

Video Surveillance over IP

I used `dash.js`, `HTML` and `JavaScript` for the functionality and user interface of the website and for the http server part i used `Apache`. My project is not connected to the remote server just working on my localhost!

I applied the desired functionalities in this task:

- 1- I connected to my computer camera and captured my real time video.
- 2- I encoded my video content and stored it with creating the `m4s files and stream.mpd`
- 3- I made available this encoded video on the HTTP Apache server.
- 4- I used `dash.js` and `HTML5` for the displaying encoded video content.
- 5- I added following controls like rewinding to a specific time, pausing, jumping back to the live point, and taking a screenshot.
- 6- Then, I added the audio feature to my real time vieo too.
- 7- For getting better UI features, I added thumbnails feature.

For displaying the devices which i can use on my computer:

```
ffmpeg -list_devices true -f dshow -i dummy
```

Firstly, for trying the live streaming if it works on my computer not on the server, I run this command:

```
ffmpeg -f dshow -rtbufsize 702000k -i video="Chicony USB2.0 Camera" -c:v h264_nvenc -preset llhp -zerolatency 1 -f mpegts - | ffplay -
```

and i can watch my live video with my camera on my pc with that ffmpeg command .

Then on my Apache localhost server i tried if it woks or not with that command:

```
ffmpeg -f dshow -i video="Chicony USB2.0 Camera" -c:v libx264 -preset veryfast -b:v 2M -f dash -seg_duration 4 -remove_at_exit 1 C:\xampp\htdocs\stream\stream.mpd
```

Then i tried to add audio feature with adding microphone:

```
ffmpeg -f dshow -i video="Chicony USB2.0 Camera":audio="Microphone (2- High Definition Audio Device)" -c:v libx264 -preset veryfast -b:v 2M -c:a aac -b:a 128k -f dash C:\xampp\htdocs\stream\stream.mpd
```

And then i realized that audio was before the video because it was not desired, i searched that how can i remove this behavior and added the `async` option to the command for video and audio synchronization. Additionally, with `remove_at_exit 1` if i quit the live video then it deletes the old records.

Segment size 4: `ffmpeg -use_wallclock_as_timestamps 1 -f dshow -i video="Chicony USB2.0 Camera":audio="Kulaklık (Sena adlı kişiye ait Buds2 Pro)" -s 1280x720 -async 1 -vsync 1 -c:v libx264 -preset veryfast -b:v 2M -c:a aac -b:a 128k -seg_duration 4 -remove_at_exit 1 -f dash C:\xampp\htdocs\stream\stream.mpd`

When i applied 1280x720 resolution and calculated the latency manual ,segment if ;

Segment size = 2, then latency is : 12.07 seconds

Segment size = 4 , then latency is: 16.46 seconds

Segment size = 6 , then latency is : 19.36 seconds

Then i tried to create thumbnails. Thumbnails, actually are taken images while the video was playing. I added thumbnails on the slide bar.

```
ffmpeg -rtbufsize 702000k -use_wallclock_as_timestamps 1 -f dshow -i video="Chicony USB2.0 Camera":audio="Kulaklık (Sena adlı kişiye ait Buds2 Pro)" -filter_complex "[0:v]split=2[stream][thumbs];[thumbs]fps=1/10,scale=320:180[thumbout]" -map "[stream]" -map 0:a -s 1280x720 -async 1 -vsync 1 -c:v libx264 -preset veryfast -b:v 2M -c:a aac -b:a 128k -seg_duration 4 -remove_at_exit 1 -f dash C:\xampp\htdocs\stream\stream.mpd -map "[thumbout]" -q:v 5 C:\xampp\htdocs\stream\thumbnails\thumb%03d.jpg
```