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A Multi-view E-learning System for Remote Education

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Introduction & Motivation

- Project is supported by KEGA c.n. 062TUKE-4

- Target is to develop e-learning system that meets this properties:

  - Learn everywhere and everytime

  - Take one or more views to lectures

  - Support of advanced interactive technologies

  - Based on modern and universal frameworks (HTML5, Ajax, etc.)

  - To be open software

System model

- Based on proven server/client model
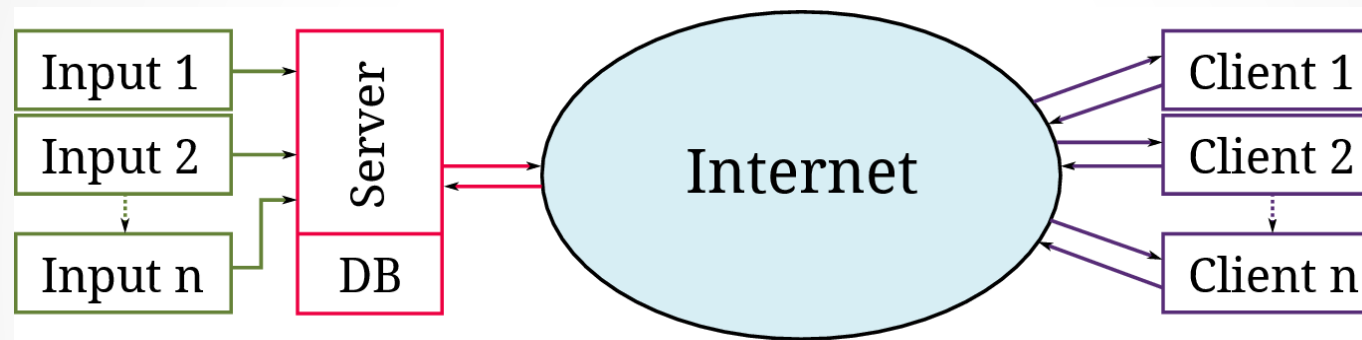
- Access from any place
- Modular design
- Client can be:
  - Web browser
  - Smart phone application
  - Desktop application

Function of server

- Lecture streaming server is major part of system
- Operates with various inputs
    - IP cameras
    - PDF/Image slides
    - Signals from interactive table
- Multiplexes video frames
- Encodes multiplexed stream and mixing it with audio stream
- Responsible of live streaming of target AV stream
- Using open source software(ffmpeg, opencv...)
- Uses RAID array to store every input of live lectures
- Stores also timeline of presentation
- Acts as archive databse

Video input multiplexor

- Implemented in C++ using OpenCV library
- Works with encoded video frames
    - Can edit frames at pixel level
- Responsible for cutting
- Cuts can be made:
    - by director of lecture (already implemented)
    - or automaticaly by lecturer tracking(by color or template matching)
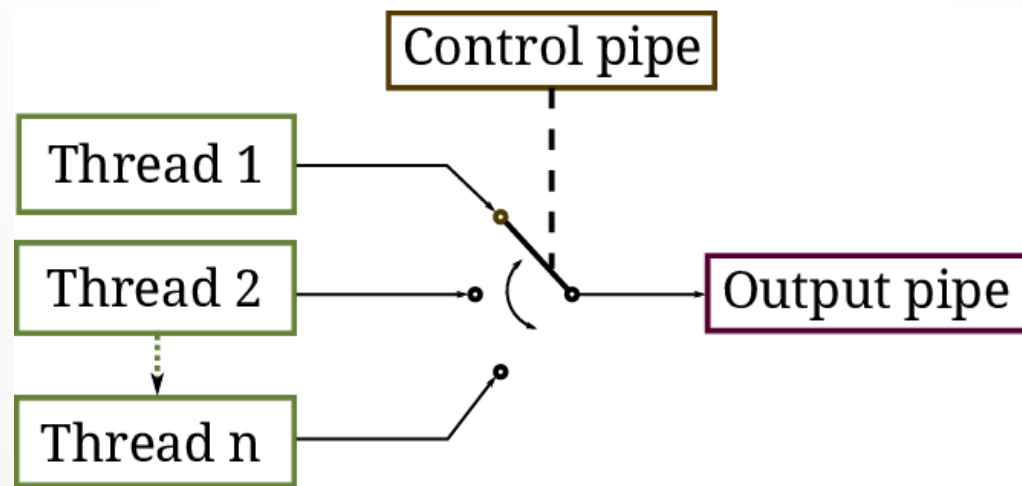
User interface

- Main user interface is dynamic web application served from lecture server
- UI is divided in two sections:
  - student section
  - and admin section
- Students are able to:
  - List of categorized lectures
  - Information about active/live presentation
  - Viewing and participating lectures
- Admins are able to:
  - Create new presentation
  - Define inputs and upload assets
  - Live control of lecture
  - Access control

Test of multiview e-learning system
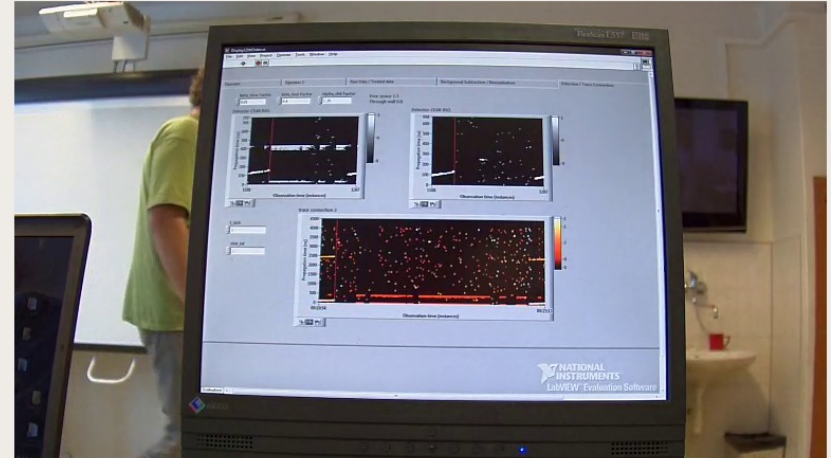
View 1   View 2

Example

Monitors

1 Dinion 35
2 Dinion 36
3 Dinion 37
4 V132 Cam#2

Tracking

☐ 1 ☐ 2 ☐ 3 ☐ 4

Conslusion

- This proposed multiview sytem can be:
    - effectively used to display a technical lesson with detailed view to a particular area of interest.
    - lectures database
    - open solution
        - No client hardware or software limitation
        - Takes into account clients experience (feedback)
    - easy portability
        - No fixation to particular lecture room
        - Only constraint is the need of appropriate network connectivity

Acknownlegment

Thanks for your attention!