing being done in this project. Therefore, fast compression algorithms developed by multimedia experts have been implemented into this product with Streaming SIMD Extensions 2 (SSE2) technology in Pentium® 4 processor.

Each conferencing Client records video and audio using web cam and microphone. The video and audio encoders compress the data for transmission, and the decoders de-compression the received data for playing at the client computer.
The Conferencing System provides real time conferencing through Internet to up to 4 Clients with resolution of 352x288. Users can also use this as surveillance and video recording system. The system also has these additional features:

1. Whiteboard – allows users to show their idea using pen.
2. Chat Room – provides text chatting similar to ICQ.
3. File Transfer – allows users to transfer files among themselves.

Figure 2 – IP Conferencing System on Network

Figure 3 – System Block Diagram for each conferencing pair
The PC for testing has the following configurations:
Desktop with Intel Pentium® 4 2.4GHz processor and 512MB main memory
Operating System: Windows XP

Figure 4 – Encoding Frame Rate Change during Speeding up period
Referring to the above graph, the project achieves encoding frame rate of 26 in CIF video format that is 26 times faster than the original video codec JM5.0. The CPU and Memory usages for running the whole system at 4 Clients conferencing mode are 95% and 50Mbytes respectively. The figure below shows the packet loss rate for different modes of the system.

Figure 5 – Packet Loss Rate for different modes of the system