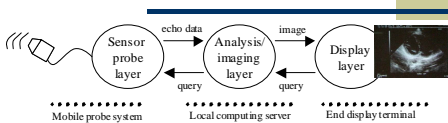# Tele-echography using mobile ultrasound probe

[For COE technical presentations, 2004.04.22]
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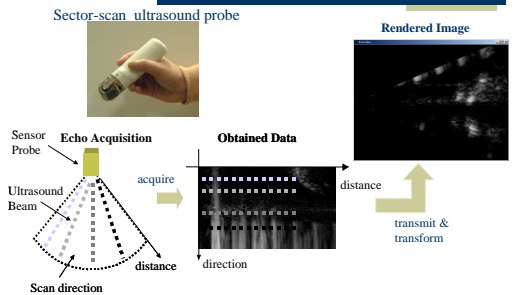Visual Media Project
Image Processing Laboratory

Background

- Although the transmission teqniques for echography images over the Net (tele-echo) are being deployed in practical medical application, they are still <u>bound to hospital for their complexity.</u>
- For home-visit medicine or emergency medicine, more <u>compact</u> and <u>distributed</u> tele-eho framework should be required.

Proposed Framework

- Probe layer
  Probe + wearable computer, wireless communication
- Imaging layer
  Storage for echo-data sequence, image renderer
- Display layer
  Software client (viewer program, video encoder)

Probe (1)

Probe (2)

Samples per ultrasound data	508 samples
Number of available ultrasound data lines per frame	75 lines
Maximum frame rate	10fps
Number of bits per sample	8-bit

Required bandwidth: 75line, 10fps: 3.048Mbps
300line, 10fps: 12.192Mbps

Transmission

Media
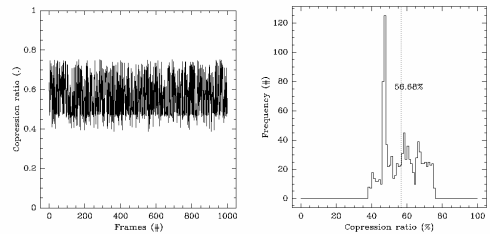- WirelessLAN(IEEE 802.11b)
- TCP Unicast

Compression
- Frame-wise (75lines by 508 samples/frame) compress
- Loss-less (GZIP algorithm)

Experiment

- Developed system was tested in a wireless-LAN environment
  - Ideal condition: Both ends are 5m from the same access point
    - Compression performance
    - FPS
  - Roaming: Across 4 floors and 50m between building in the campus (by walking)
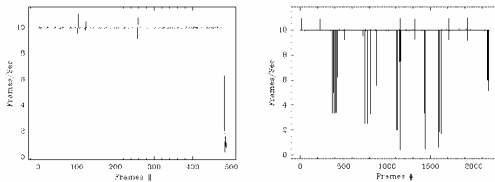   - FPS

Result

Compression performance

Result (cnt'd)

Frame-rate

Discussion

- Under ideal condition, transmission was successful with almost constant delay.
  - Application for home-visit medicine will be possible.
- Under roaming condition, image frames were sometimes delayed (and skipped) on changing access station.
  - Handling for delayed image (queuing in separate session, for example) will be required.

Summary

A mobile tele-echography system was implemented and tested on a wireless LAN environment.

While the image transmission was stable between fixed nodes, severe frame delays are observed in transmission from the nomadic node.