Video Streaming over Wireless Networks

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Overview

- Project
- Real Time Protocol
- System Implementation
- Demo
- Performance Analysis
- Challenges
- Possible Improvements
- **Camera**
  - 640x480 pixel images
  - 7.5–30 frames/sec
- **802.11g Network**
- **End-to-end video streaming system.**
Project – bigger picture

- Pupil Monitoring
  - Horizontal and vertical position
  - Torsional position
  - Pupil size
- Purpose
  - Diabetic Retinopathy*
  - Several medical diagnosis including Balance Disorder
- Other applications

Gathering images from the Point Gray Camera

Isolating each frame and break it down in smaller packets

Sending each packet using RTP library

Displaying each frame in the picture box

Forming the complete frame and listening for more packets

Receiving packets, checking for end-of-frame
Software Architecture - Sender High Level View

Goggles Sender Application

Network Socket A

Network Socket B

Goggles Driver Interface

FlyCap

JRTPLIB

JTHREAD

Microsoft .net + Win32
Software Architecture - Receiver

T1: Compressed Image

T2: Un-compressed Image

T3: Display Interface

Low Level Interface
Real Time Protocol

- Real Time?
- Reliable?
- Why use it?
  - Control Mechanism
  - Time Stamp
  - RFC 3016 is our friend
- I’m old school. I’ll use TCP
  - No! And here’s why:
    - Don’t force reception
    - Good luck with multicast
    - Congestion Control
Demo

- Sit back, relax and enjoy the demo.
Challenges

- Interfacing PGRFlyCapture library
- Microsoft .NET framework
- Multi Thread application
- Event-driven programming
Performance Analysis

- Sender and Receiver in the **same room**

<table>
<thead>
<tr>
<th>Camera FPS</th>
<th>Throughput (kbps)</th>
<th>Packets/sec</th>
<th>Frames/sec</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TX</td>
<td>RX</td>
<td>TX</td>
</tr>
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<td>440</td>
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<td>650</td>
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Performance Analysis

- Sender and Receiver in the separate rooms

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<td>690</td>
<td>630</td>
<td>62.8</td>
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<tr>
<td>30</td>
<td>690</td>
<td>640</td>
<td>61.8</td>
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Possible Improvements

- Pre-processing
  - Region of Interest
  - Various compression mechanisms

- System
  - Frame rate
  - Non-identical RTP channels

- Application
  - GUI
  - Better video display
Questions