

Echo Sai V2

MRINAL KANTI SAHA

Introduction

- ▶ EchoSai is the software used at the hospital to fetch the captured and compressed Echo done on patients
- ▶ Also allows the user to view, play, export the videos into different formats, and take snapshots of the Echo video.

WHY A VERSION 2 !!!

- ▶ DirectShow utilities are proprietary and are not being supported in the latest operating system (Windows 10).
- ▶ The viewer had been developed only using windows forms.

Enhancements in V2

- ▶ Remove the dependency on the proprietary software which is not currently supported
- ▶ Develop a web-based viewing utility to enable clinicians to use any device to review the captured videos

Scope of My Project

To develop a thick client application using FFmpeg,

- ▶ To capture the Echo, or for that matter, any kind of video,
- ▶ To store it in a configurable folder along with the thumbnail of the video that will be used in the viewer to display the videos

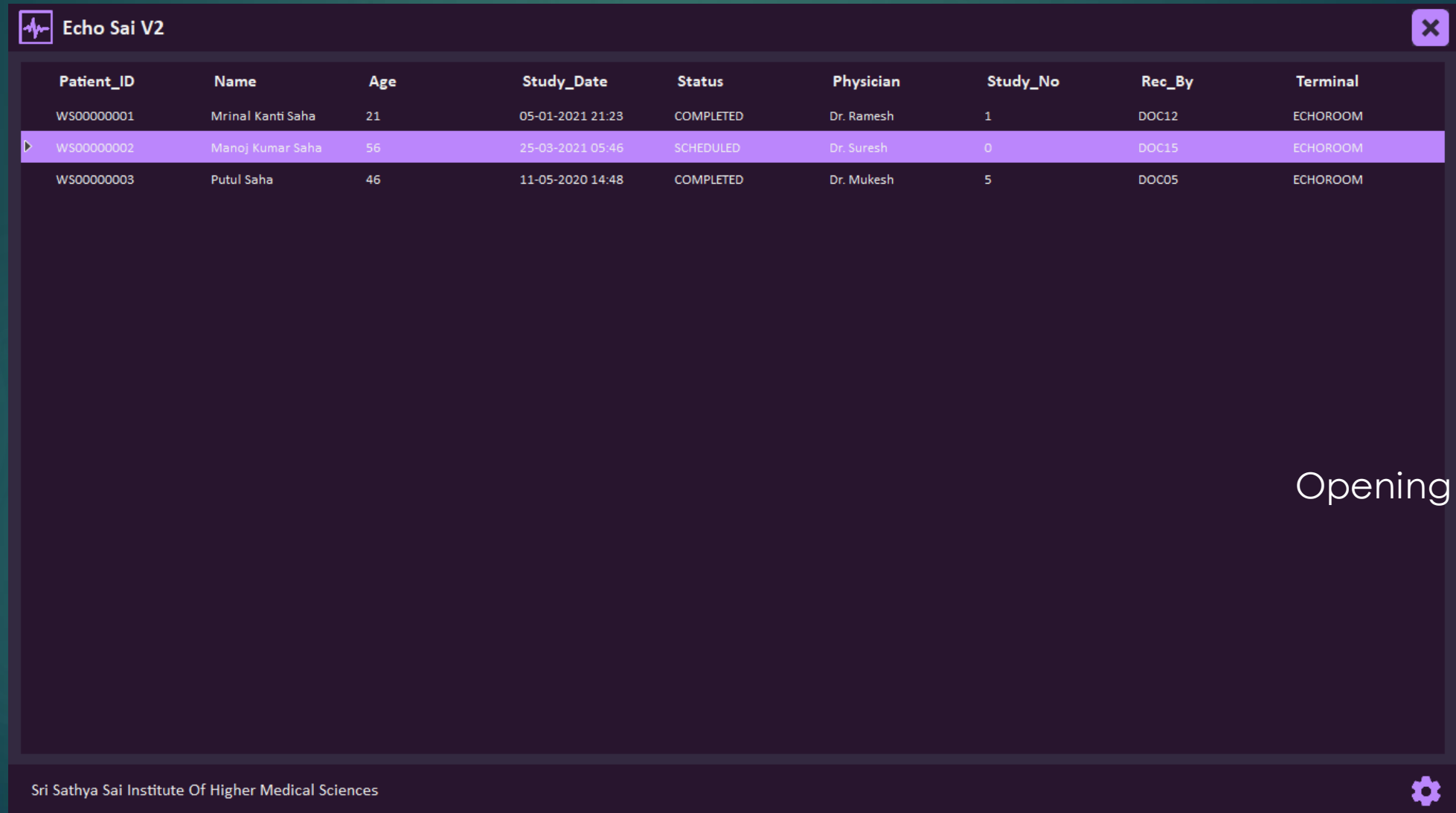
Technologies used

- ▶ FFmpeg
- ▶ Microsoft Visual Studio 2019
- ▶ The C# language and WinForms

FFmpeg

- ▶ Free, open source project and a command line tool that can be used to record, transcode and stream media
- ▶ Used for basic editing such as trimming, joining images into a video, overlays, etc
- ▶ Used in VLC media player, Youtube, and other editing softwares.

Welcome to the Application



Patient_ID	Name	Age	Study_Date	Status	Physician	Study_No	Rec_By	Terminal
WS00000001	Mrinal Kanti Saha	21	05-01-2021 21:23	COMPLETED	Dr. Ramesh	1	DOC12	ECHOROOM
WS00000002	Manoj Kumar Saha	56	25-03-2021 05:46	SCHEDULED	Dr. Suresh	0	DOC15	ECHOROOM
WS00000003	Putul Saha	46	11-05-2020 14:48	COMPLETED	Dr. Mukesh	5	DOC05	ECHOROOM

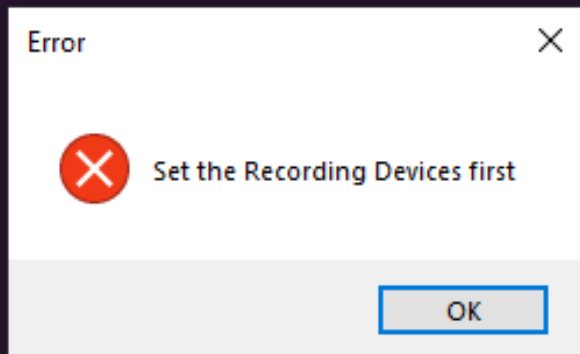
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Opening Screen

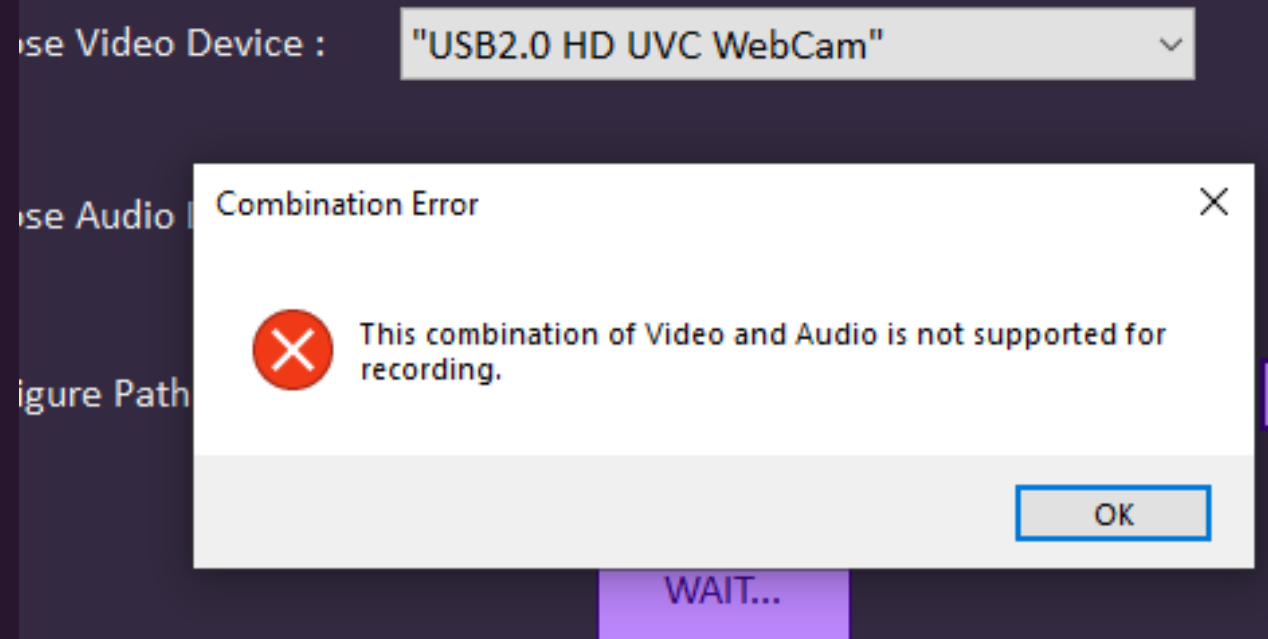
Welcome to the Application(contd)

- ▶ The Data Grid contains the necessary data to be displayed for all the patients in the database.
- ▶ Double Clicking the patient row, the current data viewer is discarded and the capture control window appears.
- ▶ If the recording device has not been set or the combination of video and audio devices is invalid, an error msg is flashed

Flash messages



Devices Not Set Error



Combination of Devices Error

Disclaimer

- ▶ The Data entry into the databases is done by HIS, which is not a part of the project.
- ▶ The EchoSaiV2 is only reading data to be displayed in the Data Grid and on the Information Bar in the Capture Screen. Also, for updating a few attributes of the tables.

Settings

Echo Sai V2

Patient_ID	Name	Age	Study_Date	Status	Physician	Study_No	Rec_By	Terminal
WS00000001	Mrinal Kanti Saha	21	05-01-2021 21:23	COMPLETED	Dr. Ramesh	1	DOC12	ECHOROOM
WS00000002	Manoj Kumar Saha	56	25-03-2021 05:46	SCHEDULED	Dr. Suresh	0	DOC15	ECHOROOM
WS00000003	Putul Saha						C05	ECHOROOM

Settings

Choose Video Device :
"USB2.0 HD UVC WebCam"

Choose Audio Device :
"Microphone (Realtek(R) Audio)"

Configure Path :
C:\Users\mrina\Desktop\

CHOOSE

TEST

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Settings Panel

Settings Button

- There are options to choose a particular video and audio device and also the configurable path to the folder where all the clips would be stored.

All these information are stores in the .config file of the application.

```
Form3.cs  Form2.cs  Form1.cs
EchoSaiProto2.exe.config
<?xml version="1.0" encoding="utf-8"?>
<configuration>
  <startup>
    <supportedRuntime version="v4.0" sku=".NETFramework4.0" />
  </startup>
  <appSettings>
    <add key="ClientSettingsProvider.ServiceUri" value="http://localhost:8080" />
    <add key="Device" value="dummy" />
    <add key="Path" value="C:\\" />
  </appSettings>
  <system.web>
    <membership defaultProvider="ClientAuthentication" />
  </system.web>
</configuration>
```

Choose Video Device : "USB2.0 HD UVC WebCam" ▾

Choose Audio Device : "Microphone (Realtek(R) Audio)" ▾

Configure Path :

"Microphone (Realtek(R) Audio)"
"VisioForge Network Streamer Audio Source"
"VisioForge Virtual Audio Card"
"VisioForge What You Hear Source"

CHOOSE

TEST

The Capture Window

The screenshot displays the 'Echo Sai V2 (Capture Mod)' application interface. The main area is a 'Live Feed' showing a dark, noisy video stream. Above it is an 'Information Bar' containing patient details: Patient ID : WS00000001, Name : Mrinal Kanti Saha, Age : 21, Sex : M, Accn No : 12, and Study No : 1. To the right of the live feed is a 'Clips List' with five entries, each showing a small video thumbnail and a number (01 to 05). Above the clips list are controls for '00:00' and a 'START' button. Below the clips list is a 'Delete Button' represented by a trash icon. At the bottom right is a 'Go Back' button with a left arrow. The bottom left corner shows the text 'Sri Sathya Sai Institute Of Higher Medical Sciences'.

Echo Sai V2 (Capture Mod)

Information Bar

Patient ID : WS00000001 | Name : Mrinal Kanti Saha | Age : 21 | Sex : M | Accn No : 12 | Study No : 1

00:00 START

Clips

01 02 03 04 05

Live Feed

Clips List

Delete Button

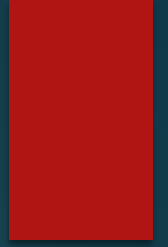
Go Back

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The Capture Window(contd)

- ▶ The START button doubles up as the STOP button.
- ▶ There is a timer.
- ▶ Minimum Video Length 6 seconds.
- ▶ As the recording stops, the thumbnail is generated from the frame of the video at 00:00:01 i.e at 1 second.

The Capture Window(contd)



- ← The clips list shows the thumbnail of the videos and also an option for deleting the clips by checking the boxes beside the thumbnail.
- ← The deletes buttons deletes the selected videos and refreshes the clips list.
- ← The Information bar shows a few details of the patient.
- ← The Go Back button takes us back to the viewer

Uses of FFmpeg in this project

- ▶ List all the media devices
- ▶ Check device compatibility for seamless video streaming
- ▶ Stream the feed from the devices chosen
- ▶ Play the live video stream
- ▶ Capture a portion of the stream
- ▶ Take screenshot of the created videos

List all media devices

- ▶ The user selects the video and audio devices that are identified by the FFmpeg.
- ▶ `ffmpeg -list_devices true -f dshow -i dummy`

• Check device compatibility video streaming

- ▶ Tests whether the device combination (video and audio) is allowed by FFmpeg.
- ▶ `ffmpeg -list_options true -f dshow
-i video="video_device":audio="audio_device"`

Stream the feed from the devices

- ▶ Starts an FFmpeg streaming process to two different ports (localhost) using UDP : one for playing live and another for capturing the stream to a file.
- ▶

```
ffmpeg -f dshow -rtbufsize 100M  
-i video="video_device":audio="audio_device"  
-c:v libx264 -x264-params keyint=7:scenecut=0  
-c:a aac -preset superfast  
-f tee -map 0:v -map 0:a  
"[f=mpegts]udp://127.0.0.1:XXXX|[f=mpegts]udp://  
127.0.0.1:XXXX"
```

Play the live video stream

- ▶ Starts the FFplay process.

- ▶ `ffplay -i -fflags nobuffer
-probesize 32 -analyzeduration 0
-sync ext
udp://127.0.0.1:XXX`

Capture a portion of the stream

- ▶ Starts capturing the live stream as the START Button is pressed.
- ▶

```
ffmpeg -i udp://127.0.0.1:XXXX  
-map 0:0 -map 0:1  
-c:v copy -c:a copy  
c:\outputFolder\fileName.mp4
```

• Take screenshot of the created videos

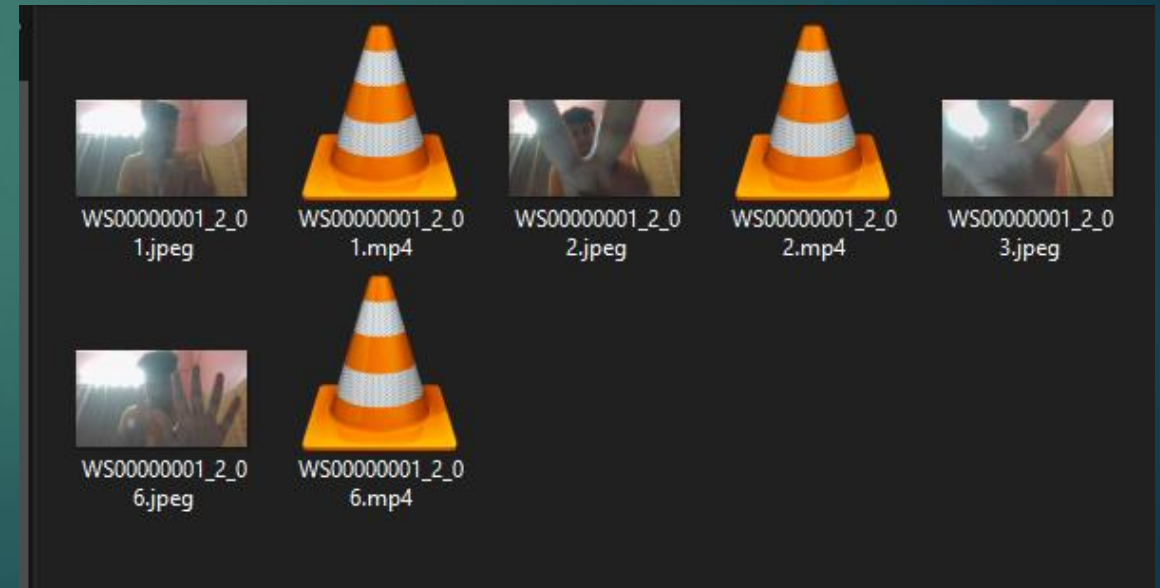
- ▶ The screenshot of the video recorded is taken and is used as a thumbnail (taken at 00:00:01) in the view

- ▶

```
ffmpeg -ss 00:00:01  
      -i input.mp4  
      -vframes 1 -q:v 1  
      output.jpeg
```

Folders, Files and their Naming Conventions

- ▶ The video files are stored as .mp4 and the thumbnails are stored as .jpeg
- ▶ The naming convention of the folder is PatientID_StudyNo
- ▶ Convention for files
PatientID_StudyNo_ClipNo.mp4
PatientID_StudyNo_ClipNo.jpeg



Acknowledgement

- ▶ We thank our guide, Sri V Bhaskaran without whose direction we would have not been able to finish our project.
- ▶ We would also like to thank Sri Subba Rao G V R for giving his time and helping us throughout the project.
- ▶ I am eternally indebted to our beloved Bhagawan Sri Sathya Sai Baba for his grace on us.



Thank You

JAI SAI RAM