IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

_____

BEFORE THE PATENT TRIAL AND APPEAL BOARD

_____

SNAP INC.,

Petitioner,

v.

PLAYVUU, INC.,

Patent Owner.

_____

Case No. IPR2023-00848

U.S. Patent No. 10,931,911

_____

Declaration of Jeremy Cooperstock, Ph.D.

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I, Jeremy Cooperstock, Ph.D., declare as follows:

1. My name is Jeremy Cooperstock. I am a Professor in the Department of Electrical & Computer Engineering at McGill University in Montreal, Canada. As described in §VII, I am a widely recognized expert in audio and video content creation, editing, and file sharing, and related technologies.

2. I have prepared this Declaration as an expert witness retained by Snap Inc. ("Snap"). In this Declaration I give my opinions as to whether certain claims of U.S. Patent No. 10,931,911 ("the '911 patent") are invalid. I provide technical bases for these opinions as appropriate.

3. This Declaration contains statements of my opinions formed to date and the bases and reasons for those opinions. I may offer additional opinions based on further review of materials in this matter, including opinions and/or testimony of other expert witnesses and material from related matters. I make this Declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters contained herein.

I. OVERVIEW OF THE TECHNOLOGY

A. Background

4. As discussed below, the '911 patent generally relates to systems for generating and disseminating audio content or audio and visual content over a network. EX1001 (*'911 Patent*), Title, Abstract, 3:48-53.

5. More specifically, the '911 Patent relates to a system that allows a user to: (i) select existing multimedia (*see* §II.A.4); (ii) combine it with a video created by the user to create new multimedia (*see* §II.A.5); (iii) review, edit, and save the new multimedia (*see* §II.A.6); and (iv) publish the resulting new multimedia (*see* §II.A.7). But such techniques have long been known, as described in the following sections.

B. Systems for Combining Audio and/or Video Content to Create Multimedia Content Have Long Been Known

6. Systems were well-known to POSITAs by 2009-2010[1] that enabled the creation of multimedia user content by combining audio and visual content from various sources. I discuss several example references here and in the following sections that teach this concept. Many more examples exist, including, for example, those identified in the Grounds. *See* §§III, VI.

7. ***Corset:*** For example, *Corset* (US Patent Application Publication No. 2002/0007718; EX1009) teaches[2] a "video immersion" karaoke system where the user can insert their image in a "video clip or movie" such that he/she replaces an actor. *Corset* (EX1009), Abstract. In the *Corset* system, as shown in FIG. 2 reproduced here, after a video clip or movie is selected from a database (*e.g.*, on

[1] "2009-2010" represents the timeframe before the earliest possible effective filing date of the '911 patent.
[2] I use "teach" herein to mean "teach or suggest."

the Internet), analysis and processing device 11 receives the user's voice and image from pickup device, and separates the face of the user from the background according to chroma key (*e.g.*, blue-screen) techniques. *Corset* (EX1009), ¶¶[0004], [0010], [0013], [0017]. Then, mixing and rendering device 12 composes the user with a pre-recorded background and mixes in the user's voice. *Corset* (EX1009), ¶¶[0004], [0010]. Displaying device is "used for displaying the final result (i.e. the combination of the pre-recorded material and of what belongs specifically to the user)." *Corset* (EX1009), ¶¶[0004], [0010]. The final result may also be saved on recording device 25. *Corset* (EX1009), ¶[0013]. The user may also put the final product on his/her homepage, using compression techniques as necessary. *Corset* (EX1009), ¶[0017].

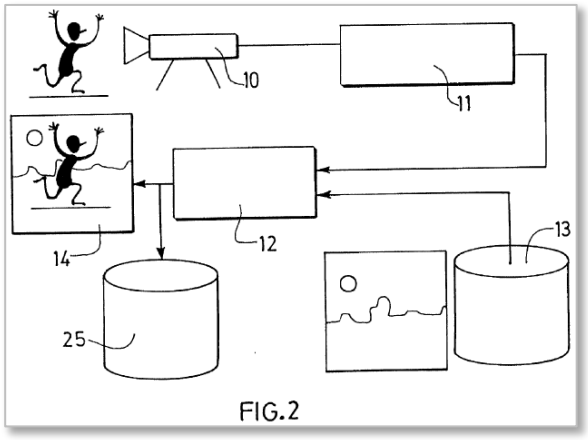


FIG.2

8. ***Relan:*** *Relan* (US Patent Application Publication No. 2007/0122786; EX1010) teaches another "video karaoke system" that provides multiple video (or audio-visual) sources to a mixing unit that provides a composite video output. *Relan* (EX1010), Abstract, ¶¶[0002], [0022]. In particular, *Relan* teaches a video karaoke system in FIG. 1 (reproduced here), where a first video source (*e.g.*, a prerecorded video) and a second video or audio-visual source (*e.g.*, a live video of

a user) are sent to mixing unit 113 to create a composite video. *Relan* (EX1010), ¶[0021], ¶[0022], ¶[0025], ¶[0035]. In particular, *Relan* teaches that "first video source 107 could be a video output from video camera aimed at a person or a viewer of the display unit, the second video source 109 could be, for example, a scene from a movie, and the video karaoke system makes it possible to superimpose the image of the viewer's face captured by the video camera (and tracked by the video camera) such that the combined output viewed is one where one of the characters in the scene from a movie is that of the viewer or person whose image is being captured via the video camera." *Relan* (EX1010), ¶[0048].

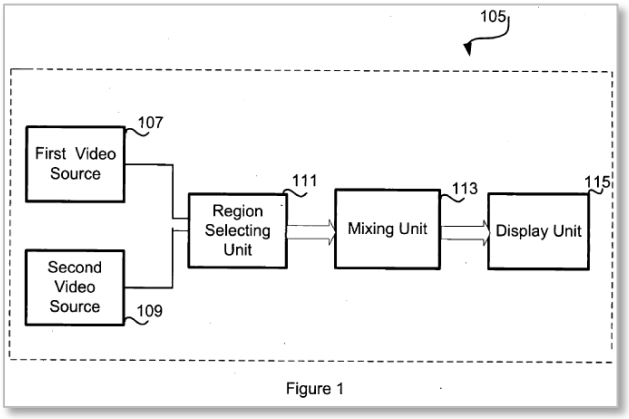
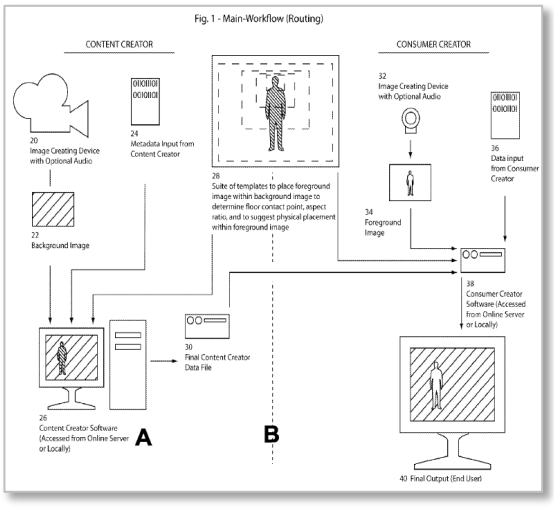


Figure 1

9. ***Gauseride:*** *Gauseride* (WO Publication No. 2009/079560 A1; EX1011) teaches "a process and system that allows an end user to insert images into a video content so that the images appear part of that content," such that the consumer "seem[s] to be part of a video, and interact with the famous personalities in that video." *Gauseride* (EX1011), Abstract. For example, *Gauseride* (EX1011) teaches "[t]wo,

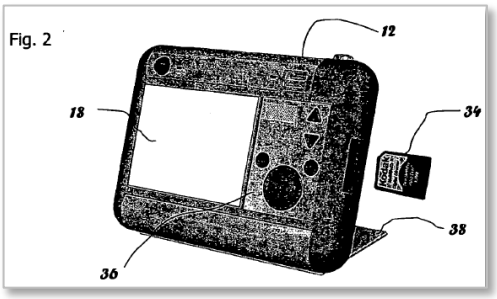


or more, separate video/image streams can be composited together" to produce "a convincing illusion in which the user/subject seems to be interacting live with the 'content,'" such as adding a user into the video of a rock concert. *Gauseride* (EX1011), ¶¶[0006], [0012].

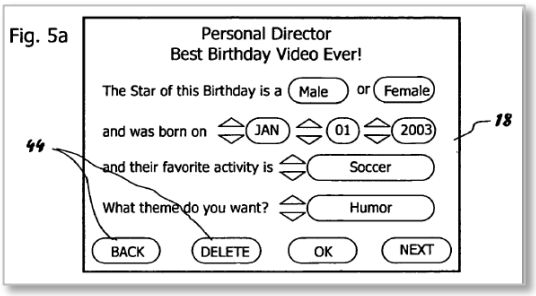
10. *Gauseride's* system involves a "content creator" that creates and distributes backgrounds, such as videos with templates for video content to be added, and a "consumer creator" that inserts a user's video to make a combined image. *Gauseride* (EX1011), ¶[0023], ¶[0024]. The consumer creator can select a "background video/image to interact with from available content on his / her computing device," and then use an image creating device 32, *e.g.*, a video camera, to obtain a video of himself and "combine it with the final video 30 using superimposing or keying to insert or composite a foreground image into the 'place holder' position created by the template." *Gauseride* (EX1011), ¶¶[0025], [0040], [0041]. A user's audio (*e.g.*, singing) can also be recorded. *Gauseride* (EX1011), ¶[0031]. *Gauseride* further teaches that "the performance can be saved for upload to online services, emailing or even burning onto a DVD or other recording medium." *Gauseride* (EX1011), ¶[0031].

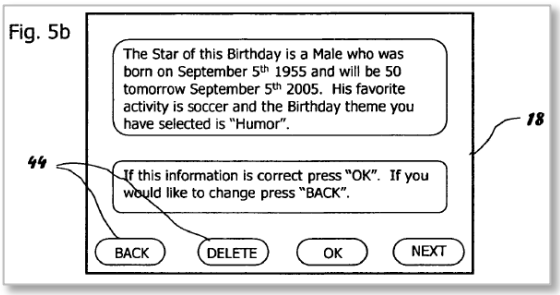
11. ***Manico:*** *Manico* (US Patent Application Publication No. 2005/0206751; EX1012) teaches a camera 12 with a touchscreen display 18 that is used to capture images and produce "compelling video programs." EX1012

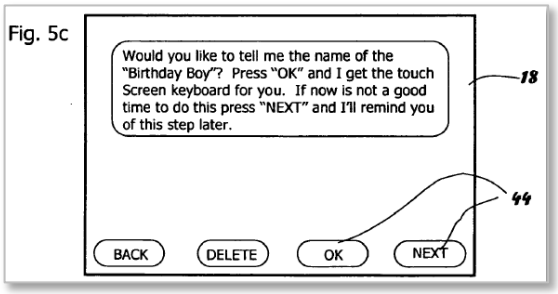
(*Manico*) at ¶¶[0002], [0009]-[0024], [0052]-[0053]. *Manico's* system provides "operator guidance and automated image processing utilities that enable even an unskilled operator to capture and construct a presentation of image sequences that can have the appearance of a professionally prepared production." EX1012 (*Manico*) at ¶[0054].

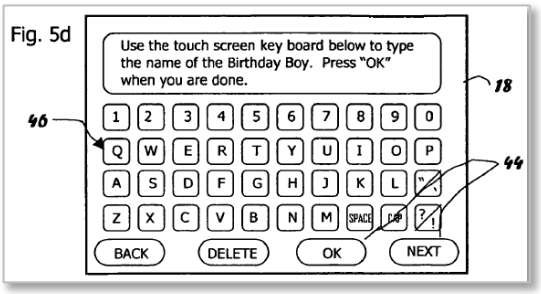


12. In operation, *Manico* teaches that instructions and images may be downloaded to camera 12. EX1012 (*Manico*), ¶[0057]-[0058]. As part of this process a user may select from various themes to be loaded. EX1012 (*Manico*), ¶¶[0058]. This selection process is shown in FIGS. 5a-5d, reproduced below.





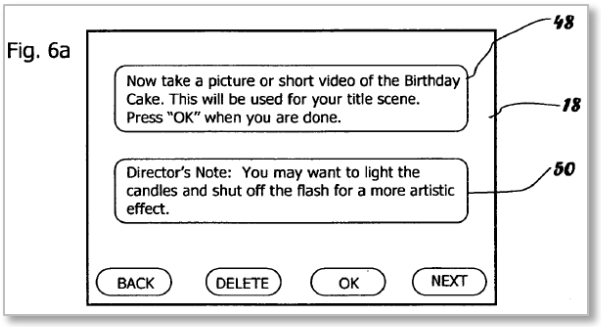


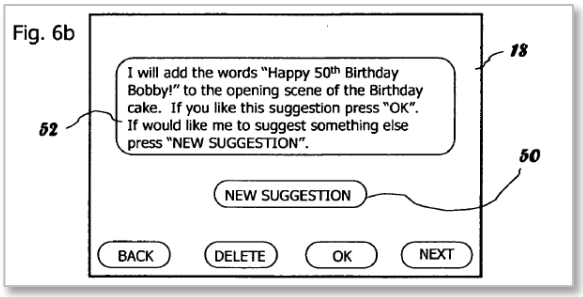


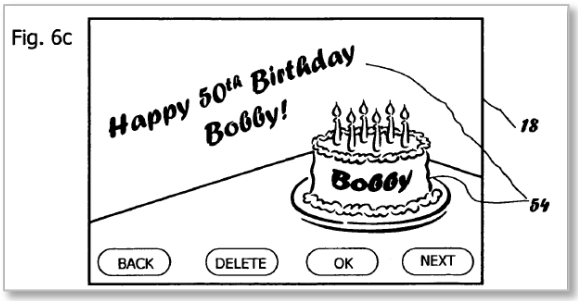
13. *Manico* further teaches various examples of multimedia content creation combining images, video, and audio in accordance with user instructions

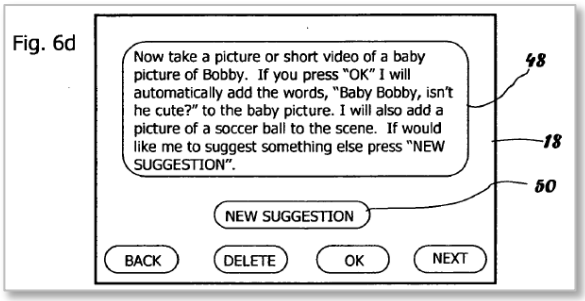
via a user interface, including memorializing a birthday party (*e.g.*, FIGS. 6a-6p; EX1012 (*Manico*) at ¶¶[0066]-[0069]), creating a music video (*e.g.*, FIGS. 10a-10g; EX1012 (*Manico*) at ¶¶[0081]-[0088]), and creating a comedy sequence (*e.g.*, FIGS.14a-15d; EX1012 (*Manico*) at ¶¶[0089]-[0091]).

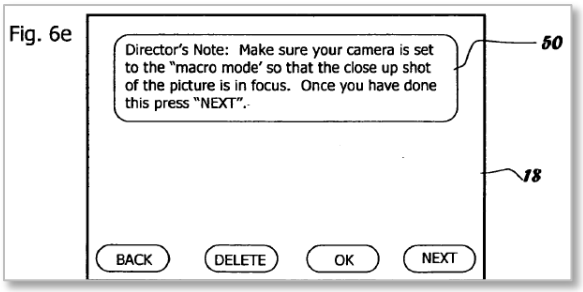
14. In the first example, *Manico's* system instructs the user to collect images and videos of a birthday party, which can be edited with text and graphics, as shown in FIGS. 6a-6g and 6k-6p. EX1012 (*Manico*) at ¶¶[0066]-[0069].

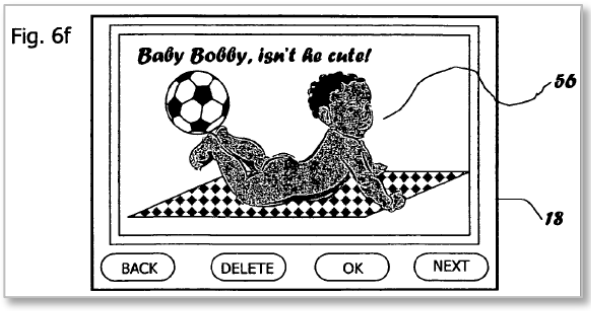


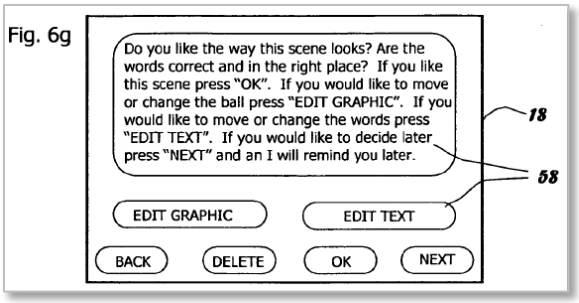


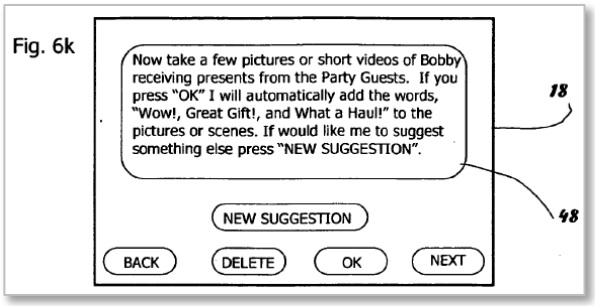








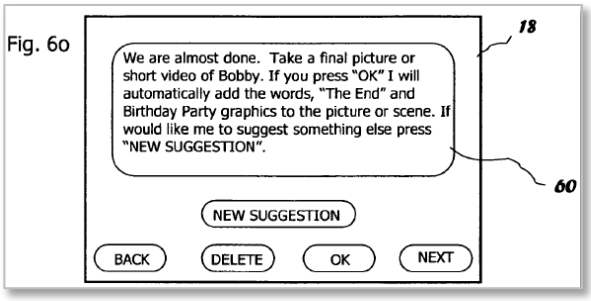






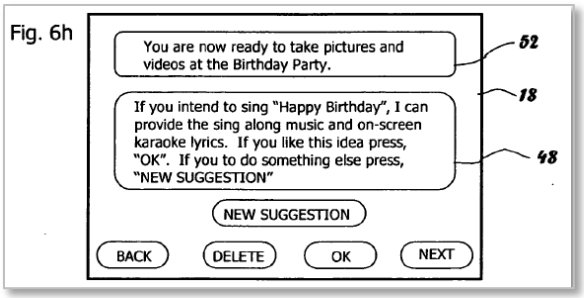


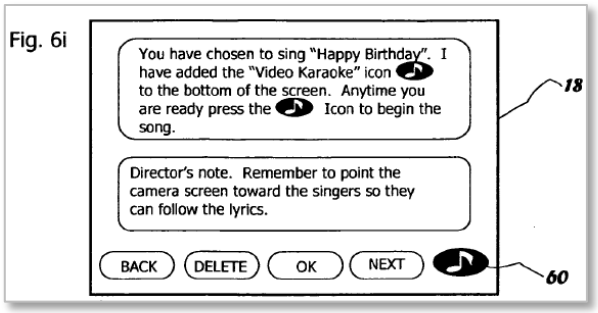


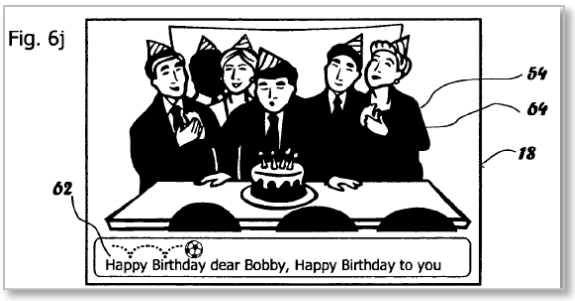




15. *Manico* also teaches, as shown in FIGS. 6h-6j reproduced here, that a "'video karaoke' sequence" may be captured. EX1012 (*Manico*) at ¶[0068]. The screens allow a user to agree to the "Happy Birthday" song or ask for a new selection, and to indicate when he is ready to record by pressing a button on the user interface. EX1012 (*Manico*) at ¶[0068].







16. These various images and videos can then be assembled into a multimedia electronic storyboard 70. EX1012 (*Manico*) at ¶¶[0070]-[0075].

17. In addition to the above, *Manico* teaches that "[n]umerous special effects can be employed for further customization" of the multimedia content, including images, graphic templates for images and video ("includ[ing] decorative or thematic borders and could be populated with still or motion images using 'drag and drop' or other suitable user interface techniques"), and sound clips. EX1012 (*Manico*) at ¶¶[0077]-[0079].

18. *Manico* also teaches, as discussed above, an embodiment where a user may make a music video. EX1012 (*Manico*) at ¶[0081]. In this embodiment: (i) the camera is provided with "an audio soundtrack (a popular song, for example) a video track (such as music video scenes, for example) and a control track that

provides instructions for video frame compositing and pseudo-camera movements;" (ii) "[t]he audio soundtrack is played back as new video sequences are captured, so that the filmed subjects can act in time to the music;" and (iii) "[t]he captured live video is then combined with the video track to produce a new video sequence that includes both live images and the music video scenes provided by the digital director." EX1012 (*Manico*) at ¶¶[0081]-[0086].

19. In particular, *Manico* teaches that its music video embodiment is enabled by display 18 of camera 12, which provides a prompt for song selection 92a (*see* FIG. 12a) leading to a song listing (*see* FIG. 12b) and a prompt for theme selection 92b leading to a theme listing (*see* FIG. 12c). EX1012 (*Manico*) at ¶¶[0085]-[0086]. After song and theme selection, display 18 shows an "initiation prompt 96 for beginning the music video sequence" (*see* FIG. 12d). EX1012 (*Manico*) at ¶¶[0085]-[0086]. Video recording of the user singing along with the selected song may then be performed, which the system composites with a background. EX1012 (*Manico*) at ¶[0087].

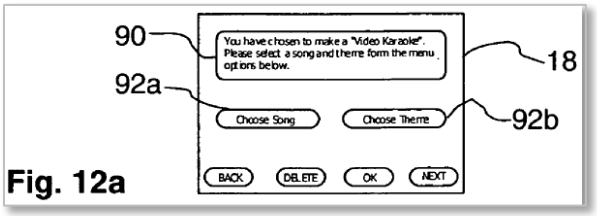


Fig. 12a

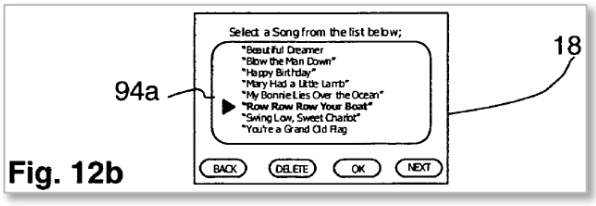


Fig. 12b

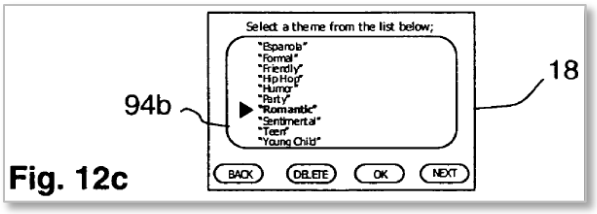


Fig. 12c

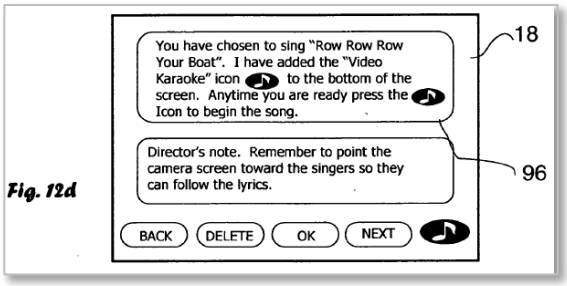


Fig. 12d

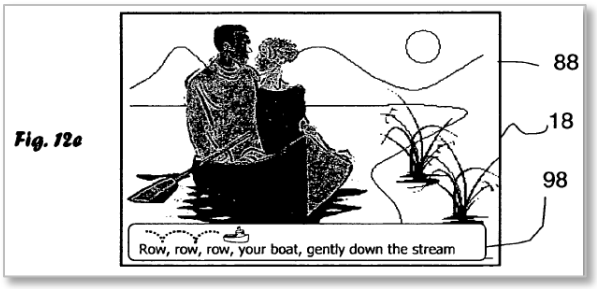


Fig. 12e

20. *Manico* teaches that this process results in "a 'personalized' music video, produced by the user and featuring a selected song, with one or more subjects 86 suitably featured as the 'stars,' [where the] live scene is captured as the actors perform in accordance with the song, and the composited video images are stored in synchronization with the song." EX1012 (*Manico*), ¶[0088].

21. *Manico* also teaches, as discussed above, an embodiment where a user may make a "humorous scripted program" where text and graphics can be added to images. EX1012 (*Manico*), ¶¶[0089]-[0092].

22. ***Gentile:*** *Gentile* (U.S. Patent Pub. No. 2010/0027961; EX1013) teaches a system allowing users to "select a scene from [a] movie," a "role to play in [the] movie scene," and then "record his or her own performance" such that "the system inserts that performance in place of the original character, creating the

appearance that the participant is interacting with the other characters in the movie scene. *Gentile* (EX1013), ¶[0009]. *See also* Abstract, ¶¶[0035], [0047].

23. *Gentile's* process begins, as shown at step 205 in FIG. 2 (reproduced here), with a user selecting a particular pre-recorded movie, scene, and role such as by using the graphical user interfaces shown in FIGS. 9, 11, and 12. *Gentile* (EX1013), ¶¶[0071], [0139]-[144], [0148], [0149]. *Gentile* teaches its system includes a database 101 of "prerecorded video content," such as video clips with audio and video content. *Gentile* (EX1013), ¶¶[0012], [0048], [0050], [0051]. The video may be in QUICKTIME, MPEG, WMA, WMV, MP4, MKV, JPEG, or other formats. *Gentile* (EX1013), ¶[0050]. The database can be a remote server. *Gentile* (EX1013), ¶[0053].

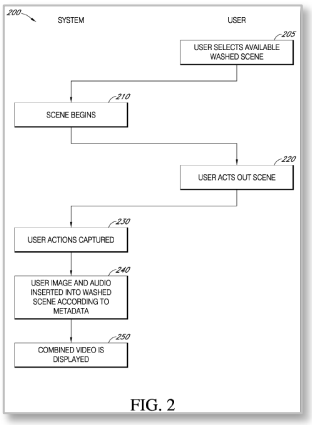


FIG. 2

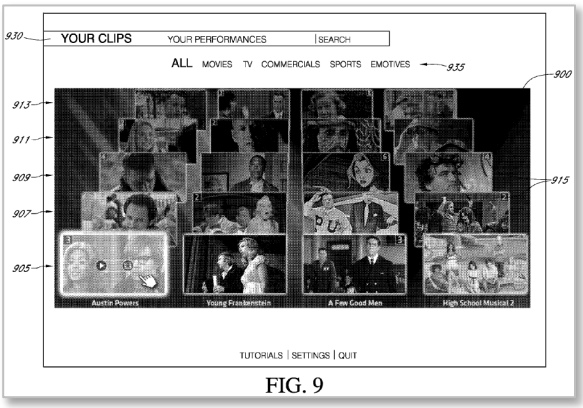


FIG. 9

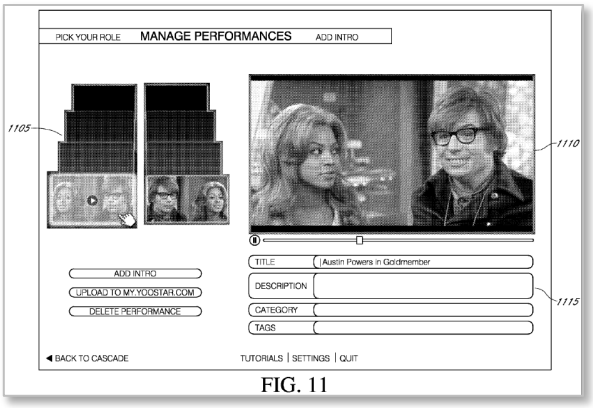


FIG. 11

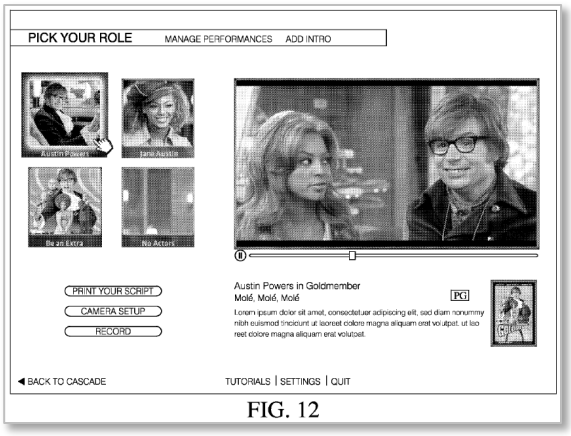


FIG. 12

24. After the user selects a movie, scene, and role, the system provides the user instructions on how to compose the scene, such as how to position the user, camera, and green screen as shown in FIG. 15. *Gentile* (EX1013), ¶[0152]. A record video screen is then provided, as shown in FIG. 16. *Gentile* (EX1013), ¶[0153].

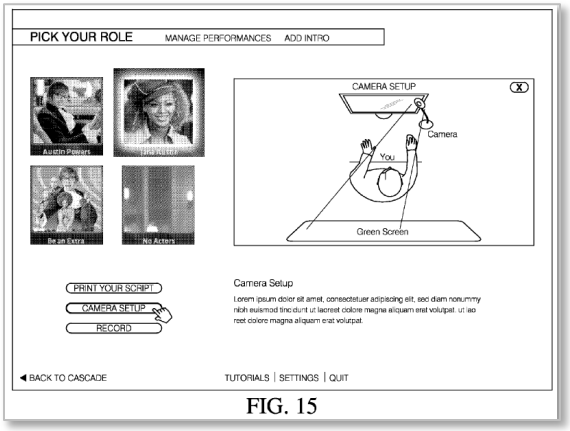


FIG. 15

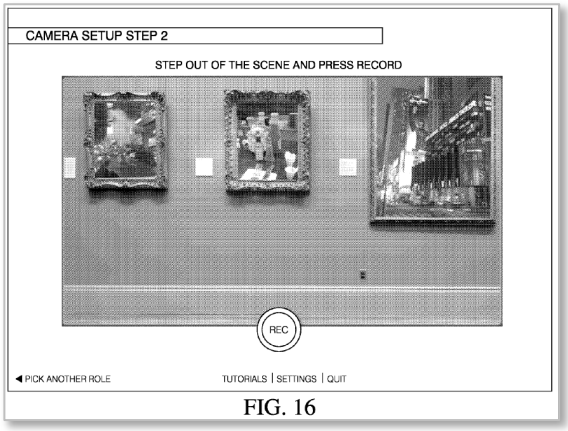


FIG. 16

25. Next, the user may cause the selected scene to begin playing (*Gentile* (EX1013), ¶[0072]) and (at step 220) act out the scene by following the directions or other prompts (*Gentile* (EX1013), ¶¶[0072]-[0073]). The user's performance (at step 230) is recorded by video recorder 110 (*e.g.*, a web camera or smartphone) in

front of a green screen, or other similar techniques suitable "to isolate the image of the participant from the background," including chroma key techniques). *Gentile* (EX1013), ¶[0075]. *See also Gentile* (EX1013), ¶¶[0012], [0049], [0058].

26. Next, at step 240, the participant's video is inserted into the selected scene by video compositor 120. *Gentile* (EX1013), ¶[0079]. *See also Gentile* (EX1013), ¶[0063]. The system may be "configured to filter the real-time video signal to remove the background image to create a modified real-time video signal, and combine … the prerecorded video content and the modified real-time video signal … such that the video image of the participant appears in place of the original character" (*Gentile* (EX1013), ¶[0012]) such as by overlaying (*Gentile* (EX1013), ¶[0011], [0013]). *See also* Abstract, ¶[0049]. Various techniques may be used, such as green screen, blue screen, or other similar chroma-key processes (*Gentile* (EX1013), ¶[0059]) or background subtraction techniques (*Gentile* (EX1013), ¶[0060]).

27. *Gentile* further teaches that the combined video can be shown on display 125, where "[c]ustom filters can further be applied during playback to improve the displayed image." *Gentile* (EX1013), ¶[0091]. As shown in FIG. 17, the user may also add an introduction screen with backgrounds, including "message, advertisement, product placement, logo, still image, combinations of the above, or the like," by using a process similar to that of recording over the movie

scene. *Gentile* (EX1013), ¶[0154]. The user can also add metadata. *Gentile* (EX1013), ¶[0154]. *Gentile* also teaches video and audio editing capability, including "removing, replacing, and/or enhancing video elements, such as music, vocals, score, sound effects, special effects, combinations of the same or the like." *Gentile* (EX1013), ¶[0061].

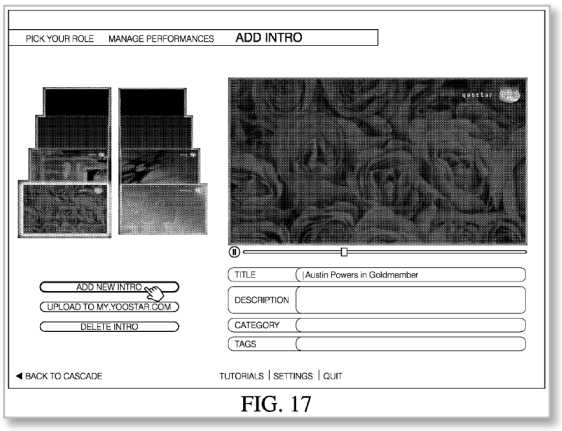


FIG. 17

28. Once the user's performance is complete, the combined image may be stored as a single file "for later playback, comment, use and/or the like." *Gentile* (EX1013), ¶[0064]. The file can be "shared online, or sold as a DVD to the user in a variety of fashions." *Gentile* (EX1013), ¶[0125]. The file may be stored in user content database 115 (*Gentile* (EX1013), ¶[0061]), which may be a local or remote database (*Gentile* (EX1013), ¶[0062]). When the content is stored on-line, a user may "control the storage, filtering, and/or distribution of the finished video output." *Gentile* (EX1013), ¶[0125].

29. *Gentile* further teaches that, "the combined video or elements of the combined video, such as the user content file, are uploaded to a website for searching, sharing, and/or viewing combined video content." *Gentile* (EX1013), ¶[0092]. To enable such sharing, *Gentile* teaches that the combined video may be

sent to transcoding server, which "transcodes the content into a flash video file, MPEG, JPEG, and/or other file type for viewing at a display 125 and/or for submission to a content sharing website." *Gentile* (EX1013), ¶[0090]. In one configuration, to provide content protection when stored on-line, "combined content is stored only on a secure storage location, such as a controlled server, and only links or references to the protected content are allowed from programs or applets. The programs can stream the files from the secure storage location without saving a copy of the content." *Gentile* (EX1013), ¶[0129]. "[T]he online environment can be a website for sharing combined video …. with other viewers" such that the videos can be rated and "ranked based on popularity." *Gentile* (EX1013), ¶[0135]. In such a system, "[u]sers can choose to share videos with select individuals or can choose to make videos publicly available to anyone," and "build social networks with each other." *Gentile* (EX1013), ¶[0135]. The website includes "performance gallery pages where combined videos are displayed and where users may search for combined videos based on associated metadata" and "purchased content can then be downloaded to the interactive role performance system 100." *Gentile* (EX1013), ¶[0136].

C. Selection of Audio and Video Content From Lists of Stored Content To Create Multimedia Content Using The Selected Content Has Long Been Known

30. It was well-known to POSITAs by 2009-2010 to provide for the selection of audio and video content from lists of stored content to create new multimedia content using the selected stored content. I discuss several example references here that teach this concept. Many more examples exist, including, for example, those identified in the Grounds. *See* §§III, VI.

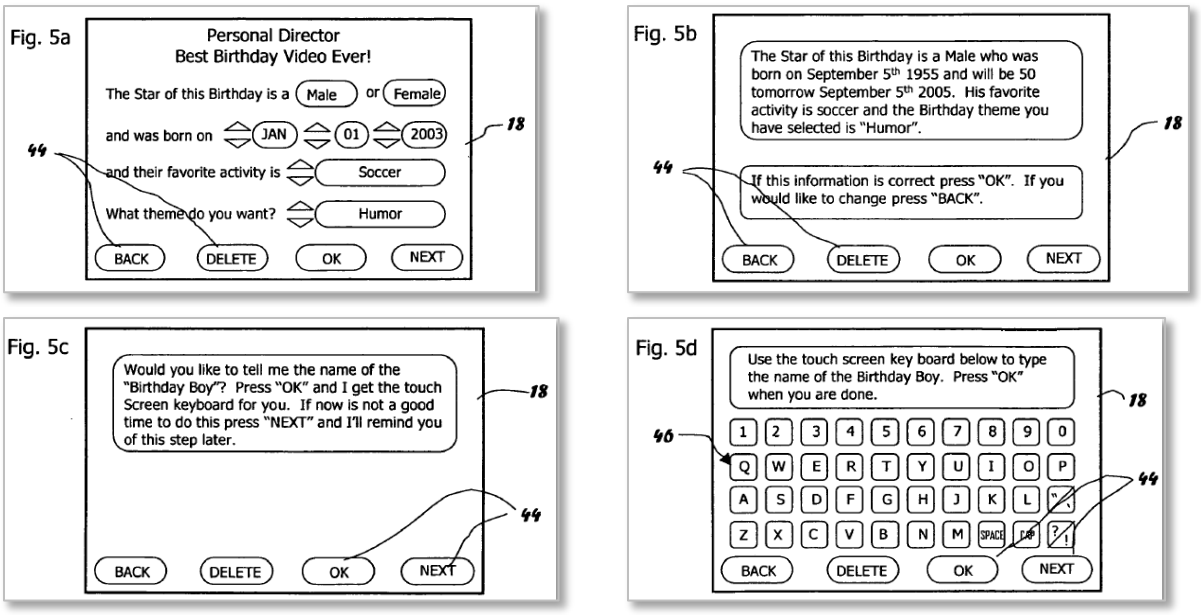
31. ***Corset:*** *Corset* (EX1009) teaches using stored video clips or movies from a database (including on a tape or the Internet) to perform its "video immersion" karaoke process. *Corset* (EX1009), Abstract, ¶¶[0013], [0017]. A POSITA would have understood that karaoke involves user-selection of a song to sing, along with one of the stored clips or movies.

32. ***Relan:*** *Relan* (EX1010) teaches selecting pre-recorded content (*e.g.*, video recordings from "a video library") for the user to record over (*Relan* (EX1010), ¶¶[0020], [0022], [0028], [0044], [0046], [0048]) and the ability to edit various aspects of the selected content (*Relan* (EX1010), ¶¶[0035], [0042]).

33. ***Gauseride:*** *Gauseride* (EX1011) teaches that, to select a "background video/image to interact with," a consumer creator "is able to browse a number of video files by looking at thumbnail representations of the videos, search functions

like tags and keywords, most viewed, most recent and best rated are available." *Gauseride* (EX1011), ¶¶[0040], [0088].

34. ***Manico:*** *Manico* teaches that, as part of its functionality, particular instructions and images may be downloaded to camera 12. EX1012 (*Manico*), ¶¶[0053], [0056]-[0057]. For example, a user may select from various themes to be loaded. EX1012 (*Manico*), ¶¶[0060]-[0061]. This selection process is shown in FIGS. 5a-5d, reproduced below.



35. *Manico* also teaches, as discussed above, an embodiment where a user may make a music video. EX1012 (*Manico*) at ¶[0081]. In particular, *Manico* provides a prompt for song selection 92a (*see* FIG. 12a) leading to a song listing (*see* FIG. 12b) and a prompt for theme selection 92b leading to a theme listing (*see* FIG. 12c). EX1012 (*Manico*) at ¶¶[0085]-[0086].

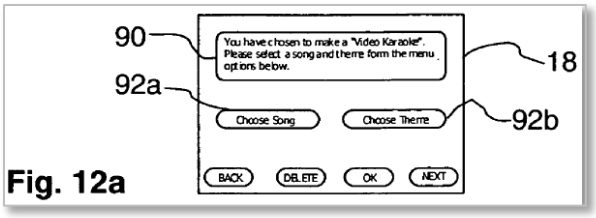


Fig. 12a



Fig. 12b

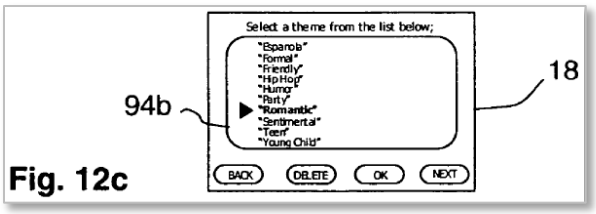


Fig. 12c

36. ***Gentile:*** *Gentile* (EX1013) teaches that a user may select a particular pre-recorded movie, scene, and role to record over such as by using the graphical user interfaces shown in FIGS. 2, 9, 11, and 12. *Gentile* (EX1013), ¶¶[0071], [0139]-[0144], [0148], [0149]. *Gentile* teaches its system includes a database 101 of "prerecorded video content," such as video clips with audio and video content. *Gentile* (EX1013), ¶¶[0012], [0048], [0050], [0051].

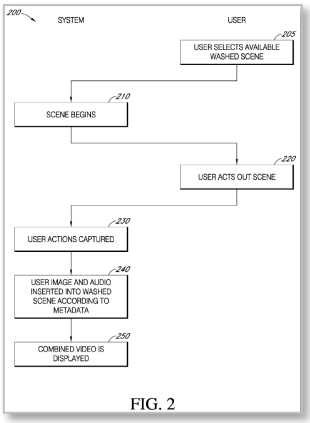


FIG. 2

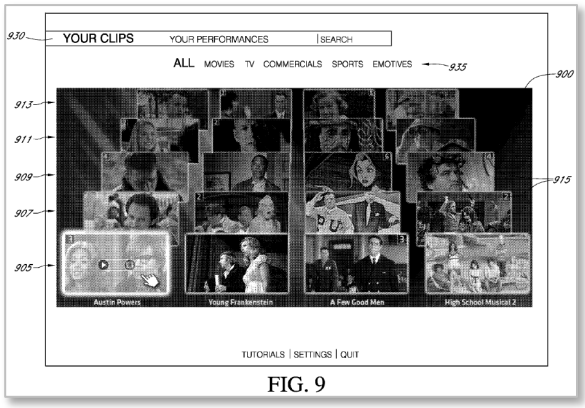


FIG. 9

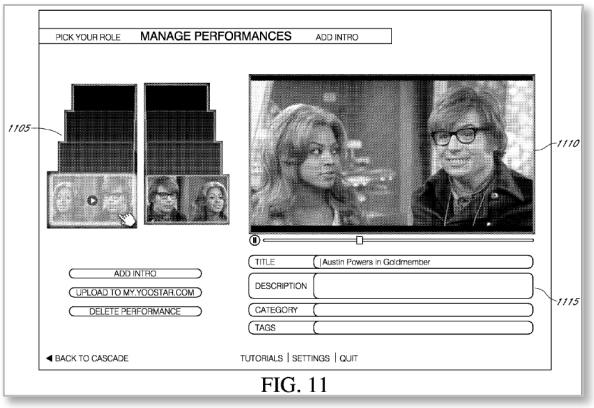


FIG. 11

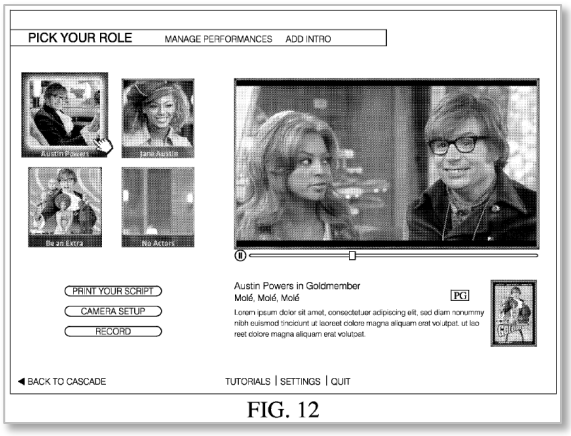


FIG. 12

D. Compositing Background Images/Video with Foreground Video of a User to Create Multimedia Content Has Long Been Known

37. It was well-known to POSITAs by 2009-2010 to composite background images/video with foreground video of a user to create multimedia content. I discuss several example references here that teach this concept. Many more examples exist, including, for example, those identified in the Grounds. *See* §§III, VI. Indeed, the '911 Patent itself indicates that its "user interface allows for a technique of compositing two frames together, wherein one image is selectively made transparent to reveal the other image, ***as well known in the prior art***." EX1001 (*'911 Patent*), 17:22-25 (emphasis added).

38. ***Corset:*** *Corset* (EX1009) teaches that its system composites images of a user taken from its pickup device with pre-recorded images. *Corset* (EX1009), ¶[0004] (the karaoke system includes "a pickup device, for picking up an image and the voice of an user, [and] an analysis and processing device, for separating at least a part of the user from the background, a mixing and rendering device, for

combining the [output] signal of said analysis and processing device and a pre-recorded material"), ¶[0005] ("the voice and the face in the video clip of the song can be replaced by the voice and the face of the [] singer"), ¶[0010] (analysis and processing device 11 separates "the face of the user from the background and thus defin[es] an alpha plane (such a circuit can be based for example on the chroma key technique, if the user is put on stage, in front of a blue screen)," "compos[es] the user with a background pre-recorded video or audio-video delivered by a medium 13 (said pre-recorded material is shown at the left side of the medium)," and "[u]sing the alpha plane defined thanks to the device 11, … combine[s] the two sources, according to a relation of the following type: [(video 1×alpha)+(video 2×(255−alpha))]/255= finalvideo)."

39. ***Relan:*** *Relan* teaches that its "video karaoke system" composites video streams, including of a pre-recorded background video and live video of a user. *Relan* (EX1010), Abstract, FIG. 1, ¶¶[0020]-[0023], ¶[0025], ¶[0029], ¶[0035], ¶[0048]. For example, *Relan* teaches that the video sources can be superimposed such that an image of a viewer's face captured by a video camera can be superimposed on a scene from a movie. *Relan* (EX1010), ¶[0048].

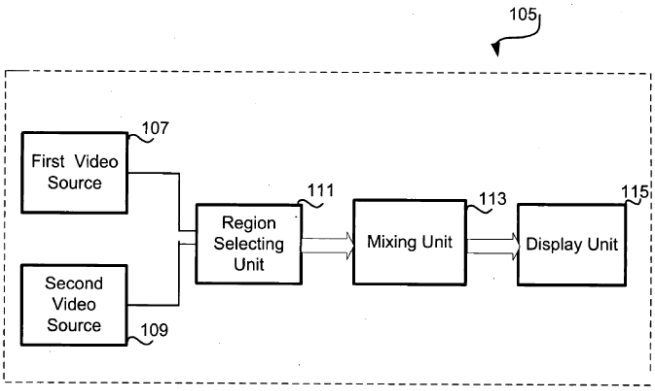


Figure 1

40. ***Gauseride:*** *Gauseride* (EX1011) teaches "[t]wo, or more, separate video/image streams can be composited together" to produce "a convincing illusion in which the user/subject seems to be interacting live with the 'content.' For example, assume that a video of a rock concert is available on the Internet. The user captures his or her own image using a computer (which includes a variety of computing devices including personal computers and game consoles) connected video camera. This image of the user-consumer is combined with the 'content' video using real-time software to produce a final video image where the user appears to be present in the rock concert video." *Gauseride* (EX1011), ¶[0006]. *See also Gauseride* (EX1011), ¶[0012].

41. In particular, *Gauseride* teaches that the consumer creator can use an image creating device 32, *e.g.*, a video camera, to obtain a video of him(her)self and "combine it with the [background video] using superimposing or keying to insert or composite a foreground image into the 'place holder' position created by the template." *Gauseride* (EX1011), ¶[0025]. Regarding the keying process, *Gauseride* teaches that:

> Keying is a well-known process involved in superimposing or combining two or more image or video streams. In graphics, superimposition or "superimpose" is the placement of an image or video on top of an already-existing image or video, usually to add to the overall image effect, but also sometimes to conceal something (such as using the left side of the screen for the background image and the right side for the foreground image, also known as split screen). Keying is the process whereby the portion of one video image is

> isolated from its background so it can be composited with or combined into another image. The most commonly used key is chroma key. Chroma key is a technique for blending two images, in which a color (or a small color range) from one image is removed (or made transparent), revealing another image. This technique is also referred to as color keying, color-separation overlay (CSO), green-screen and blue-screen. It is commonly used for weather forecast broadcasts, wherein the presenter appears to be standing in front of a large weather map while actually standing in front of a blue background or green background.

Gauseride (EX1011), ¶[0026]. *See also Gauseride* (EX1011), ¶[0028]. *Gauseride* teaches that the results of such video compositing are similar to known "blue-screen" processes. *Gauseride* (EX1011), ¶[0027].

42. ***Manico:*** *Manico* (EX1012) teaches, as discussed above, an embodiment where a user may make a music video. EX1012 (*Manico*) at ¶[0081]. In this embodiment: (i) the camera is provided with "an audio soundtrack (a popular song, for example) a video track (such as music video scenes, for example) and a control track that provides instructions for video frame compositing and pseudo-camera movements;" (ii) "[t]he audio soundtrack is played back as new video sequences are captured, so that the filmed subjects can act in time to the music;" and (iii) "t]he captured live video is then combined with the video track to produce a new video sequence that includes both live images and the music video scenes provided by the digital director." EX1012 (*Manico*) at ¶¶[0081]-[0085].

43. In particular, *Manico* teaches that its music video embodiment is enabled by display 18 of camera 12, which provides an "initiation prompt 96 for

beginning the music video sequence" (*see* FIG. 12d). EX1012 (*Manico*) at ¶¶[0086]-[0087]. Video recording of the user singing along with the selected song may then be performed, which the system composites with a background. EX1012 (*Manico*) at ¶[0085].

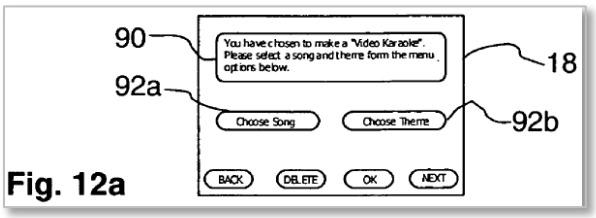


Fig. 12a

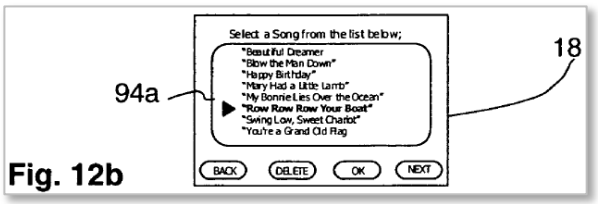


Fig. 12b

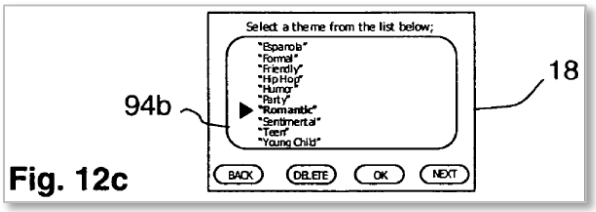


Fig. 12c

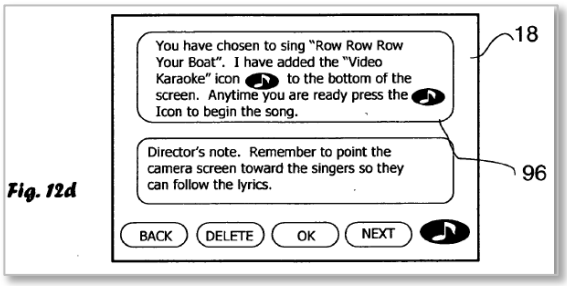


Fig. 12d

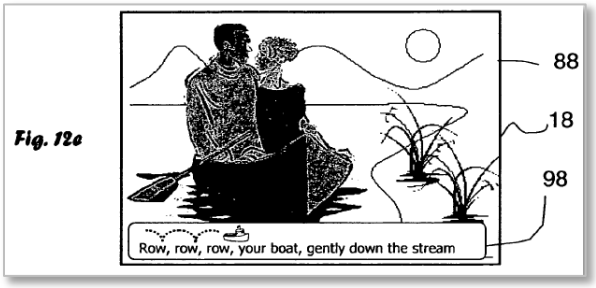


Fig. 12e

44. *Manico* teaches that this process results in "a 'personalized' music video, produced by the user and featuring a selected song, with one or more subjects 86 suitably featured as the 'stars,' [where the] live scene is captured as the actors perform in accordance with the song, and the composited video images are stored in synchronization with the song.") EX1012 (*Manico*), ¶[0088].

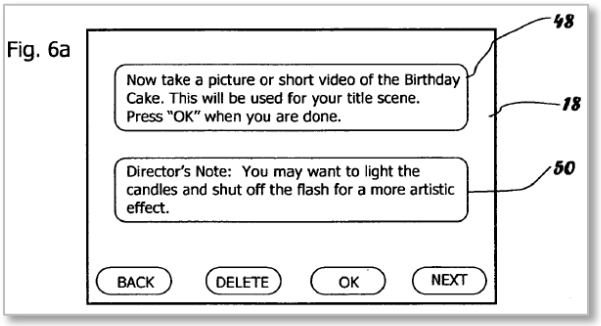
45. ***Gentile:*** *Gentile* (EX1013) teaches that a user's performance (at step 230) is recorded by video recorder 110 (*e.g.*, web camera or smartphone) in front of a green screen, or other similar techniques suitable "to isolate the image of the participant from the background," including chroma key techniques. *Gentile* (EX1013), ¶[0075]. *See also Gentile* (EX1013), ¶¶[0012], [0049], [0058]. Then, at step 240, the participant's video is inserted into the selected scene by video compositor 120. *Gentile* (EX1013), ¶[0079]. *See also Gentile* (EX1013), ¶[0063]. The system may be "configured to filter the real-time video signal to remove the background image to create a modified real-time video signal, and combine … the prerecorded video content and the modified real-time video signal … such that the video image of the participant appears in place of the original character" (*Gentile* (EX1013), ¶[0012]) such as by overlaying (*Gentile* (EX1013), ¶[0011], [0013]). *See also* Abstract, ¶¶[0049]. Various techniques may be used, such as green screen, blue screen, or other similar chroma-key processes (*Gentile* (EX1013), ¶[0059]) or background subtraction techniques (*Gentile* (EX1013), ¶[0060]).

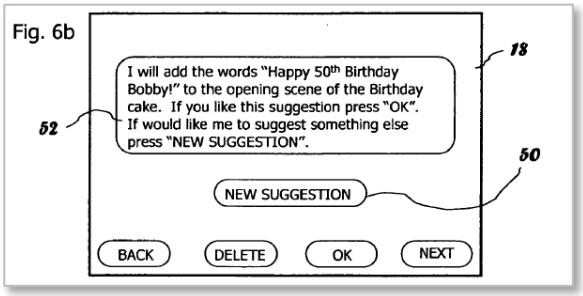
E. It Has Long Been Known to Provide Previews and Editing Functionality for User-Created Multimedia Content

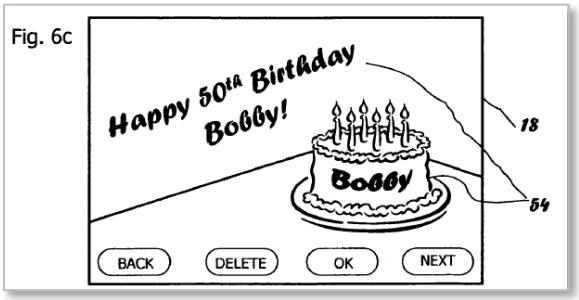
46. It was well-known to POSITAs by 2009-2010 to provide previews and editing functionality for user-created audio and/or video content. I discuss several example references here that teach this concept. Many more examples exist, including, for example, those identified in the Grounds. *See* §§III, VI.

47. ***Gauseride:*** *Gauseride* (EX1011) teaches a "personalization" step of the video creation process where the consumer creator "has the option to display names or other content as an overlay graphic on screen. This is akin to adding a visible digital "watermark" to the video to identify the source, such as one's name, etc." *Gauseride* (EX1011), ¶[0042].

48. ***Manico:*** *Manico* (EX1012) teaches, in its first example, its system instructs the user to collect images and videos of a birthday party, which can be edited with text and graphics, as shown in FIGS. 6a-6g and 6k-6p. EX1012 (*Manico*) at ¶¶[0067]-[0069].







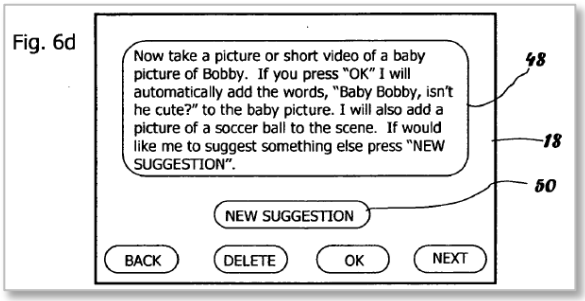


Fig. 6e

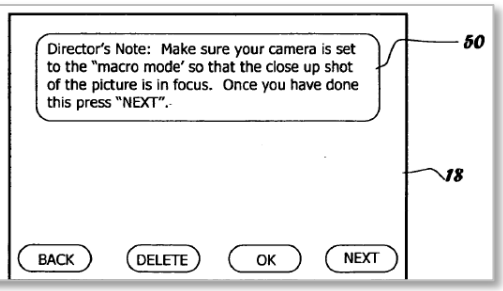


Fig. 6f

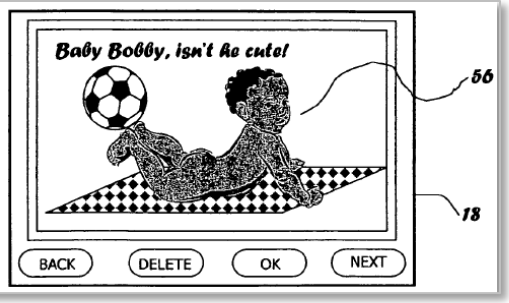


Fig. 6g

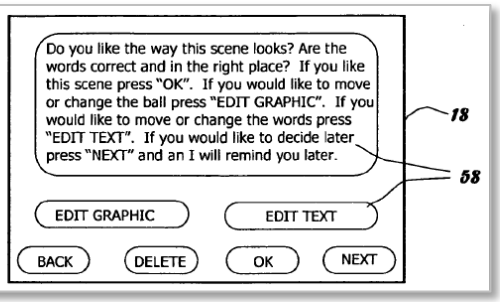


Fig. 6k

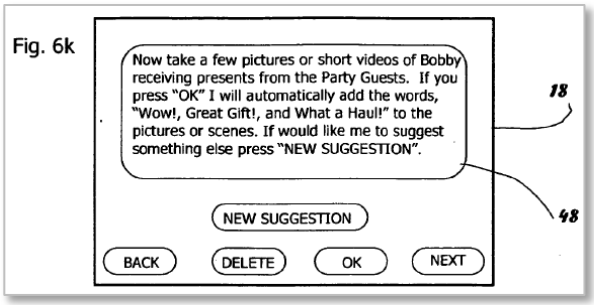


Fig. 6l



Fig. 6m



Fig. 6n



Fig. 6o

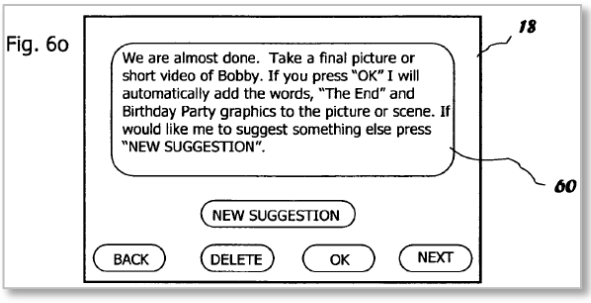


Fig. 6p



Snap Inc. - EX1003, Page 0031

49. As part of this process, various previews are provided, such as are shown in FIGS. 6c and 6f, that can be further edited. Moreover, *Manico* teaches that "[n]umerous special effects can be employed for further customization" of the multimedia content, including images, graphic templates for images and video ("include[ing] decorative or thematic borders and could be populated with still or motion images using 'drag and drop' or other suitable user interface techniques"), and sound clips. EX1012 (*Manico*) at ¶¶[0077]-[0079].

50. ***Gentile:*** *Gentile* (EX1013) teaches that the user-created video can be shown on display 125, where "[c]ustom filters can further be applied during playback to improve the displayed image." *Gentile* (EX1013), ¶[0091]. A shown in FIG. 17, the user may also add an introduction screen with backgrounds, including "message, advertisement, product placement, logo, still image, combinations of the above, or the like," by using a process similar to that of recording over the movie scene. *Gentile* (EX1013), ¶[0154]. The user can also add metadata. *Gentile* (EX1013), ¶[0154]. *Gentile* also teaches general video editing capability, including "removing, replacing, and/or enhancing video elements, such

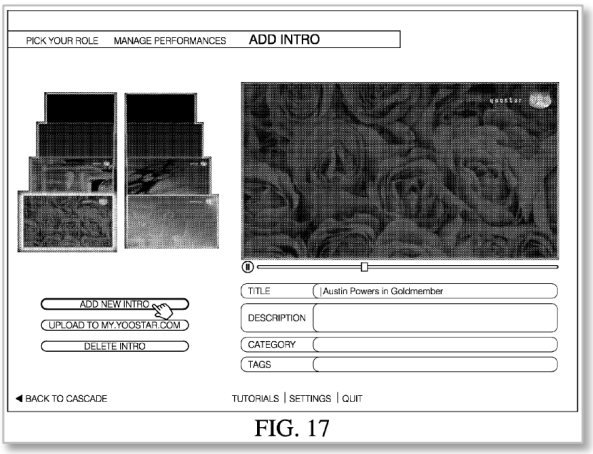


FIG. 17

as music, vocals, score, sound effects, special effects, combinations of the same or the like." *Gentile* (EX1013), ¶[0061].

F. It Has Long Been Known to Save User-Created Multimedia In Systems With User-Specified System Accessibility

51. It was well-known to POSITAs by 2009-2010 to provide functionality to save user-created audio and/or video content and specify its accessibility to other users of systems. I discuss several example references here that teach one or more of these concepts. Many more examples exist, including, for example, those identified in the Grounds. *See* §§III, VI.

52. ***YouTube:*** The most well-known streaming video website as of 2009-2010 was, of course, YouTube.com. The functionality of YouTube is discussed in more detail below but, in the YouTube system, users would select whether the streamable content was public or private. EX1015 (*YouTube*), 19, 51.

53. ***Corset:*** *Corset* (EX1009) teaches that "the user may want to record the result of the mixing operation," such as on recording device 25. *Corset* (EX1009), ¶[0016].

54. ***Gauseride:*** *Gauseride* (EX1011) teaches that the consumer creator software 38 also functions "as a video recorder so that the performance can be saved for upload to online services, emailing or even burning onto a DVD or other recording medium." *Gauseride* (EX1011), ¶[0031]. Further, *Gauseride* teaches in a "Done/Publish" step, "the end user records the interaction and creates a video file

available for playback. The end user can then upload the result for others to see, including but not limited to, distribution to the Internet and mobile phones. Users could also choose to record to other media such as a DVD." *Gauseride* (EX1011), ¶[0042].

55. ***Manico:*** *Manico* (EX1012) teaches that its process results in "a 'personalized' music video, produced by the user and featuring a selected song, with one or more subjects 86 suitably featured as the 'stars,' [where the] live scene is captured as the actors perform in accordance with the song, and the composited video images are stored in synchronization with the song."). EX1012 (*Manico*), ¶[0088].

56. ***Gentile:*** *Gentile* (EX1013) teaches that the user performance can be stored as a single file "for later playback, comment, use and/or the like." *Gentile* (EX1013), ¶[0064]. The file can "shared online, or sold as a DVD to the user in a variety of fashions." *Gentile* (EX1013), ¶[0125]. The file may be stored in user content database 115 (*Gentile* (EX1013), ¶[0061]), which may be a local or remote database (*Gentile* (EX1013), ¶[0062]). When the content is stored on-line, a user may "control the storage, filtering, and/or distribution of the finished video output." *Gentile* (EX1013), ¶[0125]. Further, *Gentile* teaches that "[u]sers can choose to share videos with select individuals or can choose to make videos

publicly available to anyone," and "build social networks with each other." *Gentile* (EX1013), ¶[0135].

G. It Has Long Been Known to Publish Created Audio/Video User Content By Processing and Encoding it to be Streamable and Moving it to a Streaming Server or Website

57. It was well-known to POSITAs by 2009-2010 to publish created audio/video user content, such as to Internet-accessible servers or websites (*e.g.*, social media sites), and to encode such content such that it is streamable from those locations. I discuss several example references here and in the following sections that teach this concept. Many more examples exist, including, for example, those identified in the Grounds. *See* §§III, VI.

58. ***Austerberry:*** It was exceedingly well-known by 2009-2010 to capture audio/video, encode the audio/video into a streamable format (*e.g.*, MPEG), and to place the encoded file on a server for streaming to users. EX1014 (*Austerberry*), Chapters 1, 3-11, 13, FIGS. 1.4, 7.3, 7.4, 7.6 (reproduced here).

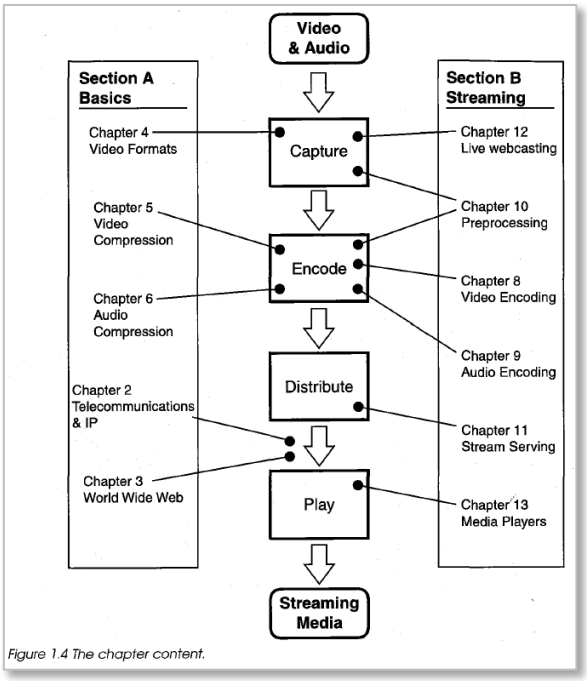


Figure 1.4 The chapter content.

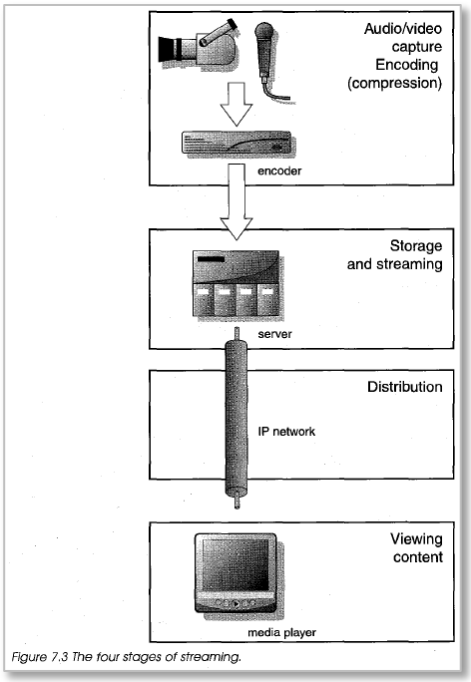


Figure 7.3 The four stages of streaming.

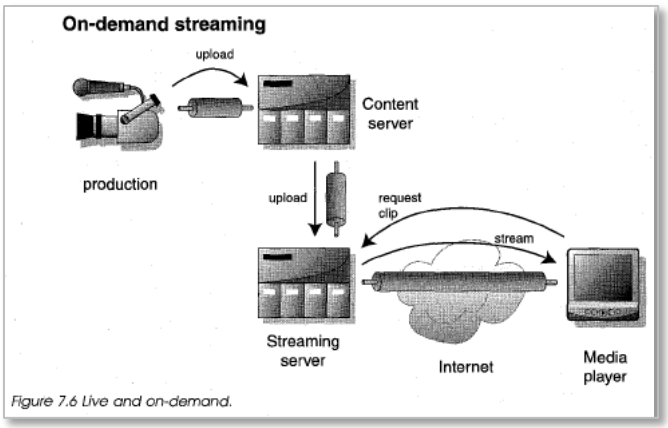


Figure 7.6 Live and on-demand.

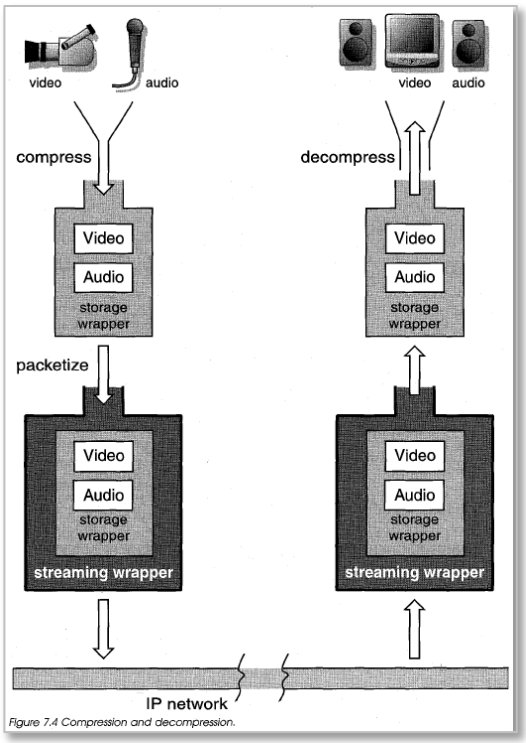


Figure 7.4 Compression and decompression.

59. In particular, *Austerberry* teaches that "[s]treaming media is an exciting addition to the rich media producers' toolbox." EX1014 (*Austerberry*), 15. As shown in FIGS. 7.3, 7.4, and 7.6 above, *Austerberry* teaches that raw audio and

video can be captured to a digital file, stored on a content server, encoded into a streamable format, and moved to a streaming server for delivery to users via a network. EX1014 (*Austerberry*), 118-124 (Chapter 7, pp. 134-140). *Austerberry* teaches various encoding methodologies in its Chapters 8 and 9. EX1014 (*Austerberry*), 133-184 (Chapters 9-10, pp. 149-200). *Austerberry* further teaches that encoding processes can be improved by pre-processing the audio and video signals before encoding, including, for example, by adjusting the video levels, de-interlacing, cropping, and noise reduction. EX1014 (*Austerberry*), 170-184. *See also* Chapter 10, pp. 186-200.

60. ***YouTube:*** By 2009-2010 users of YouTube could create video content, and then request that it be published (*i.e.*, shared) on YouTube by uploading the file, which could be provided in a number of popular formats. EX1015 (*YouTube*), 7, 22, 23, 45, 72, 80. After the file was uploaded, YouTube's system would convert (*e.g.*, process and encode) the uploaded file as a streamable flash video file, and add the streamable flash video file to its site (*e.g.*, move it from the conversion server to a web server). EX1015 (*YouTube*), 1-2, 4, 17, 22, 45, 55, 82-83. Users would tag the streamable content with author, location, date, etc. information. EX1015 (*YouTube*), 6, 14, 18, 21, 47, 53, 61, 74. Users would edit the streamable content, such as by changing the audio file. EX1015 (*YouTube*), 8,

70. Users would also select whether the streamable content was public or private. EX1015 (*YouTube*), 19, 51.

61. ***Corset:*** *Corset* (EX1009) teaches that its karaoke system may be implemented on-line, such that the user can put the combination karaoke clip on his/her homepage, including by using compression techniques if bandwidth constraint is an issue. *Corset* (EX1009), ¶[0017].

62. ***Gauseride:*** *Gauseride* (EX1011) teaches that the consumer creator software 38 also functions "as a video recorder so that the performance can be saved for upload to online services, emailing or even burning onto a DVD or other recording medium (again, Content Creator permitting)." *Gauseride* (EX1011), ¶[0031]. Further, *Gauseride* teaches in a "Done/Publish" step, "the end user records the interaction and creates a video file available for playback. The end user can then upload the result for others to see, including but not limited to, distribution to the Internet and mobile phones." *Gauseride* (EX1011), ¶[0042].

63. ***Gentile:*** *Gentile* (EX1013) teaches that, "the combined video or elements of the combined video, such as the user content file, are uploaded to a website for searching, sharing, and/or viewing combined video content." *Gentile* (EX1013), ¶[0092]. To enable such sharing, *Gentile* teaches that the combined video may be sent to transcoding server, which "transcodes the content into a flash video file, MPEG, JPEG, and/or other file type for viewing at a display 125 and/or

for submission to a content sharing website." *Gentile* (EX1013), ¶[0090]. In one configuration, to provide content protection when stored on-line, "combined content is stored only on a secure storage location, such as a controlled server, and only links or references to the protected content are allowed from programs or applets. The programs can stream the files from the secure storage location without saving a copy of the content." *Gentile* (EX1013), ¶[0129]. "[T]he online environment can be a website for sharing combined video … with other viewers" such that the videos can be rated and "ranked based on popularity." *Gentile* (EX1013), ¶[0135]. In such a system, "[u]sers can choose to share videos with select individuals or can choose to make videos publicly available to anyone," and "build social networks with each other." *Gentile* (EX1013), ¶[0135]. The website includes "performance gallery pages where combined videos are displayed and where users may search for combined videos based on associated metadata" and "purchased content can then be downloaded to the interactive role performance system 100." *Gentile* (EX1013), ¶[0136].

II. THE '911 PATENT

A. The Alleged Invention

1. Generally

64. The '911 patent states it relates to generating and disseminating audio content or audio and visual content over a network. EX1001 (*'911 Patent*), Title,

Abstract, 3:48-53. It states that "[t]raditional models of creating and publishing music" were inconvenient, costly, and overly technical. EX1001 (*'911 Patent*), 1:17-37.

2. The '911 Patent's System

65. The '911 Patent provides an overview of its system in FIG. 1, reproduced here, including client devices 101-103, with various audio/video input capabilities, coupled to network 110 and various severs 121, 123, 124, 126, and 127 and databases 122 and 125 on server side 120. EX1001 (*'911 Patent*), 5:13-6:32. Host server 120 "facilitates the generation of audio and video content over a network." EX1001 (*'911 Patent*), 6:33-39. Content database 125 (and user database 122) "may also store user information and user content, such as, user profile information, subscription information, audio files, and/or data related to the user content." EX1001 (*'911 Patent*), 6:46-51. Audio and video processing server 126 "provides functionality capable of editing audio and video." EX1001 (*'911 Patent*), 7:22-24. Video creation server 123 can accept video files, provide editing functionality, and can encode a "video file to be streamable over a

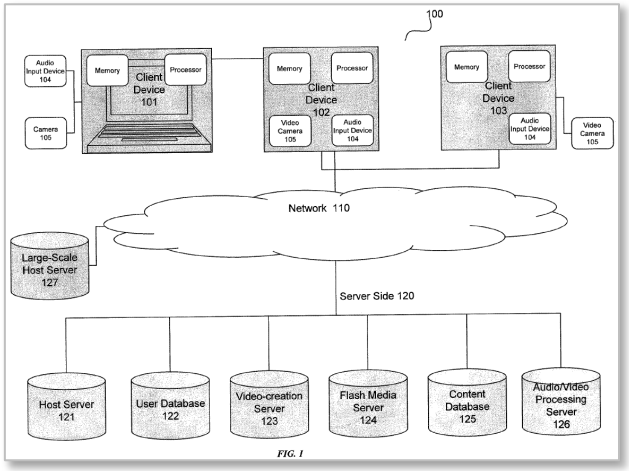
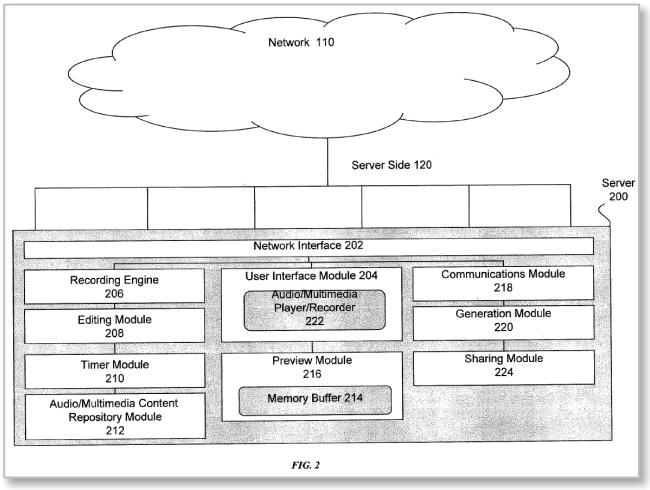


FIG. 1

network" such as "a streamable media file that can be played with HTML5, Javascript or Flash." EX1001 (*'911 Patent*), 7:31-58.

66. The '911 Patent also provides a "block diagram of a system of one or many server devices on the server-side to facilitate generation of audio and video content over a network" as shown in FIG. 2, reproduced here. EX1001 (*'911 Patent*), 7:59-61. FIG. 2 includes a number of modules that perform the functions discussed below. But the particular arrangement of modules on the server side is unimportant to the '911 Patent, which indicates that the components/functions "can be combined in any convenient and/or known manner," "divided over multiple servers, computers and/or processing units," and "implemented individually or in any combination thereof, in hardware, software, or a combination of hardware and software." EX1001 (*'911 Patent*), 12:47-67.



3. Beginning of Content Creation Process

67. The '911 Patent indicates that, to create content, "a request is sent by a user to start the creation process." EX1001 (*'911 Patent*), 3:54-55. Then, a user is asked to upload pre-recorded audio content or is prompted to create audio content. EX1001 (*'911 Patent*), 3:55-58.

68. Communication functionality between the system and the user is handled by communications module 218, which first establishes communication sessions with clients and manages log-on requests, and maintains the session "until the user leaves the site." EX1001 (*'911 Patent*), 8:8-21. Where a user indicates a desire "to record an audio or video recording, the communications module 218 prompts the user for permission to access peripheral devices (e.g., microphone, camera, webcam, camcorder, etc.) connected to the user device." EX1001 (*'911 Patent*), 8:21-25.

69. Further, the '911 Patent describes various user interfaces (see FIGS. 3-18 and 20) are provided to a user via user interface module 204 at the beginning of the content creation process. EX1001 (*'911 Patent*), 3:54-65, 11:7-23. In particular, "user interface module 204 identifies user requests," such as an indication that the user wishes to browse existing recordings (to utilize as discussed below), "and displays a listing of audio content, compositions, beats, and/or video content" such as shown in FIGS. 3-5." EX1001 (*'911 Patent*), 11:24-37; 51-61. FIG. 3, reproduced here, shows "an

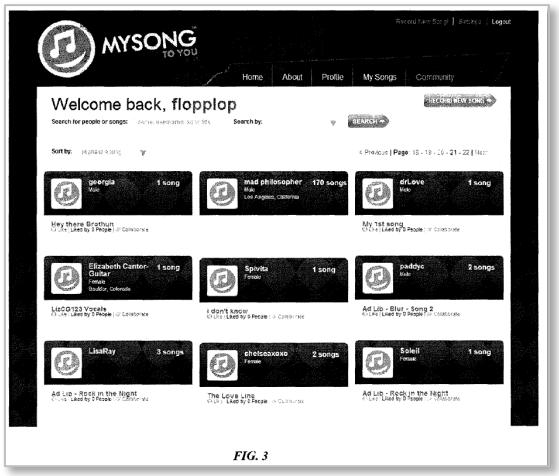


FIG. 3

example user interface of a listing of pre-recorded audio content" that has browsing capability. EX1001 (*'911 Patent*), 13:1-17.

4. Identification of Existing Multimedia to Utilize for Creating New Content

70. The '911 Patent indicates that existing multimedia files may be selected and used in the content creation process, as shown in FIGS. 3-18 and 20, provided via user interface module 204. EX1001 (*'911 Patent*), 11:7-23. *First*, a file for the user to play and record content over (*e.g.,* either an audio or video recording of the user singing over the playing music) may be selected. For example, user interface module 204 "displays a listing of audio content, compositions, beats, and/or video content." EX1001 (*'911 Patent*), 11:24-61. Examples of pre-recorded content listings (*e.g.*, entries 402) provided by user interfaces (*e.g.*, user interface 400) are shown in FIGS. 3 and 4. EX1001 (*'911 Patent*), 13:1-30. *Second*, when a user is recording video content, the user may select a background video into which the video recording can be composited. FIG. 20 shows a user interface where a video has been selected by a user to use as a background. EX1001 (*'911 Patent*), 17:9-11.

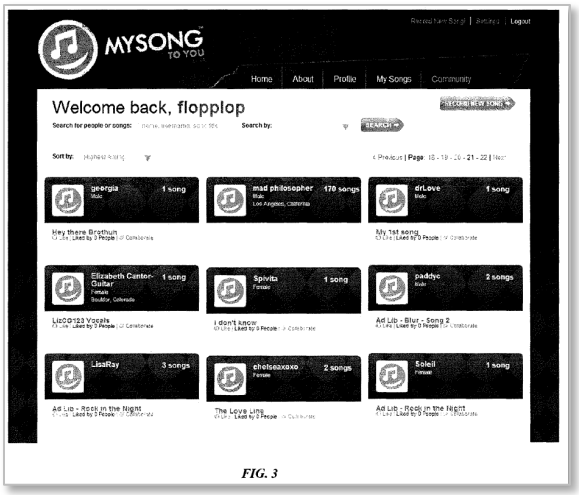


FIG. 3

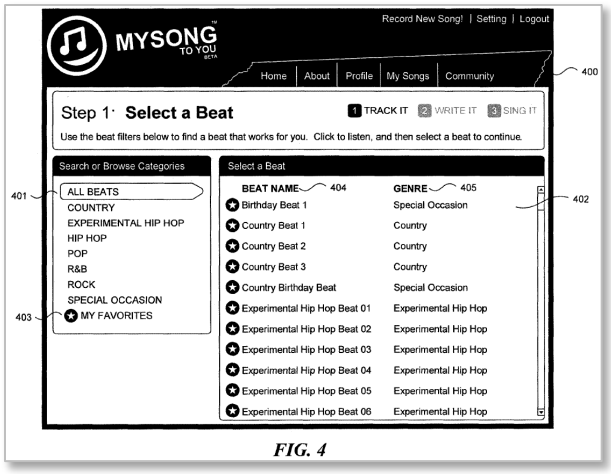


FIG. 4

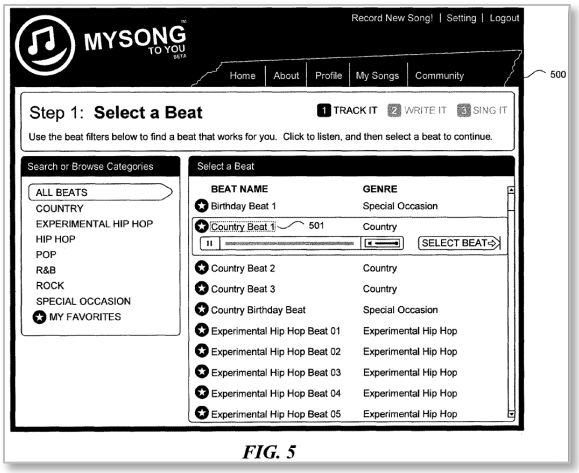


FIG. 5

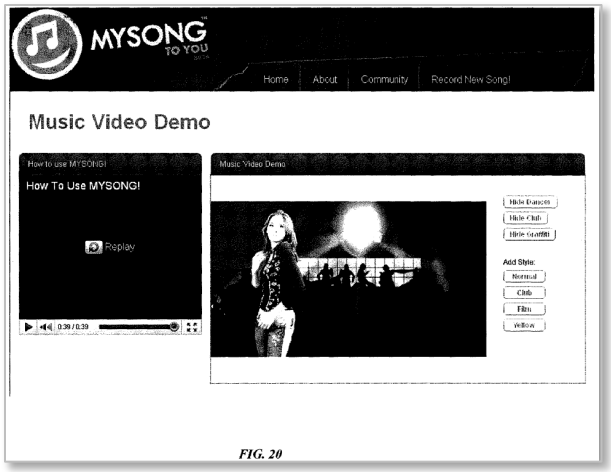


FIG. 20

5. Creation of New Content

71. When a user is ready to create new audio or video content, the '911 Patent indicates that a user can do so by the click of a record button on the user interface. EX1001 (*'911 Patent*), 4:5-27. This functionality is handled by recording engine 206, which: (i) may record "multimedia (e.g., audio, text, image, and/or video) content" by "establish[ing] a connection with a user device through the communications module 218" and (ii) may receive and react to user inputs. EX1001 (*'911 Patent*), 8:36-59. In particular, after a user requests a recording

session by clicking on a record button, "the recording engine 206 presents an indication of the initiation of the recording session," including a visible or audible countdown, and begins to record audio and/or video when the countdown ends. EX1001 (*'911 Patent*), 8:60-67. Where the user is recording content over an existing audio or video file, "recording engine 206 can perform simultaneous aural playback of a composition to the recording user during a recording session when the recording user has requested to record over the composition." EX1001 (*'911 Patent*), 4:27-33, 9:3-7. Recording engine 206 may terminate the recording session after a duration of time by user indication or automatically via a timer. EX1001 (*'911 Patent*), 9:8-26.

72. User interfaces related to this functionality are shown in, for example, FIGS. 8, 9, 17, and 20 and are provided via user interface module 204. EX1001 (*'911 Patent*), 11:7-23; 11:62-12:25. As shown in FIG. 8, user interface 800 includes "audio/multimedia player/recorder 801 with selectable buttons for playing of a prerecorded composition 802 or video recording and/or recording of an audio/video recording" where "the user can click the record button of the audio recorder/player (or multimedia recorder/player) to initiate a recording session over the pre-recorded beat or any other selected multimedia content." EX1001 (*'911 Patent*), 14:5-30. As shown in FIG. 9, the combined recording, which is typically

stored in a buffer, can be played back, edited, and saved. EX1001 (*'911 Patent*), 14:38-56, 15:18-26.

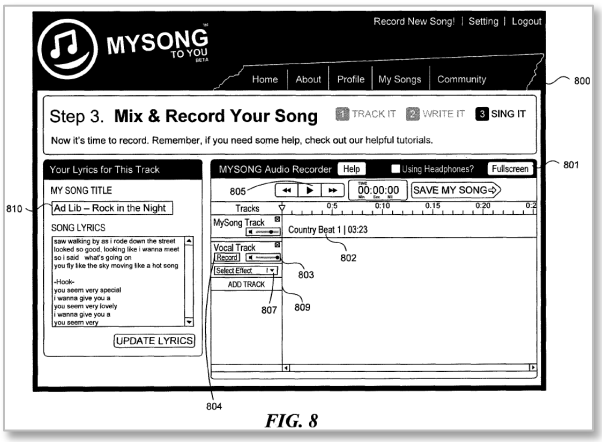


FIG. 8

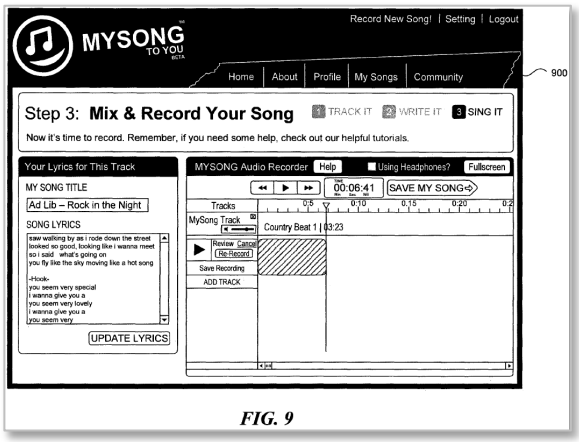


FIG. 9

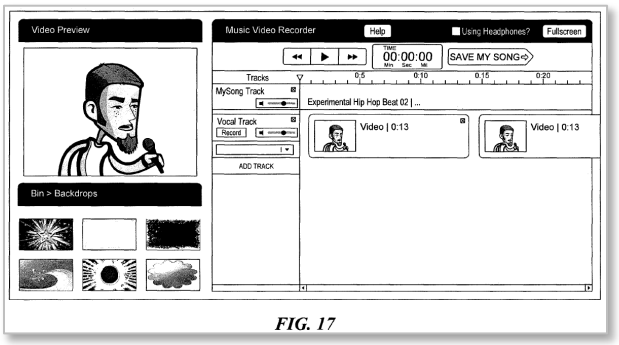


FIG. 17



FIG. 20

73. FIG. 17 illustrates a user interface presented when video is being recorded. EX1001 (*'911 Patent*), 16:44-54. As discussed above, the '911 Patent indicates that pre-recorded images or video may be used as a background for the video recording. In this instance, "the user interface allows for a technique of compositing two frames together, wherein one image is selectively made transparent to reveal the other image, as well known in the prior art," such that "the principal subject is recorded against a background of the pre-recorded video

recording." EX1001 (*'911 Patent*), 17:9-34. FIG. 20 shows a user interface "for the process of chroma key compositing for a video recording." EX1001 (*'911 Patent*), 17:9-10. In this embodiment, "[a] pre-recorded video recording is provided to a user to utilize as a background during the video recording" via a user interface provided by user interface module 204, and the user interface permits various modifications (e.g., "filtering, color correction, color saturation, speed adjustment, etc.") to the video background. EX1001 (*'911 Patent*), 17:10-15

6. Reviewing, Saving, and Indicating a Privacy Attribute for New Content In the System

74. After a user has completed a recording session, the '911 Patent indicates that the user may review, edit, save, and identify a privacy attribute for the recording. Specifically, the '911 Patent indicates that a "user has the option of previewing the recorded content," where the "preview of the recording (e.g., audio or video) can be played back to the user over the network to the user." EX1001 (*'911 Patent*), 4:33-41. The '911 Patent explains that "[t]ypically, the recorded content is stored in a buffer (e.g., memory buffer) when being played for preview." EX1001 (*'911 Patent*), 4:41-43. As part of the preview, "[t]he user can adjust the volume level of the recorded content" or "apply a special sound effect to the audio or video recorded." EX1001 (*'911 Patent*), 4:43-46. If the user decides the recording is satisfactory, it can be "permanently saved." EX1001 (*'911 Patent*), 4:46-54. The user can also decide whether to make the recording accessible to

others in the system by selecting a privacy attribute for the recording ("the recording user can make the recorded content publicly accessible (e.g., can be aurally played by other members) or private (e.g., only visible to the user and/or can only be played by the user)." EX1001 (*'911 Patent*), 4:52-56; 5:4-12.

75. This functionality is handled by preview module 216, generation module 220, editing module 208, content repository module 212, and sharing module 224, as described below. Preview module 216: (i) may perform playback of recorded content, and (ii) may include "memory (e.g., volatile and/or non-volatile) and/or storage unit (e.g., magnetic disk drive, optical disk drive, etc.) for storing multimedia content (e.g., audio, video, image or the like), including memory buffer 214; and (iii) may "discard or save the file based on user request." EX1001 (*'911 Patent*), 9:27-64. Preview module 216 also enables "the user to make any adjustments to the recorded content (e.g., sound or imaging effects, fade-in, fade-out, frequency, timing, etc.)," such as "chang[ing] the underlying composition and/or the timing or latency adjustment (e.g., to the beat) of the audio recording for the synchronization of the composition and audio recording." EX1001 (*'911 Patent*), 9:64-10:8. Generation module 220 "generates [a] synchronized multimedia file from a compilation of individual audio and video files" for the user's preview. EX1001 (*'911 Patent*), 10:9-20. Editing module 208 allows audio or video editing of the recording. EX1001 (*'911 Patent*), 10:30-40.

Content repository module 212 may "store, playback, and/or read" multimedia files and is accessible by the recording engine 206, the editing module 208, and the generation module 220. EX1001 (*'911 Patent*), 10:41-11:6. And sharing module 224: (i) is provided to "manage, track, modify, and/or enforce the privacy attributes of audio content" and (ii) may receive a privacy attribute of a user's content indicating whether it "may be shown on the user's public profile or kept as a private draft, etc., with further reference to FIG. 15." EX1001 (*'911 Patent*), 12:36-46.

76. The '911 Patent also discusses user interfaces related to this functionality. EX1001 (*'911 Patent*), 11:7-23. For example, user interface module 204 provides a user interface 900 as shown in FIG. 9 that includes a "review" button once the user is finished recording. EX1001 (*'911 Patent*), 12:17-25. "Once the user has completed the recording process, a preview of the audio or video recording can be played back over the network to the user" from a buffer (e.g., memory buffer). EX1001 (*'911 Patent*), 14:38-45.

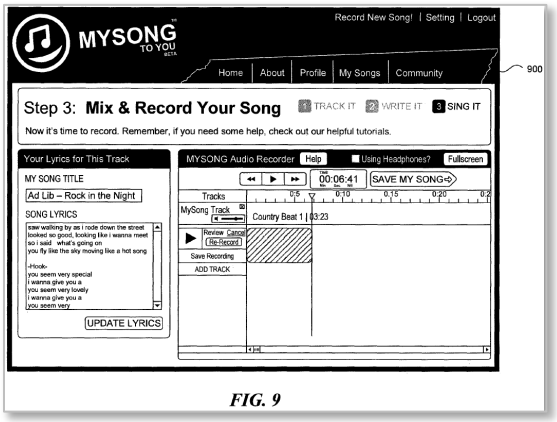


FIG. 9

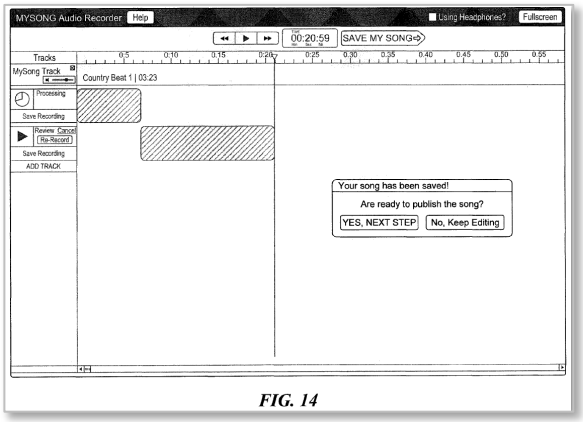


FIG. 14

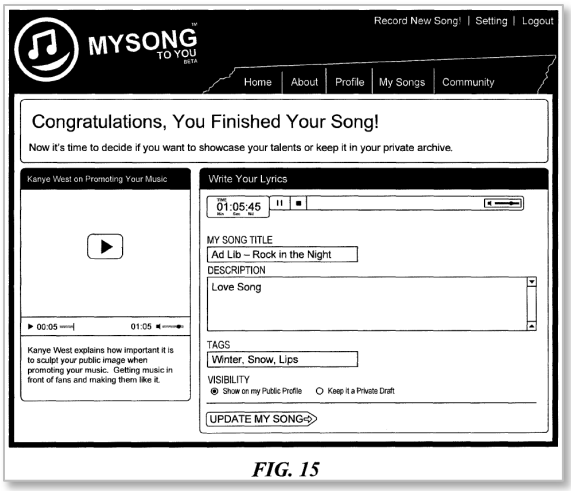


FIG. 15

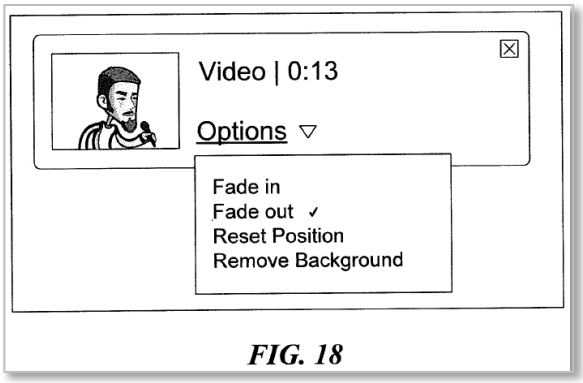


FIG. 18

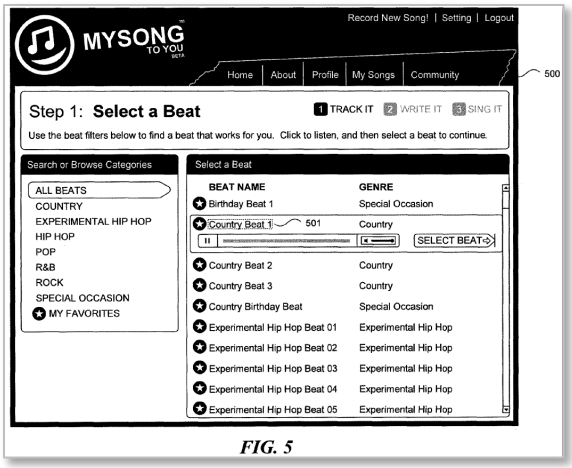


FIG. 5

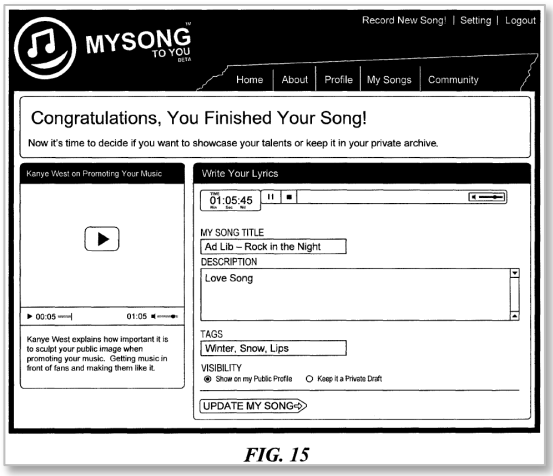


FIG. 15

77. In the preview, a user can edit the audio volume or add special effects and then permanently save the file. EX1001 (*'911 Patent*), 14:46-56. If the recording is a video, video editing options such as "fading in, fading out, resetting the position of a video recording, and superposition of composite images to remove a background" are provided. EX1001 (*'911 Patent*), 16:53-59.

78. After editing, the recording can be saved and, as shown in FIG. 14, the system may query the user as to whether the recorded content can also be published. EX1001 (*'911 Patent*), 15:18-26; 15:60-16:4. As shown in FIG. 15, a

user may also decide on a privacy attribute for the recording. EX1001 (*'911 Patent*), 16:5-21.

7. Publishing the Recorded Content On a Media Server

79. Finally, after a user has saved the recording to the system, the user can also request to publish the recording to a media server, such as a streamable file on Flash media server 124 in FIG. 2. EX1001 (*'911 Patent*), 7:40-58. Specifically, as described above, FIG. 14 provides (via user interface module 204) a query of the user as to whether the user wants to publish the saved recording. EX1001 (*'911 Patent*), 11:7-23, 15:60-16:4. If so, "FIG. 19 illustrates the queuing process for a video content in preparation for publishing over a network," such that "when a user requests the synchronization of the composition, audio recording(s), video recording(s), etc.," the "individual components that comprise audio/video content are [] processed, encoded, and made streamable over a network for publication," and then "moved to a Flash media server coupled to a database." EX1001 (*'911 Patent*), 16:60-17:7

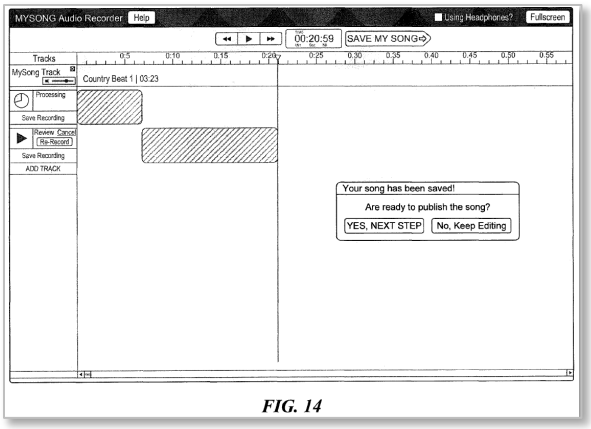


FIG. 14

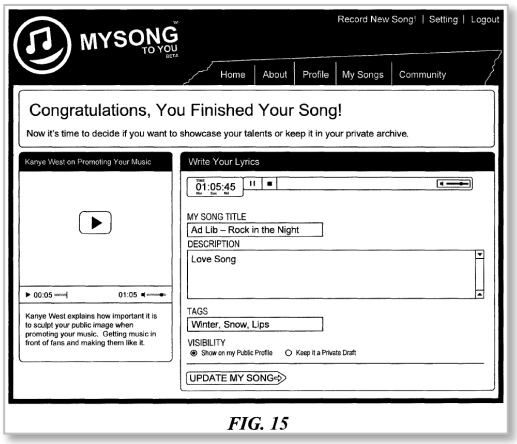


FIG. 15

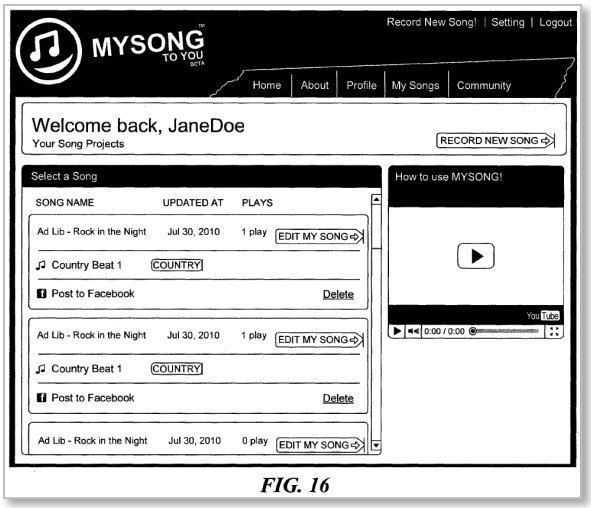


FIG. 16

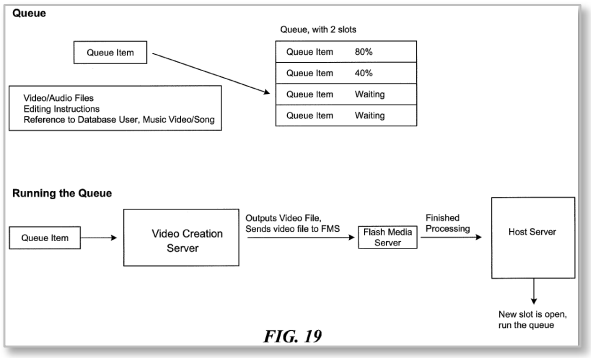


FIG. 19

80. The ’911 Patent also provides a “Post to Facebook” option in FIG. 16 that enables users to send an instance of the recording to Facebook. EX1001 (*’911 Patent*), 16:32-35. Alternatively, an “embed” option may also be available, which allows users to embed the recording instance in a social media site. EX1001 (*’911 Patent*), 16:35-43.

B. Prosecution History

81. The ’911 Patent is the result of the third application in the following chain of patent applications filed by Patent Owner (“PO”):[3]

	Application #	Filing Date	Patent #	Notes
A	61/364,500	7/15/2010	n/a	EX1016
B	12/953,350	11/23/2010	n/a	EX1017, Abandoned
C	16/248,687	1/15/2019	10,931,911	EX1002

82. It is my understanding that the PO’s discussion of: (i) the meaning of claim language; (ii) the differences between claim language and prior art references; or (iii) the teachings of prior art references, during the ’911 patent’s prosecution can be relevant to an understanding of the scope and validity of the issued claims of the ’911 patent. Thus, I have reviewed the prosecution history of the ’911 patent (Application C in the chart above, discussed in subsection 3 below).

83. It is also my understanding that the PO’s discussion of: (i) the meaning of claim language similar to that of the ’911 patent; (ii) the differences between such claim language and prior art references; or (iii) the teachings of prior art references, during the prosecution of other members of the ’911 patent’s family

[3] It is my understanding that the named inventor of the ‘911 Patent and the other patent applications in its family, Shane Pollack, assigned the applications to his company, Mysongtoyou, Inc., and that the name of that company was subsequently changed to Playvuu, Inc., the current owner. EX1020 (*’911 Patent Assignment History*).

can be relevant to an understanding of the scope and validity of the issued claims of the ’911 patent. Thus, I have reviewed the prosecution history of the other members of the ’911 patent’s family (Applications A, B, and D in the chart above, discussed in subsections 1, 2, and 4 below).

1. ’500 Provisional Application

84. On July 15, 2010, PO filed provisional application No. 61/364,500 (“*’500 Prov. Application*”). EX1016 (*’500 Prov. Application*), 10-19. Yenyun Fu of Perkins Coie LLP signed the application papers. EX1016 (*’500 Prov. Application*), 11.

85. The *’500 Prov. Application* consists of two pages of description (one of which is a description of the prior art), two pages of bullets, and three figures. EX1016 (*’500 Prov. Application*), 15-19. The *’500 Prov. Application* discusses providing backgrounds for a music video, live collaboration between users, band battles, lyric generation, three screens for selecting a beat, entering lyrics, and recording over the beat, and sharing. EX1016 (*’500 Prov. Application*), 16-19. None of this content appears to be any different from the various recording or video karaoke systems well-known in the art by that time, such as *Corset* (EX1009) and *Cohen* (EX1004).

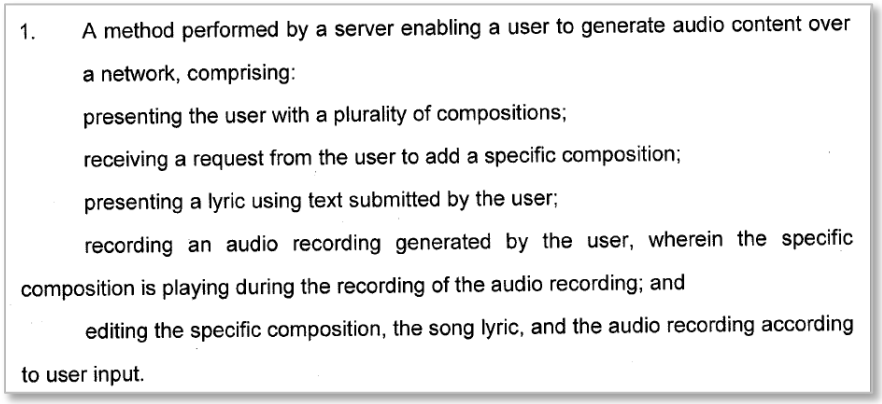
86. I have not, at this time, formally considered whether any claims of the subsequent non-provisional applications discussed herein, including the

Challenged Claims, are fully supported by the *'500 Prov. Application* such that they are entitled to the filing date of the *'500 Prov. Application*. This is because the references I identified and relied on below in the Grounds are prior art to the Challenged Claims even if the Challenged Claims are entitled to the *'500 Prov. Application's* filing date. I reserve the right to more fully consider this issue should the need arise later in this or any other matter.

2. '350 Application

87. Application number 12/953,350 ("the '350 Application"), now abandoned, was filed on November 23, 2010, with 27 claims. EX1017 (*'350 Application File History*), 495-99. Yenyun Fu of Perkins Coie LLP signed the application papers. EX1017 (*'350 Application File History*), 447.

88. Originally filed claim 1 of the '350 Application is shown here:



1. A method performed by a server enabling a user to generate audio content over a network, comprising:

presenting the user with a plurality of compositions;

receiving a request from the user to add a specific composition;

presenting a lyric using text submitted by the user;

recording an audio recording generated by the user, wherein the specific composition is playing during the recording of the audio recording; and

editing the specific composition, the song lyric, and the audio recording according to user input.

EX1017 (*'350 Application File History*), 495.

89. A non-final office action was mailed on February 15, 2013, rejecting all claims. EX1017 (*'350 Application File History*), 417-32. The claims were

rejected under 35 U.S.C. § 103(a) as being obvious in view of various combinations of U.S. Patent Pub. 2010/0082768 (*Edwards*; EX1021), U.S. Patent Pub. 2010/0223314 (*Gadel*; EX1022), U.S. Patent Pub. 2004/0152055 (*Gliessner*; EX1023), U.S. Patent Pub. 2008/0144955 (*Rai*; EX1024), U.S. Patent 6,128,001 (*Gonsalves*; EX1025), and U.S. Patent Pub. 2009/0263023 (*Iwamoto*; EX1026).

90. On August 29, 2013, a notice of abandonment for not responding to the February 15, 2013 office action was mailed. EX1017 (*'350 Application File History*), 415-416. Almost two years later, on August 14, 2015, PO filed a petition to revive, asserting the lack of response was due to a docketing error. EX1017 (*'350 Application File History*), 386-87. On February 9, 2016, the patent office granted the petition. EX1017 (*'350 Application File History*), 385.

91. In an August 14, 2015 response to the office action filed with the August 14, 2015 Petition, PO significantly amended the claims and argued for their allowance over the prior art. EX1017 (*'350 Application File History*), 389-408. For example, independent claim 1 was amended as follows:

1. (Currently amended) A method ~~performed by a server enabling a user to generate audio content over a network,~~ comprising:

presenting, via a display associated with a client device, ~~the user with~~ a graphical listing of plurality of pre-recoded audio compositions, the listing separated into a plurality of categories of compositions, each of the plurality of pre-recorded audio compositions including a selectable audible preview;

receiving, via a network, a ~~request from the user to add~~ selection by the user of a specific pre-recorded audio composition from the listing of the plurality of pre-recorded audio compositions;

presenting, via the display, a lyric ~~using text submitted by the user~~ generation prompt, the lyric generation prompt including a plurality of editable text fields, each of the plurality of editable text fields configured to receive an entry by the user of at least one of the following categories of words: a name, a nickname, a noun, and adverb, or an adjective;

receiving, via the network, an entry by the user of one or more words in response to the lyric generation prompt;

automatically generating, by a processor, a song lyric, based on the selected specific pre-recorded audio composition and the entered one or more words;

receiving, via the network, an audio recording ~~an audio recording generated~~ by the user, ~~wherein~~ the audio recording recorded while playing the specific pre-recorded audio composition and while displaying the song lyric~~is playing during the recording of the audio recording; and~~

editing, by a processor, the specific pre-recorded audio composition, the song lyric, and the audio recording according to received user input; and

generating, by a processor, a streamable file based on the specific pre-recorded audio composition, and the audio recording.

92. A final rejection was mailed on May 17, 2016, again rejecting all claims. Various claims, including the independent claims, were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Pub. 2009/0118849 (*Dery*; EX1027) and under 35 U.S.C. § 103(a) as being obvious in view of *Dery* in view of various other references, including *Gliessner*, *Rai*, *Gonsalves*, *Iwamoto*, and U.S. Patent No. 8,539,542 (*Elhag*; EX1028). EX1017 (*'350 Application File History*), 365-76.

93. On August 17, 2016, PO responded by amending the independent claims and filing a request for continued examination. EX1017 (*'350 Application File History*), 342-58. For example, independent claim 1 was amended as follows:

1. (Currently amended) A method comprising:

presenting, via a display associated with a client device, a graphical listing of plurality of pre-recoded audio compositions, the listing separated into a plurality of categories of compositions, each of the plurality of pre-recorded audio compositions including a selectable audible preview;

receiving, via a network, a selection by the user of a specific pre-recorded audio composition from the listing of the plurality of pre-recorded audio compositions;

presenting, via the display, a lyric generation prompt, the lyric generation prompt including a plurality of editable text fields, each of the plurality of editable text fields configured to receive an entry by the user of one or more keywords in at least one of the following categories ~~of words~~: a name, a nickname, a noun, ~~and~~ an adverb, or an adjective;

receiving, via the network, an entry by the user of one or more ~~words~~ keywords in response to the lyric generation prompt;

automatically generating, by a processor, a set of custom song ~~lyric~~ lyrics, based on the selected specific pre-recorded audio composition and the entered one or more ~~words~~ keywords;

receiving, via the network, an audio recording by the user, the audio recording recorded while playing the specific pre-recorded audio composition and while displaying the generated set of custom song ~~lyric~~ lyrics;

editing, by a processor, the specific pre-recorded audio composition, the song lyric, and the audio recording according to received user input; and

generating, by a processor, a streamable file based on the specific pre-recorded audio composition, and the audio recording.

EX1017 (*'350 Application File History*), 346.

94. PO correspondingly argued that the prior art did not teach or suggest the "lyric generation prompt." EX1017 (*'350 Application File History*), 354-357.

95. On September 9, 2016, a non-final office action was mailed, again rejecting all claims. EX1017 (*'350 Application File History*), 324-336. The claims were rejected under 35 U.S.C. § 103(a) as being obvious in view of various combinations of *Dery*, U.S. Patent Pub. 2009/0307207 (*Murray*; EX1029), *Gliessner*, *Rai*, *Gonsalves*, *Iwamoto*, and *Elhag*. EX1017 (*'350 Application File History*), 327-335.

96. On February 9, 2017, PO cancelled all claims and added new claims 31-49. EX1017 (*'350 Application File History*), 317-322. For example, new independent claim 30 recited the following:

30. (New) A method performed by a server computer in communication, via a computer network, with a wireless mobile device, the method comprising:

causing display, via the wireless mobile device, of a first graphical listing of a plurality of media content stored in a content database accessible to the server computer;

receiving, via the computer network, a user selection of a particular media content from the first graphical listing;

in response to the user's selection of the particular media content, causing automatically the display, via the client wireless mobile device, of a composite of the particular media content and a video capture by the user, the video captured via a video input device associated with the client within the wireless mobile device;

wherein the composite includes:

portions of the particular media content selectively made transparent to reveal portions of the video capture; and/or

portions of the video capture selectively made transparent to reveal portions of the particular media content;

wherein the composite is generated and displayed as the video is captured via the video input device without additional input by the user;

causing display, via the wireless mobile device, of a second graphical listing of a plurality of styles that can be applied to the displayed composite, each of the plurality of styles associated with one or more visual modifications that are applied to the displayed composite;

receiving, via the computer network, a user selection of a particular style from the second graphical listing; and

in response to the user's selection of the particular style, causing automatically display, via the wireless mobile device, of an updated composite using the one or more visual modifications of the selected particular style, wherein the visual modifications of the particular style include any one or more of filtering, exposure adjustment, color adjustment, and speed adjustment.

EX1017 (*'350 Application File History*), 317-318.

97. On June 1, 2017, a final rejection was mailed rejecting the new claims. EX1017 (*'350 Application File History*), 283-294. The claims were rejected under 35 U.S.C. § 103(a) as being obvious in view of various combinations of U.S. Patent Pub. 2010/0027961 ("*Gentile*;" EX1013), U.S. Patent Pub. 2002/0171668 ("*Samra*;" EX1030), and Applicant Admitted Prior Art.

98. After an interview and refusal of the Examiner to enter an incremental amendment, PO filed an amendment and request for continued examination on October 2, 2017 that substantially amended the pending claims. EX1017 (*'350 Application File History*), 210-245. For example, independent claim 30 was amended as follows:

30. (Currently amended) A method performed by a server computer in communication, via a computer network, with a wireless mobile device, the method comprising:

causing display, by the server computer, ~~via~~ at a display of the wireless mobile device, of a first graphical listing of a plurality of media content stored in a content database accessible to the server computer;

receiving, by the server computer, via the computer network, a user selection of a particular media content from the first graphical listing;

in response to ~~the user's~~ receiving the user selection of the particular media content[[,]]:

generating, by the server computer, a composite of the particular media content and a user video captured by a video capture device of the wireless mobile device; and

causing automatically the display, ~~via~~ at the display of the ~~client~~ wireless mobile device, of [[a]] the composite ~~of the particular media content and a video capture by the user,~~ as the user video is captured ~~via a~~ by the video ~~input~~ capture device ~~associated with the client within the wireless mobile device~~;

wherein the composite includes:

portions of the particular media content selectively made transparent to reveal portions of the user video ~~capture~~; and/or

portions of the user video ~~capture~~ selectively made transparent to reveal portions of the particular media content;

~~wherein the composite is generated and displayed as the video is captured via the video input device without additional input by the user;~~

causing display, by the server computer, ~~via~~ at the display of the wireless mobile device, of a second graphical listing of a plurality of styles that can be applied to the displayed composite, each of the plurality of styles associated with one or more visual modifications that are applied to the displayed composite;

receiving, by the server computer, via the computer network, a user selection of a particular style from the second graphical listing; and

in response to ~~the user's~~ receiving the user selection of the particular style, causing automatically the display, by the server computer, at the display of ~~via~~ the wireless mobile device, of an updated composite using the one or more visual modifications of the selected particular style, wherein the visual modifications of the particular style include any one or more of filtering, exposure adjustment, color adjustment, and speed adjustment.

EX1017 (*'350 Application File History*), 219-225.

99. On January 2, 2018, a non-final office action was mailed rejecting all claims. EX1017 (*'350 Application File History*), 165-79. The claims were rejected under 35 U.S.C. § 101 as being directed to an abstract idea and under 35 U.S.C. §

103(a) as being obvious in view of various combinations of *Gentile*, U.S. Patent Pub. 2006/0259588 ("*Lerman*;" EX1031), and Applicant Admitted Prior Art.

100. On April 2, 2018, PO filed a response again substantially amending the claims. EX1017 (*'350 Application File History*), 118-45. For example, claim 30 was amended as follows:

30. (Currently amended) A method performed by a server computer in communication, via a computer network, with a wireless mobile device, the method comprising:

causing display, by the server computer, at a display of the wireless mobile device, of a first graphical listing of a plurality of media content stored in a content database accessible to the server computer;

receiving, by the server computer, via the computer network, a user selection of a particular media content from the first graphical listing;

~~in response to receiving the user selection of the particular media content:~~

receiving, by the server computer, user video captured by a video capture device of the wireless mobile device;

processing, the by the server computer, the received user video to track motion of an object captured in the user video;

generating, by the server computer, a graphical element in the form of a trailing light that tracks the motion of the object captured in the user video;

processing, by the server computer, the particular media content to incorporate the generated graphical element;

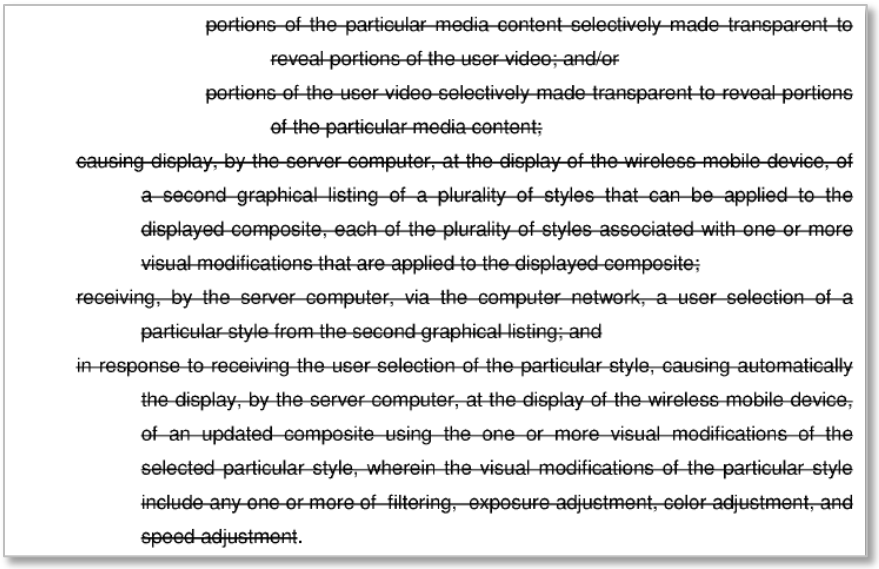
generating, by the server computer, a composite of the particular media content and [[a]] the user video captured by ~~a video capture device of the wireless mobile device~~ layering the particular media content and the user video and by processing the particular media content and user video to:

selectively make portions of the particular media content transparent to reveal portions of the user video; and/or

selectively make portions of the user video transparent to reveal portions of the particular media content; and

causing automatically the display, at the display of the wireless mobile device, of the composite as the user video is captured by the video capture device~~;~~

~~wherein the composite includes:~~



portions of the particular media content selectively made transparent to reveal portions of the user video; and/or

portions of the user video selectively made transparent to reveal portions of the particular media content;

causing display, by the server computer, at the display of the wireless mobile device, of a second graphical listing of a plurality of styles that can be applied to the displayed composite, each of the plurality of styles associated with one or more visual modifications that are applied to the displayed composite;

receiving, by the server computer, via the computer network, a user selection of a particular style from the second graphical listing; and

in response to receiving the user selection of the particular style, causing automatically the display, by the server computer, at the display of the wireless mobile device, of an updated composite using the one or more visual modifications of the selected particular style, wherein the visual modifications of the particular style include any one or more of filtering, exposure adjustment, color adjustment, and speed adjustment.

EX1017 (*'350 Application File History*), 119-20.

101. On August 8, 2018, a final office action was mailed again rejecting all claims. EX1017 (*'350 Application File History*), 86-103. The claims were rejected under 35 U.S.C. § 103(a) as being obvious in view of various combinations of *Gentile*, U.S. Patent Pub. 2011/0053688 ("*Crawford*;" EX1032), *Lerman*, *Dery*, and *Murray*.

102. On January 8, 2019, PO filed a response again substantially amending the claims, along with a request for continued examination. EX1017 (*'350 Application File History*), 49-71. For example, claim 30 was amended as follows:

30. (Currently amended) A method ~~performed by a server computer in communication, via a computer network, with a wireless mobile device~~of creating video content using a mobile device, the method comprising the steps of:

requesting a listing of media content from a server computer;

displaying ~~causing display, by the server computer, at a display of the wireless mobile device, of~~ a first graphical listing ~~of a plurality~~ of the listing of media content stored in a content database ~~accessible to~~ on the server computer;

prompting a user to select a media content from the first graphical listing;

~~receiving~~ the, by the server computer, via the computer network, a user's selection of ~~the a particular~~ media content from the first graphical listing;

presenting the user with a record button;

initiating a video recording session to create a user video, the video recording session initiating upon a user interaction with the record button;~~receiving, by the server computer, user video captured by a video capture device of the wireless mobile device;~~

~~processing, the by the server computer, the received user video to track~~tracking a motion of an object captured in the user video;

generating~~, by the server computer,~~ a graphical element ~~in the form of a trailing light~~ that ~~tracks~~ follows the motion of the object captured in the user video;

incorporating the graphical element into ~~processing, by the server computer,~~ the ~~particular~~ media content ~~to incorporate the generated graphical element~~;

generating~~, by the server computer,~~ a composite of the ~~particular~~ media content and the user video ~~captured~~ by layering the ~~particular~~ media content and the user video and by processing the ~~particular~~ media content and user video to:

selectively make portions of the ~~particular~~ media content transparent to reveal portions of the user video; and/or

selectively make portions of the user video transparent to reveal portions of the ~~particular~~ media content; and

~~causing automatically the display, at the display of the wireless mobile device, of~~ displaying, in real-time or near real-time, the composite as the user video is captured by the video capture device.

EX1017 (*'350 Application File History*), 58-67.

103. On February 4, 2019, a non-final office action was mailed rejecting all claims. EX1017 (*'350 Application File History*), 28-42. The claims were rejected under 35 U.S.C. § 103(a) as being obvious in view of various combinations of

Gentile, U.S. Patent Pub. 2008/0219509 ("*White*;" EX1033), *Lerman*, *Dery*, and *Murray*.

104. PO did not respond to the February 4, 2019 office action and, on August 9, 2019, the application was deemed abandoned. EX1017 (*'350 Application File History*), 1-2.

105. During the pendency of the '350 Application, PO appears to have filed only one Information Disclosure Statement ("IDS"), on January 25, 2018. Despite, as discussed below, having copied much of the content of the '350 Application from *Cohen* (EX1004), PO did not identify *Cohen* (EX1004) in the January 25, 2018 IDS, or otherwise make *Cohen* of record.

3. The '911 Patent

106. The '911 Patent was the result of Application number 16/248,687 ("the '687 Application"), filed on January 15, 2019. EX1001 (*'911 Patent*), Cover. The '687 Application is a continuation of the '350 Application and included seven claims as-filed. EX1002 (*'911 Patent File History*), 144-99.

107. The '687 Application's original claims were relatively close to those issued in the '911 Patent. For example, claim 1 as-filed recites:

1. A method for generating and sharing audio/video content to a social network, comprising:

initiating a content creation process in response to a request from a user;

prompting the user to record content;

prompting the user to select an audio composition from a list of compositions retrieved from a host server;

presenting the user with a record button;

displaying a countdown to a recording session based on a user interaction with the record button, wherein the recording session comprises video recording;

providing the user an indication of the initiation of the recording session after the countdown to the recording session has counted down;

providing simultaneous aural playback of the composition during the recording session, thereby permitting the user to hear the composition during recording;

generating recorded content based on the recording session;

displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition;

selecting a privacy attribute for the recorded content; and

sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute.

EX1002 (*'911 Patent File History*), 173.

108. On November 15, 2019, a non-final office action was mailed rejecting all claims under 35 U.S.C. § 102 as being anticipated by U.S. Patent Pub. 2009/0164034 ("*Cohen*;" EX1004). EX1002 (*'911 Patent File History*), 114-119.

109. On April 6, 2020, PO substantially amended claim 1 as follows:

1. (Currently Amended) A method for generating and sharing audio/video content to a social network, comprising:

initiating a content creation process in response to a request from a user;

prompting the user to record content;

prompting the user to select an audio composition from a list of compositions retrieved from a host server;

presenting the user with a record button;

presenting the user with a selection of visual media content for use as a background, wherein upon selecting an instance of pre-recorded visual media content from the selection, the user is presented with an interface to selectively edit the instance of pre-recorded visual media content;

~~displaying a countdown to a recording session based on a user interaction with the record button, wherein the recording session comprises video recording;~~

~~providing the user an indication of the initiation of the recording session after the countdown to the recording session has counted down;~~

providing simultaneous aural playback of the composition during ~~the~~ a recording session, thereby permitting the user to hear the composition during recording;

generating recorded content based on the recording session by compositing video captured during the recording session with the instance of pre-recorded visual media content, such that the video captured during the recording session is selectively made transparent to reveal the instance of pre-recorded visual media content;

displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition;

selecting a privacy attribute for the recorded content; ~~and~~

sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute;

receiving a request to publish the recorded content;

in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video; and

publishing the streamable video by copying the streamable video to a media server.

EX1002 (*'911 Patent File History*), 108-09.

110. PO also added independent claims 11 and 12 (eventually issued as claims 10 and 11).

11. (New) A method for generating and sharing audio/video content to a social network, comprising:

initiating a content creation process in response to a request from a user;

prompting the user to record content;

prompting the user to select an audio composition from a list of compositions retrieved from a host server;

presenting the user with a record button;

displaying a countdown to a recording session based on a user interaction with the record button, wherein the recording session comprises video recording;

providing the user an indication of the initiation of the recording session after the countdown to the recording session has counted down;

providing simultaneous aural playback of the composition during the recording session, thereby permitting the user to hear the composition during recording;

generating recorded content based on the recording session by compositing video captured during the recording session with a second video recording such that the video captured during the recording session is selectively made transparent to reveal the second video recording;

displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition;

selecting a privacy attribute for the recorded content;

sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute;

prompting the user to continue editing the recorded content;

prompting the user to publish the recorded content;

in response to a request to publish, processing and encoding individual components of the recorded content to create a streamable video; and

publishing the streamable video by copying the streamable video to a media server.

12. (New) A method for generating and sharing audio/video content to a social network, comprising:

initiating a content creation process in response to a request from a user;

prompting the user to record content;

prompting the user to select an audio composition from a list of compositions retrieved from a host server;

presenting the user with a record button;

displaying a countdown to a recording session based on a user interaction with the record button, wherein the recording session comprises video recording;

providing the user an indication of the initiation of the recording session after the countdown to the recording session has counted down;

providing simultaneous aural playback of the composition during the recording session, thereby permitting the user to hear the composition during recording;

generating recorded content based on the recording session;

detecting user movement in the video captured during the recording session and representing that movement by a trailing light;

displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition;

selecting a privacy attribute for the recorded content;

sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute;

receiving a request to publish the recorded content;

in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video; and

publishing the streamable video by copying the streamable video to a media server.

EX1002 (*'911 Patent File History*), 110-112.

111. PO correspondingly argued that

Cohen fails to teach every limitation present in amended claim 1. For example, Cohen fails to teach:

presenting the user with a selection of visual media content for use as a background, wherein upon selecting an instance of pre-recorded visual media content from the selection, the user is presented with an interface to selectively edit the instance of pre-recorded visual media content;

No part of Cohen contemplates providing a selection of visual media content for use as a background, as Cohen fails to contemplate allowing users to use video backgrounds at all, thus never giving rise to a need to present users with a selection of possible video background. Accordingly, Cohen fails to consider the use of selective transparency of a user-recorded video to reveal a video background.

(EX1002 (*'911 Patent File History*), 105) and that

Cohen also fails to consider making video content available for streaming over a network by first receiving a request to publish recorded content and then processing and encoding individual components of the recorded content to create a streamable video that is then copied to a media server where it can be accessed by others.

(EX1002 (*'911 Patent File History*), 106).

112. In other words, in an effort to differentiate the then-pending claims from *Cohen*, PO amended independent claim 1 and added similar independent claims 11 and 12 (issued claims 10 and 11) to include the concepts of a user selecting a background (*see* element [1f] herein), generating recorded content by compositing the background and video from a recording session (*see* elements [1i] and [10i]), and processing, encoding, and publishing the recorded content in a streamable format (*see* elements [1o]-[1s], [10q]-[10s], and [11o]-[11s]). But, as described in §§I and VI, it is my opinion that the concepts of using multimedia backgrounds in video recording, compositing a background and foreground video, and publishing multimedia files were exceedingly well-known by 2009-2010.

113. On June 10, 2020, a final office action was mailed rejecting all claims. EX1002 (*'911 Patent File History*), 78-91. Claims 1-11 were rejected under 35 U.S.C. § 103 as being obvious in view of *Cohen*, *Gentile*, and U.S. Patent Publication No. 2008/0109306 ("*Maigret*;" EX1034), and claim 12 was rejected under 35 U.S.C. § 103 as being obvious in view of *Cohen*, *Crawford*, and *Maigret*. EX1002 (*'911 Patent File History*), 80-89.

114. In response, on September 9, 2020, PO appealed. EX1002 (*'911 Patent File History*), 72. On November 9, 2020, PO filed an appeal brief. EX1002 (*'911 Patent File History*), 52-67.

115. In the appeal brief, PO argued that the Examiner's proffered combinations did not teach or suggest the features of the independent claims.

116. ***First***, PO argued the Examiner's position that *Cohen* teaches element [1b] of claim 1 ("initiating a content creation process in response to a request from a user") was incorrect as follows:

> The Examiner asserts that Cohen discloses "initiating a content creation process in response to a request from a user," citing paragraph [0164]. In the Applicant's pending claims, the content creation process includes video recording during simultaneous aural playback of a selected audio composition. Cohen, though, is primarily directed to recording audio over another user's beat track: "In one aspect of the present disclosure, an audio mix request with a first audio track representing a beat is received. One embodiment includes, recording a second audio track provided by the recording user while simultaneously performing aural playback of the beat represented by the first audio track…." Cohen, Abstract.

> Though Paragraph [0164]—that cited by the Examiner—discloses a video recording process, it does so *outside* the context of simultaneous aural playback of a selected audio composition during the video recording. Cohen, [0164], Figure 7; *see* [0163]–[0171]. Indeed, in the context of video, Cohen purposes such videos for visual playback during *audio* recording, rather than as the product of audio playback during *video* recording. *See* Cohen [0095]. Thus, Cohen does *not* disclose "initiating a content creation process in response to a request from a user," as claimed by the Applicant. None of the cited references, either alone or in combination, disclose this element.

EX1002 (*'911 Patent File History*), 57.

117. For at least the reasons discussed below in element [1b], I disagree. PO's appeal brief argument misrepresents *Cohen*. PO's argument seems to be that *Cohen* does not teach a "content creation process" and therefore cannot teach "initiating a content creation process." But *Cohen* does teach a "content creation process" for at least the reasons I explain in elements [1c]-[1s] below (including in

the context of simultaneous aural playback as explained in element [1i]). The distinction PO tried to make, that *Cohen's* videos are only for playback during audio recording,[4] is simply untrue. *Cohen* expressly teaches audio ***and*** video recording during audio playback (*see*, *e.g.*, elements [1i] and [1j], below). In sum, as discussed in element [1b], *Cohen* teaches initiating a content creation process (*e.g.*, the multimedia content creation process described in elements [1c]-[1s]) in response to a request from a user (*e.g.*, a user requesting access to *Cohen's* system and/or requesting user interfaces, such as those of FIGS. 4A, 4B). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0068], [0070], [0071], [0092]-[0094], and FIGS. 1, 2, 4A, 4B. That is all that is required by element [1b].

118. Moreover, even if *Cohen* were somehow considered deficient as to an express teaching of element [1b] (it is not), "initiating a content creation process in response to a request from a user" would have been obvious for at least the reasons expressed in element [1b]. Indeed, references like *Chu* and *Sherman* expressly teach this functionality, and it was otherwise well-known by 2009-2010. *See* element [1b].

[4] Moreover, PO did not explain in its briefing why "content creation process" should be limited in the manner it proposed.

119. ***Second***, PO argued the Examiner's position that *Cohen* teaches element [1e] of claim 1 ("presenting the user with a record button") was incorrect as follows:

> The Examiner asserts that Cohen discloses "presenting the user with a record button" in Paragraph [0174]. But Paragraph [0174] discloses no such button: it simply provides that "When the record request is received, in process 804, an indication of initiation of a recording session is presented via the service site." Paragraph [0173] merely provides that a user "can select to record a sound production over the beat"—even if this is read to disclose a "button," which it does not, it does not disclose the step of "*presenting* a record button." A physical button that is already present on a device, for example, has not been "presented" to a user. Thus the Examiner has not shown Cohen discloses this element, and none of the cited references, either alone or in combination, disclose this element.

EX1002 (*'911 Patent File History*), 58.

120. For at least the reasons discussed below in element [1e], I disagree. PO's appeal brief argument misrepresents *Cohen*. As discussed in element [1e], *Cohen* explicitly and repeatedly teaches "presenting the user with a record button," (*e.g.*, a user is presented with various record or challenge buttons, such as shown in FIGS. 5A, 5B, and 6A, by way of user interface module 214 of FIG. 2). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0041], [0048], [0095], [0097], [0100], [0137], [0139], [0150]-[0154], [0164], [0183], [0197], and [0206], and FIGS. 1, 2, 5A, 5B, 6A. In view of these repeated teachings, PO's arguments with respect to ¶[0173] and ¶[0174] of *Cohen* are difficult to understand, especially where PO appears to try to distinguish *Cohen* on the basis of a "physical button," of which there is no explicit teaching in *Cohen*. *Cohen's* record buttons are presented via the user interface

screens just like that discussed in the '911 patent. Thus, PO's arguments are irrelevant in view of *Cohen's* teachings.

121. Moreover, even if *Cohen* were somehow considered deficient as to an express teaching of element [1e] (it is not), "presenting the user with a record button" to initiate a recording process would have been obvious for at least the reasons expressed in element [1e]. Indeed, references like *Sherman* expressly teach this functionality, and it was otherwise well-known by 2009-2010. *See* element [1e].

122. ***Third***, PO argued the Examiner's position that *Cohen* teaches element [1i] of claim 1 ("providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording") was incorrect as follows:

> The Examiner asserts that Cohen discloses "providing simultaneous aural playback of the composition during a recording session," citing to Paragraph 0074. That paragraph, though, consistent with Cohen's direction to recording audio over beats, provides only that the recording engine "can perform simultaneous aural playback of a beat to the recording user during a recording session *when the recording user has requested to record over a beat*." (emphasis added). Consistent with the overall purpose of Cohen, and as shown by the language "record over a beat," this type of request is for audio—not video—recording sessions. *See* Cohen Abstract, [0062] ("Users can also, in some embodiments, record audio tracks over tracks such as tracks comprising beats….").

> Where Cohen does disclose video recording—i.e., in context of its "competition" module in Paragraph 114—it does so only after a user request to challenge a full audio "track." [0113]. As Cohen explains, "[t]he competition module 220 can receive a user request to challenge a mixed audio *track* which is typically generated from a beat and a vocal expression") (emphasis added), *compare* [0114] ("The competition module 220 can initiate a recording session to capture audio detected … while performing audible playback of the *beat* to the user"). The audio that is played during a recording session in Cohen is *not* a "composition" that was prompted to the user to select. Cohen thus does not disclose "providing simultaneous aural playback of the composition during a recording session" where the composition is an audio composition selected from a list of compositions—as claimed by the Applicant. None of the cited references, either alone or in combination, disclose this element.

EX1002 (*'911 Patent File History*), 58-59.

123. For at least the reasons discussed below in element [1i], I disagree. PO's appeal brief argument misrepresents *Cohen*. *Cohen* teaches providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording (*e.g.,* during a recording session, *Cohen's* system provides playback of the pre-recorded audio or visual content selected from the list discussed in element [1d] while a user is recording new audio or video content by way of user interface module 214 and recording engine 206 of FIG. 2). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0046]-[0048], [0074], [0114], [0137], [0138], [0150], [0152], [0173], [0175], and [0200], and FIGS. 1, 2, 5A, 5B, 6A.

124. PO seems to be arguing that the only video recording taught by *Cohen* (EX1004) is in conjunction with its competition module and challenge functionality which, in PO's view, is somehow not covered by the claims. This

characterization of *Cohen* is wrong. *First*, Cohen's video recording functionality is not limited to the challenge embodiments. *Second*, a video recording session initiated from a challenge button is no different from a video recording process initiated by a record button in *Cohen*. As discussed in element [1i], both processes record video over various selected underlying audio compositions while they are playing.

125. Moreover, even if *Cohen* were somehow considered deficient as to an express teaching of element [1i] (it is not), "providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording" would have been obvious for at least the reasons expressed in element [1i]. Indeed, references like *Chu* expressly teach this functionality, and it was otherwise well-known by 2009-2010. *See* element [1i].

126. ***Fourth***, PO argued the Examiner's position that *Cohen* teaches element [1r] of claim 1 ("in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video") was incorrect[5] as follows:

[5] Although PO's arguments reference each of elements [1o]-[1s], they appear to be focused on element [1r]. In any event, to the extent PO's argument is addressing element [1o] or [1s], it is wrong as discussed below regarding those elements.

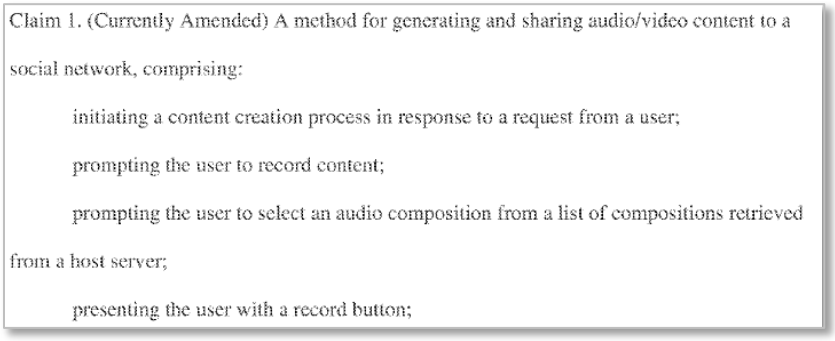
> The Examiner asserts that Cohen discloses "receiving a request to publish the recorded content; in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video; publishing the streamable video by copying the streamable video to a media server," citing paragraphs [0169] and [0170] and Figure 7, steps 714–718. Despite the Examiner's qualification that "*arguably*, these cited sections *can* reasonably read on the particular claimed features," (emphasis added), they in fact do *not* reasonably "read on" the particular claimed features because they do not disclose them.
>
> Cohen Paragraphs [0169] and [0170] discuss generally the concept of saving content to a "service site" and disclose "[i]n response to the user request to share the track with others, a listing entry of the content is published on the service site." This does not disclose "in response to the request to publish, *processing and encoding individual components of the recorded content to create a streamable video*." Figure 7 offers no such disclosure either—whether 'arguably' or otherwise.

EX1002 (*'911 Patent File History*), 56-57.

127. For at least the reasons discussed below in element [1r], I disagree. PO's appeal brief argument misrepresents *Cohen*. *Cohen* teaches, in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video (*e.g.*, *Cohen's* system, in response to the publishing request of element [1o], processes and encodes (*e.g.*, converts) the individual components (*e.g.*, audio and video) of a recorded video to create a streamable video as part of its process of migration of a widget to a target platform, such as a social media website). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0103], [0104], [0142], [0144], [0145], and [0208]. A POSITA would have considered it obvious as common knowledge in the art that individual components of *Cohen's* recorded content (*e.g.*, its audio and video components) would have been processed and encoded to create a streamable video compatible with and playable by the player widget, as described in detail below. Indeed, *Cohen* teaches saving files in

streamable formats to enable this functionality (*see*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0090] and [0091]). Moreover, even if *Cohen* were somehow considered deficient as to an express teaching of element [1r] (it is not), "in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video" would have been obvious for at least the reasons expressed in element [1r]. Indeed, references like *Chu*, *Sherman*, and *Joslin* expressly teach this functionality, and it was otherwise well-known by 2009-2010. *See* element [1r].

128. A Notice of Allowance issued on December 16, 2020. EX1002 (*'911 Patent File History*), 8-18. In the Notice of Allowance, the Examiner entered an Examiner's Amendment modifying each of the independent claims to specify that the simultaneous aural playback recited in the claims was of an "audio" composition. *See*, *e.g.*, claim 1:



Claim 1. (Currently Amended) A method for generating and sharing audio/video content to a social network, comprising:

initiating a content creation process in response to a request from a user;

prompting the user to record content;

prompting the user to select an audio composition from a list of compositions retrieved from a host server;

presenting the user with a record button;

presenting the user with a selection of visual media content for use as a background, wherein upon selecting an instance of pre-recorded visual media content from the selection, the user is presented with an interface to selectively edit the instance of pre-recorded visual media content;

providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording;

generating recorded content based on the recording session by compositing video captured during the recording session with the instance of pre- recorded visual media content, such that the video captured during the recording session is selectively made transparent to reveal the instance of pre-recorded visual media content;

displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition;

selecting a privacy attribute for the recorded content;

sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute;

receiving a request to publish the recorded content;

in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video; and

publishing the streamable video by copying the streamable video to a media server.

EX1002 (*'911 File History*), 13-17.

129. Additionally, the Examiner provided the following statement of reasons for allowance:

Reasons for Indicating Allowable Subject matter

4. Applicant's arguments filed in the Brief of 11/09/2020 have been fully considered. The prior art fail to either disclose or suggest the combination of features as arranged and claimed by applicant. In light of the newly amended feature(s) and arguments of pp. 5, 9 and in conjunction with all other limitations of the independent claims render claims 1, 11, and 12 allowable.

The dependent claims 2-9 being further limiting the independent claims, definite and fully enabled by the specification are also allowed.

EX1002 (*'911 File History*), 17.

130. It is unclear to me, and the Examiner did not explain, just how this slight modification of the claims would render them patentable over the Examiner's combinations of *Cohen*, *Gentile*, and *Maigret* (as to claims 1-11) and *Cohen*, *Crawford*, and *Maigret* (as to claim 12) as, for example, *Cohen* explicitly teaches providing simultaneous aural playback of an audio composition during a video-recording session. *See* element [1i].

131. Nevertheless, the '687 Application issued as the '911 Patent on February 23, 2021. EX1002 (*'911 File History*), 2.

132. As with the '350 Application, despite having copied much of the content of the '687 Application from *Cohen* (EX1004) as discussed below, PO did not identify *Cohen* (EX1004) via an IDS during the pendency of the '687 Application, or otherwise make *Cohen* of record. It was the Examiner that identified *Cohen* (EX1004). EX1002 (*'911 File History*), 120.

133. As discussed in detail in §§II.C and VI, it is my opinion that the Examiner erred in allowing the issued claims of the '911 patent. If, in addition to the references of record, the Examiner had the benefit of the Ground references and the explanation provided in this Declaration, along with the remaining technical background and Ground discussions, the claims of the '911 Patent would not have issued.

C. The Examiner Erred By Allowing The Challenged Claims

134. As I discussed above in §II.B.3, PO advanced four main arguments as to why the Challenged Claims were allegedly patentable over *Cohen* (and *Gentile*, *Crawford*, and *Maigret*). Each argument is: (i) wrong, including misrepresentations of *Cohen's* teachings; and/or (ii) focused on features that are otherwise well-known in the art, such as described in detail in §VI. Thus, the Examiner erred and the Challenged Claims should not have been allowed or passed to issue.

135. More specifically, because each of PO's patentability arguments for the Challenged Claims were plainly wrong in view of at least *Cohen's* teachings, the Examiner of the '911 Patent/'687 Application should have maintained the rejections of the pending claims of the '687 Application and not allowed the '911 Patent to issue. Had the Examiner properly considered *Cohen*, including by reviewing the explanation of *Cohen* and the related background and technical discussions in this declaration, the Challenged Claims of the '911 Patent would not have issued.

136. Further, to the extent any of PO's prosecution arguments trying to differentiate *Cohen* from the Challenged Claims had any merit (they do not), the arguments address features that were exceedingly well-known by 2009-2010, as described in detail in §VI, such as taught by one or more of *Chu* (EX1005), *Sherman* (EX1006), *Joslin* (EX1007), and *Lei* (EX1008), none of which were of

record during the prosecution of the Challenged Claims. Had the Examiner had the benefit of *Chu* (EX1005), *Sherman* (EX1006), *Joslin* (EX1007), and *Lei* (EX1008), the related explanation thereof provided herein (in combination with *Cohen*), and the remaining background and technical discussions herein, the Challenged Claims of the '911 Patent would not have issued.

D. The Common Specifications of the '350 Application, '911 Patent, and '612 Patent are Largely Copied from *Cohen* (EX1004)

137. As discussed below, *Cohen* (EX1004) was the publication of U.S. Patent Application No. 12/339,739 ("*Cohen Application*"; EX1037), filed December 19, 2008 (and claiming priority to Provisional Application Nos. 61/015,136 and 61/015,132, both filed December 19, 2007). EX1037 (*Cohen Application*), 21-90. Yenyun Fu of Perkins Coie LLP signed the application papers. EX1037 (*Cohen Application*), 21.

138. As discussed above, PO filed the *'500 Prov. Application* 18 months later, on July 15, 2010. EX1016 (*'500 Prov. Application*), 10-19. Yenyun Fu of Perkins Coie LLP also signed the application papers. EX1016 (*'500 Prov. Application*), 11. The *'500 Prov. Application* consists of but two pages of description, two pages of bullets, and three figures. EX1016 (*'500 Prov. Application*), 15-19. As discussed above (*see* ¶85), none of the content of the *'500 Prov. Application* appears to be any different from the various recording or video karaoke systems well-known in the art by that time. *See*, *e.g.*, §I.

139. As discussed above, the ’350 Application was filed on November 23, 2010. EX1017 (*’350 Patent File History*), 495-99. Yenyun Fu of Perkins Coie LLP also signed these application papers. EX1017 (*’350 Patent File History*), 447.

140. As shown by my analysis of the individual elements of claim 1 below, large portions of the content of the ’350 Application / ’911 Patent can be found in *Cohen* (EX1004), including entire sections copied almost *verbatim*.

141. Yenyun Fu of Perkins Coie filed both *Cohen* (EX1004) and the ’350 Application.

142. *Cohen* (EX1004) was not identified by Yenyun Fu, or anyone else at Perkins Coie, to the Examiner of the ’350 Application. Nor was *Cohen* (EX1004) identified to the Examiner of the ’911 Patent / ’687 Application. *Cohen* (EX1004) was only made of record as a result of the Examiner’s search. EX1002 (*’911 Patent File History*), 120.

143. Neither Yenyun Fu, nor anyone else at Perkins Coie, indicated to the Examiner that large portions of Cohen (EX1004) were copied into the ’350 Application and ’911 Patent / ’687 Application.

E. Challenged Claims

144. I understand that Petitioner is challenging the validity of claims 1-11 (“the Challenged Claims”) of the ’911 Patent in the Petition for *Inter Partes*

Review to which this Declaration will be attached. Those claims are reproduced in Appendix 3.

145. I have considered each of Challenged Claims 1-11 of the ’911 Patent, as well the ’911 Patent’s prosecution history (EX1002), and the other exhibits identified herein, in forming my opinions.

III. SUMMARY OF THE PRIOR ART

146. There are a number of patents and publications which constitute prior art to the ’911 patent. I have reviewed and considered the prior art discussed in this section, along with the materials listed in Appendix 2.

A. Invalidity Grounds

147. Based on my review and analysis of the materials cited herein, my opinions regarding the understanding of a POSITA in 2009-2010, and my training and experience, it is my opinion that the Challenged Claims 1-11 of the ’911 patent are invalid based on the following grounds:

Grounds	Claims	Statutory Basis	Prior Art
1	1-10	§ 103	*Cohen* in view of *Chu*, *Sherman*, and *Joslin*
2	11	§ 103	*Cohen* in view of *Chu*, *Sherman*, *Joslin*, and *Lei*
3	1-10	§ 103	*Cohen* in view of *Chu*, *Sherman*, *Joslin*, and *Austerberry*
4	11	§ 103	*Cohen* in view of *Chu*, *Sherman*, *Joslin*, *Lei*, and *Austerberry*

B. *Cohen* (EX1004)

148. *Cohen* (EX1004) is U.S. Patent Application Publication No. 2009/0164034 A1 to Cohen, Pink, and Fujita, which published on June 25, 2009. It was filed on December 19, 2008 as Application No. 12/339,739 and claims priority to Provisional Application Nos. 61/015,136 and 61/015,132, both filed December 19, 2007.

149. I understand *Cohen* qualifies as prior art to the ’911 patent under at least 35 U.S.C. § 102(b) (pre-AIA) because it is was published more than one year before the earliest possible filing date of the ’911 patent.

150. As described in much more detail below *vis-à-vis* the Challenged Claims, *Cohen* teaches “systems and methods for web-based performance collaborations based on multimedia content sharing” and mixing using “an online social network.” EX1004 (*Cohen*), ¶¶[0036]-[0037]. *Cohen’s* Figure 2 illustrates a

"host server to facilitate web-based performance collaborations, multimedia-content sharing, exchange, and competition between a plurality of users, the system includes a host server coupled to a user database, and/or a content database." EX1004 (Cohen), ¶[0007]. *See also EX1004 (Cohen),* ¶¶[0063]-[0117] describing various modules on the server 200 to perform system functions.

151. In particular, *Cohen* teaches that a user may audio- and video-record him(her)self singing over audio or audio/visual content selected by the user from available options on *Cohen's* network, such as content provided by other system users. EX1004 (*Cohen*), ¶¶[0038]-[0040], [0045], [0046]. User interface module 214 controls various user interfaces provided to the user to enable *Cohen's* processes, as described below. EX1004 (*Cohen*), ¶¶[0092]-[0093].

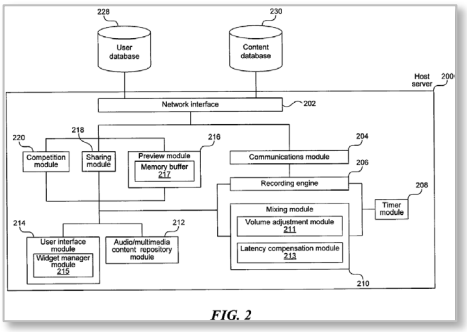


FIG. 2

152. *Cohen's* process begins with a user log-on. EX1004 (*Cohen*), ¶[0070]. Next, *Cohen* provides various user interfaces, such as is shown in FIG. 4A, that "identif[y] user requests and display[] a listing of beats, tracks, and/or video content" that a user may select from to record over. EX1004 (*Cohen*), ¶¶[0048], [0094], [0129]-[0130],

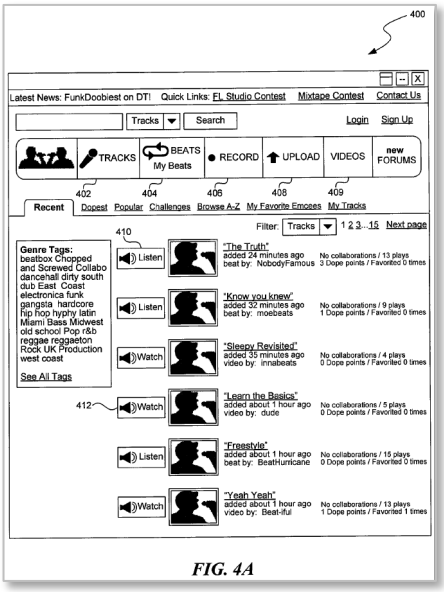


FIG. 4A

[0164], [0191]. The available content may be stored in content database 230 and/or audio/multimedia repository module 212 of *Cohen's* system. EX1004 (*Cohen*), ¶¶[0060], [0090]-[0091], [0119]-[0126].

153. Upon selection of one of the content items in FIG. 4A, *Cohen* provides a page view for the content as shown in FIG. 5A, which provides further information about the content, along with an audio/multimedia player/recorder widget 502. EX1004 (*Cohen*), ¶¶[0095]-[0096], [0130], [0135]-[0136], [0192], [0199]. As shown in FIG. 5A and 6A, widget 502 can include challenge or record buttons. EX1004 (*Cohen*), ¶¶[0097], [0100], [0137], [0150]-[0154], [0183], [0199].

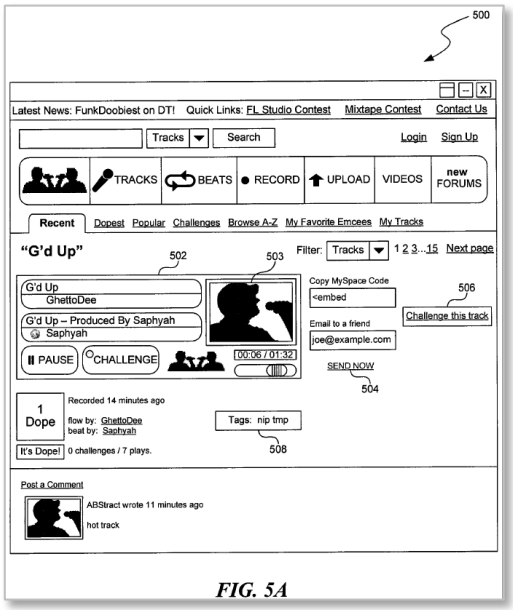


FIG. 5A

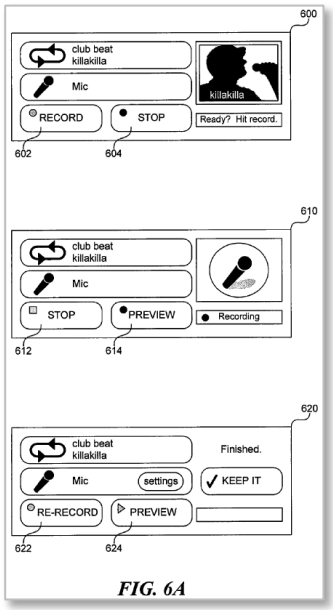


FIG. 6A

154. *Cohen* further teaches that, "[w]hen the user is ready to record a track, the user can, by the click of a button (e.g., the 'record button') on the user

interface, trigger a countdown to when the recording session will begin." EX1004 (*Cohen*), ¶¶[0041], [0048], [0074], [0165]-[0166], [0174], [0184], [0200]. During a recording session, handled by recording engine 206, the content selected by the user is played back so the user may hear it, and the user simultaneously sings, acts, or otherwise performs. EX1004 (*Cohen*), ¶¶[0048], [0070], [0072]-[0073], [0138]-[0139], [0167], [0175], [0193]-[0194], [0201], [0210], [0212]. Mixing module 210 can mix the various media audio and video inputs. EX1004 (*Cohen*), ¶¶[0083]-[0089], [0176], [0213]-[0214].

155. When the recording process is complete, *Cohen* teaches that "a preview of the recorded track" can be provided from temporary storage via sharing module 218, and the user can make various adjustments, such as to timing or latency, after which the multimedia composition can be moved to permanent storage." EX1004 (*Cohen*), ¶¶[0042], [0049], [0078]-[0082], [0140], [0168]-[0169], [0178]-[0180], [0185]-[0187], [0204], [0211]. The user can also set a "privacy attribute" for the recorded content on *Cohen's* system (e.g., public or private) to determine whether it is available to other users in the system to view or use for their own recordings. EX1004 (*Cohen*), ¶¶[0043]-[0044], [0109]-[0110], [0170].

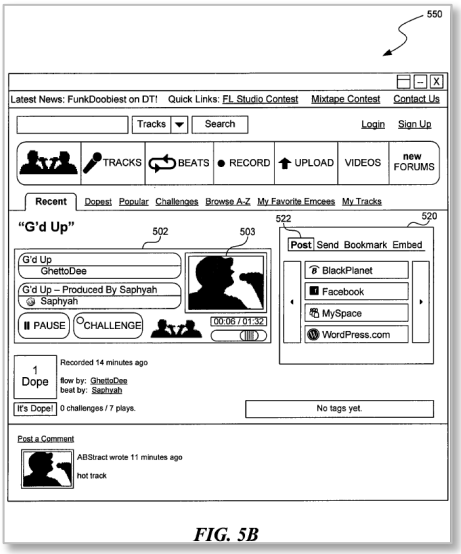


FIG. 5B

156. Finally, *Cohen* teaches that the recorded content can be migrated to other websites, such as a social media server. EX1004 (*Cohen*), ¶¶[0053], [0141]-[0149], [0208]. A user may effect this by interacting with widget 520 as shown in FIG. 5B, which provide a "Post" option to several social media sites. EX1004 (*Cohen*), ¶¶[0053], [0101]-[0105], [0208].

C. *Chu* (EX1005)

157. *Chu* (EX1005) is U.S. Patent No. 6,086,380 to Chu, Lan, Wung, and Price, which was patented (and therefore published) on July 11, 2000. It was filed on August 20, 1998 as Application No. 09/137,500.

158. I understand *Chu* qualifies as prior art to the '911 patent under at least 35 U.S.C. § 102(b) (pre-AIA) because it was published more than one year before the earliest possible filing date of the '911 patent.

159. I understand *Chu* was not cited or considered during prosecution of the '911 patent. It is not listed on the face of the '911 patent, and is not referred to or discussed in any office action or in the prosecution history generally. The content of *Chu* is not the same as any art that I have reviewed that was applied in the prosecution history. And *Chu* teaches the features PO alleged to be missing from *Cohen* (I disagree with PO's reading of *Cohen* for the reasons above), such as the simultaneous playback of audio content while video recording (see §II.B.3 and VI).

160. As described in much more detail below *vis-à-vis* the Challenged Claims, *Chu* teaches "a personalized karaoke recording studio" that allows a user to video-record him(her)self singing over a user-selected karaoke song in front of a user-selectable background scene.

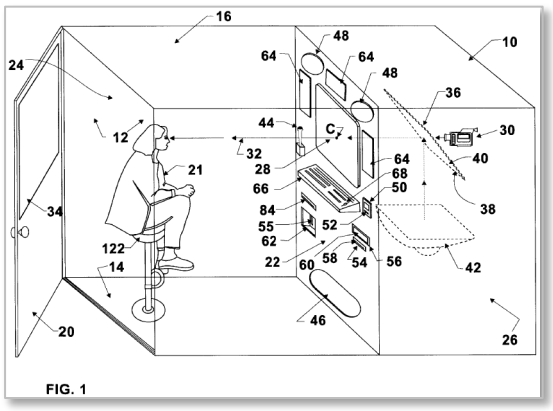


FIG. 1

EX1005 (*Chu*), 2:36-48; 3:9-17, 3:59-4:2, 5:1-16, 5:22-32. The studio booth includes a plain background surface such that the video-recording of the user's performance can be composited by the system with the user-selected background using chroma-key technology. EX1005 (*Chu*), 3:19-58, 5:34-48. After the user finishes the recording, the user may review the video and then save it. EX1005 (*Chu*), 4:47-56.

161. In *Chu's* process, the user enters the karaoke booth and "is presented with a start screen 100," which "contains initial instructions to the booth occupant 21." EX1005 (*Chu*), 11:21-36. Once the user selects a particular recording media to save his performance (*e.g.*, CD or videotape), *Chu* teaches providing a message (step 108) to the user to "make the

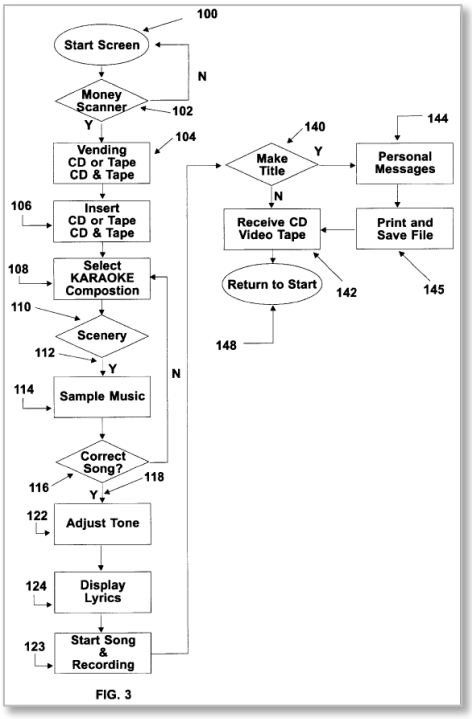


FIG. 3

selection of a musical composition" stored in the system. EX1005 (*Chu*), 12:12-33, 5:1-16, 9:8-17. In one example in *Chu*, the musical compositions are selected by first selecting a category (*e.g.*, rock, traditional, country) and then selecting from a listing of titles. EX1005 (*Chu*), 12:34-48.

162. *Chu* then teaches (at step 110) providing a message to the user to "make[] a selection of scenes which may, for example, include such background scenes as an ocean view, a lively street scene, a desert scene, and possibly other varied but reasonable different background scenes." EX1005 (*Chu*), 12:49-64. The user may then indicate that the user is ready to proceed with the recording, after which *Chu's* system (at step 123) provides a numerical countdown and then begins simultaneously audibly playing the chosen karaoke song through speakers 46, 48 and video and audio-recording the user as he performs over the chosen karaoke song. EX1005 (*Chu*), 14:9-19, 14:38-64.

163. *Chu's* audio video mixer 124 combines the audio and video data into multimedia content, including compositing the selected background and video of the user using chroma key techniques. EX1005 (*Chu*), 14:65-16:11. The user may also add (at step 140, 144) a title or message to the multimedia content. EX1005 (*Chu*), 16:12-24, 16:46-57. Then, the multimedia content can be permanently saved as, for example, an MPEG file via [MPEG] converter 137. EX1005 (*Chu*), 16:25-39.

D. *Sherman* (EX1006)

164. *Sherman* (EX1006) is U.S. Patent Application Publication No. 2003/0164924 A1 to Sherman and Chase, which published on September 4, 2003. It was filed on January 8, 2003 as Application No. 10/338,774 and is a continuation of U.S. Application No. 09/896,420, filed June 29, 2001.

165. I understand *Sherman* qualifies as prior art to the '911 patent under at least 35 U.S.C. § 102(b) (pre-AIA) because it is was published more than one year before the earliest possible filing date of the '911 patent.

166. I understand *Sherman* was not cited or considered during prosecution of the '911 patent. It is not listed on the face of the '911 patent, and is not referred to or discussed in any office action or in the prosecution history generally. The content of *Sherman* is not the same as any art that I have reviewed that was applied in the prosecution history. And Sherman teaches the features PO alleged to be missing from *Cohen* (I disagree with PO's reading of *Cohen* for the reasons above), such as process initiation and publishing (see §II.B.3 and VI).

167. As described in much more detail below *vis-à-vis* the Challenged Claims, *Sherman* teaches a "video karaoke system" that "allow[s] dubbing an actor's voice" and video in a video clip. *Sherman* (EX1006), Abstract, ¶[0002], ¶[0024]. System 10 includes computer 20, microphone 36, video camera, and storage device 50 (*e.g.*, server). *Sherman* (EX1006), ¶[0012], ¶[0024]. *Sherman*

provides a series of user interface screens to operate its system, starting with the initial screen of FIG. 2, which allows a user "the option of selecting a movie for a new recording," upon which the FIG. 3 screen will be provided listing the types of movie clips available. *Sherman* (EX1006), ¶[0014].

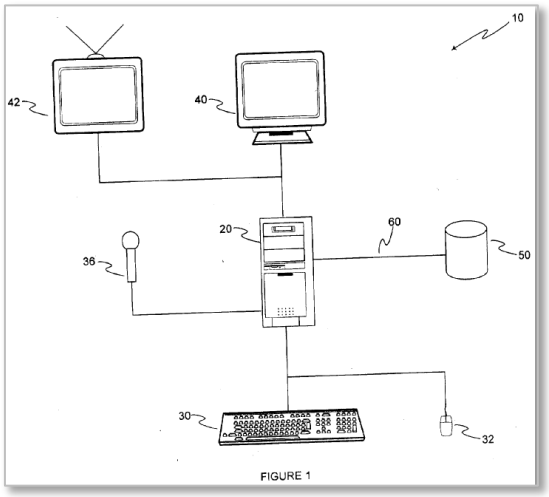


FIGURE 1

Figure 2

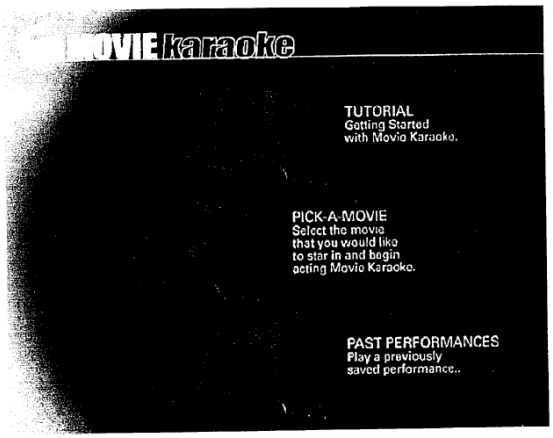
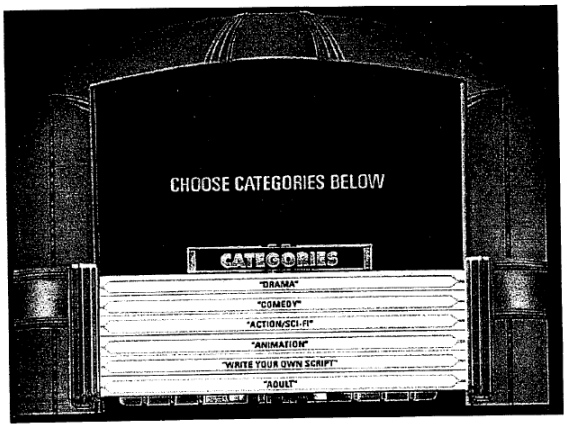


Figure 3



168. Upon choosing a category, the screen of FIG. 4 is provided listing available clips from which the user may select. *Sherman* (EX1006), ¶[0014]. After selecting a particular clip, the screen of FIG. 5 is shown that gives the user an option to preview the clip or record over one or more actors' voices. *Sherman* (EX1006), ¶[0014].

Figure 4

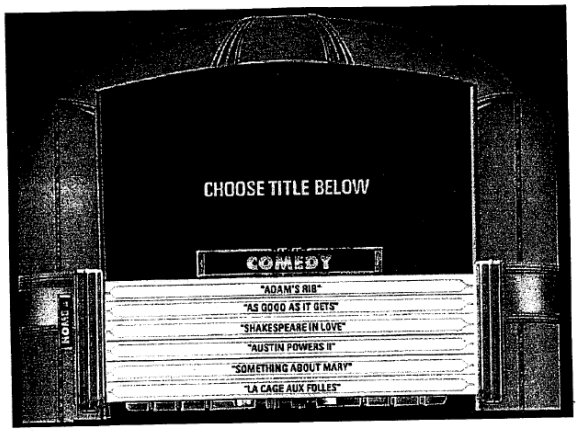


Figure 5



169. From FIG. 5, a user may select an actor from a list of actors in the scene that the user wishes to record his own voice over, and can then proceed to record mode. *Sherman* (EX1006), ¶[0015]. "In record mode, the software will play the video image of the selected movie clip along with the background sounds, the music score, and the voices of all the actors except the actor(s) selected by the user for voice-over." *Sherman* (EX1006), ¶[0015]. The microphone "records the user's voice as the user speaks the selected actor's lines in synchronization with the selected actor." *Sherman* (EX1006), ¶[0016]. The user may repeat the process for each actor in the scene. *Sherman* (EX1006), ¶[0019].

170. In addition to audio, *Sherman* teaches that images and user video can be inserted into the selected move clip. *Sherman* (EX1006), ¶[0024]. First, *Sherman* teaches that static portions of the movie clip can be segmented and replaced with another background or video. *Sherman* (EX1006), ¶[0024]. Second, *Sherman* teaches computer 20 may be connected to a video camera "that will

capture either still images of the user, or optionally capture a video file of the user's head as he speaks the selected actor's lines." *Sherman* (EX1006), ¶[0024]. The selected actor is replaced by the captured video by various video techniques. *Sherman* (EX1006), ¶[0024].

171. *Sherman* next teaches that, "[o]nce the user has finished recording over the selected actor's voice, the system software offers the option of previewing the clip" … "or the option of saving a new version of the clip with the modified soundtrack." *Sherman* (EX1006), ¶[0017]. Various editing options are available, including sound and brightness/contrast. *Sherman* (EX1006), ¶[0020].

172. The audio and video files may be saved separately, or may be saved together with "the original music score and background track as a standard video file, such as in MPEG, AVI, Windows Media, QuickTime, or Real Video format. In this manner, the user may distribute the modified movie clip to friends and others via any available distribution medium." *Sherman* (EX1006), ¶[0023].

E. *Joslin* (EX1007)

173. *Joslin* (EX1007) is U.S. Patent No. 7,324,166 to Joslin and Brown, which published as a patent on January 29, 2008. It was filed on November 15, 2004 as Application No. 10/990,161 and claims priority to U.S. Provisional Application No. 60/519,922, filed November 14, 2003.

174. I understand *Joslin* qualifies as prior art to the '911 patent under at least 35 U.S.C. § 102(b) (pre-AIA) because it is was published more than one year before the earliest possible filing date of the '911 patent.

175. I understand *Joslin* was not cited or considered during prosecution of the '911 patent. It is not listed on the face of the '911 patent, and is not referred to or discussed in any office action or in the prosecution history generally. The content of *Joslin* is not the same as any art that I have reviewed that was applied in the prosecution history. And *Joslin* teaches the features PO alleged to be missing from *Cohen* (I disagree with PO's reading of *Cohen* for the reasons above), such as publishing (*see* §II.B.3 and VI).

176. As described in much more detail below *vis-à-vis* the Challenged Claims, *Joslin* teaches a system that "inserts a participant realistically into familiar background media" (such as a movie) to create new video content using chroma key techniques and stores the new recording "on a digital server for later playback." *Joslin* (EX1007) Abstract, 1:61-67. *Joslin's* system includes cameras 1, 5, media server 11, and production switcher 14, as shown in FIGS. 2 and 3. *Joslin* (EX1007), 6:65-7:12.

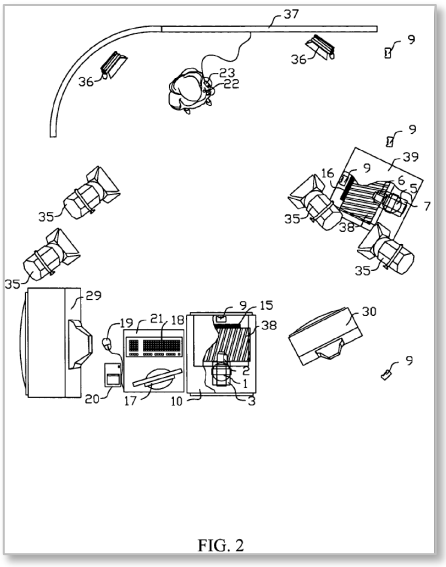


FIG. 2

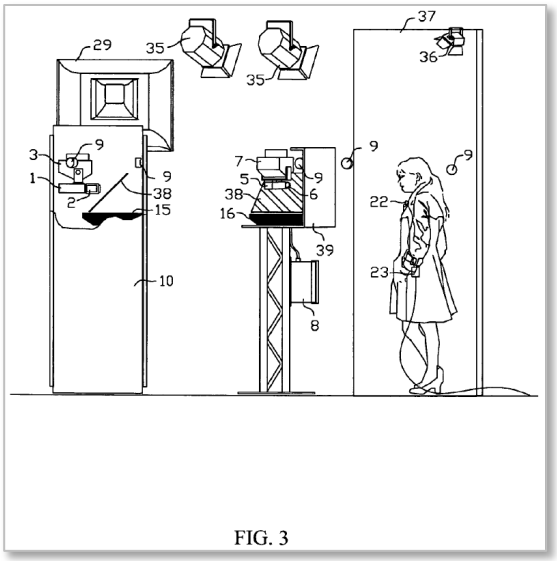


FIG. 3

177. *Joslin* teaches that its background media can be selected by the user from a "digital library [of] well known video media that has been adapted to receive the image of a live participant so as to appear an actor." *Joslin* (EX1007), 2:51-59. *Joslin* further teaches that "images of a live participant are inserted, real time, as an actor" in the selected background media. *Joslin* (EX1007), 3:45-65. The participant's performance may then be stored in a digital storage device for viewing and may be "uploaded to a server for subsequent download by the participant via the Internet." *Joslin* (EX1007), 2:39-44.

F. *Lei* (EX1008)

178. *Lei* (EX1008) is U.S. Patent Application Publication No. 2008/0285859 to Lei and Xu, which published on November 20, 2008. It was filed on April 26, 2007 as International Application PCT/GB05/04111.

179. I understand *Lei* qualifies as prior art to the ’911 patent under at least 35 U.S.C. § 102(b) (pre-AIA) because it is was published more than one year before the earliest possible filing date of the ’911 patent.

180. I understand *Lei* was not cited or considered during prosecution of the ’911 patent. It is not listed on the face of the ’911 patent, and is not referred to or discussed in any office action or in the prosecution history generally. The content of *Lei* is not the same as any art that I have reviewed that was applied in the prosecution history. And *Lei* teaches detecting user movement and representing it by a trailing light, a feature PO alleged to be missing from the art applied by the Examiner. EX1002 (*’911 Patent File History*), 60-61.

181. As described in much more detail below *vis-à-vis* the Challenged Claims, *Lei* teaches an intelligent video surveillance system that can “perform[] a number of operations on video data received from a camera, including foreground extraction, shadow removal and object tracking.” *Lei* (EX1008), Abstract. *Lei* further teaches that background and foreground data in an image are determined, object movement is detected, and “a trajectory database is maintained so that the tracking history of each foreground

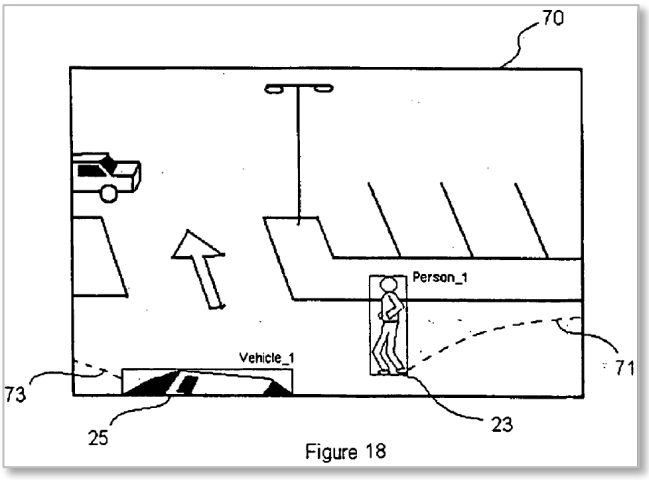


Figure 18

object is available to higher level applications which may, for example, display a trail line indicating the cumulative path taken by one or more foreground objects in the video." *Lei* (EX1008), ¶[0003]. *Lei's* FIG. 18 shows determined trail lines 71, 73. *Lei* (EX1008), ¶[0114]. *See also Lei* (EX1008), ¶[0003], ¶[0111]-[113].

G. *Austerberry* (EX1014)

182. *Austerberry* (EX1014) is Selected Chapters from The Technology of Video and Audio Streaming, by David Austerberry, published by the Focal Press in 2002. *Austerberry* (EX1014) has been cited by numerous other papers, demonstrating that is was publicly available to POSITAs as of its publication date. *See*, *e.g.*, EX1046 at 8, 15, 29, 49.

183. I understand *Austerberry* qualifies as prior art to the '911 patent under at least 35 U.S.C. § 102(b) (pre-AIA) because it is was published more than one year before the earliest possible filing date of the '911 patent.

184. I understand *Austerberry* was not cited or considered during prosecution of the '911 patent. It is not listed on the face of the '911 patent, and is not referred to or discussed in any office action or in the prosecution history generally. The content of *Austerberry* is not the same as any art that I have reviewed that was applied in the prosecution history. And *Austerberry* teaches, among other things, publishing, processing, and encoding recordings, features PO

alleged to be missing from the art applied by the Examiner. EX1002 (*'911 Patent File History*), 56-57.

185. As described above, *Austerberry* (EX1014) teaches capturing audio/video, encoding the audio/video into a streamable format (*e.g.*, MPEG), and placing the encoded file on a server for streaming to users. EX1014 (*Austerberry*), Chapters 1, 4-11, 13, FIGS. 1.4, 7.3, 7.4, 7.6 (reproduced here).

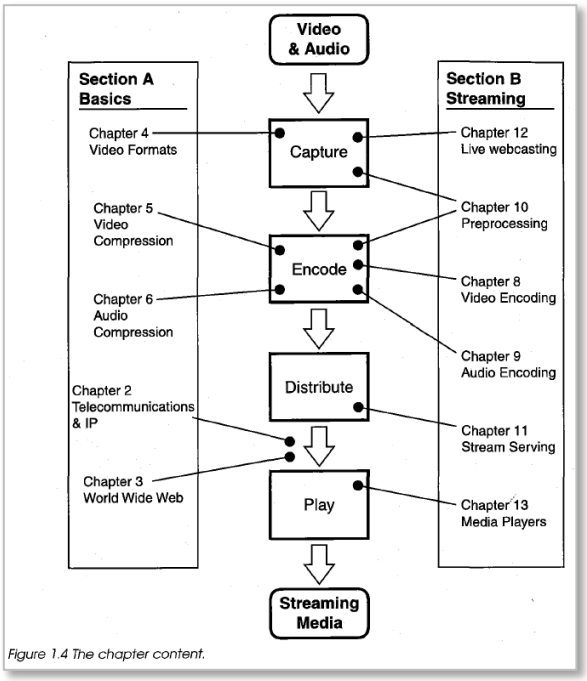


Figure 1.4 The chapter content.

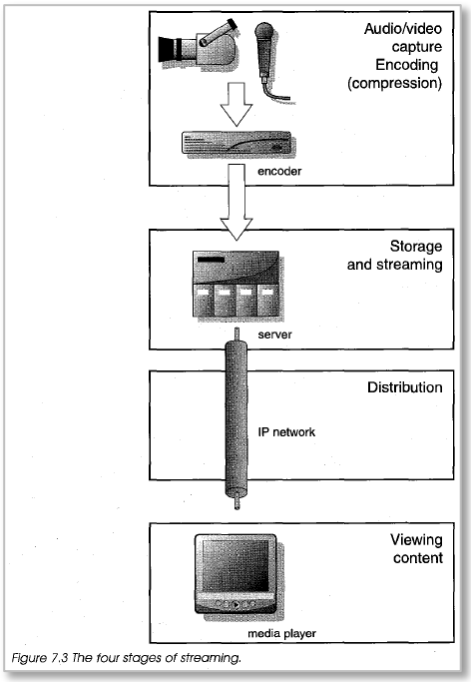


Figure 7.3 The four stages of streaming.

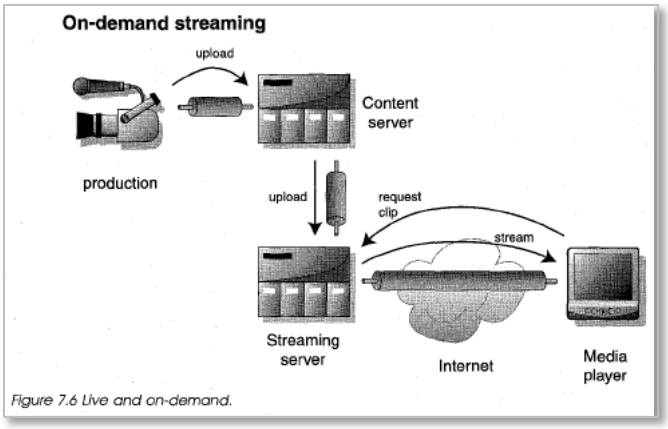


Figure 7.6 Live and on-demand.

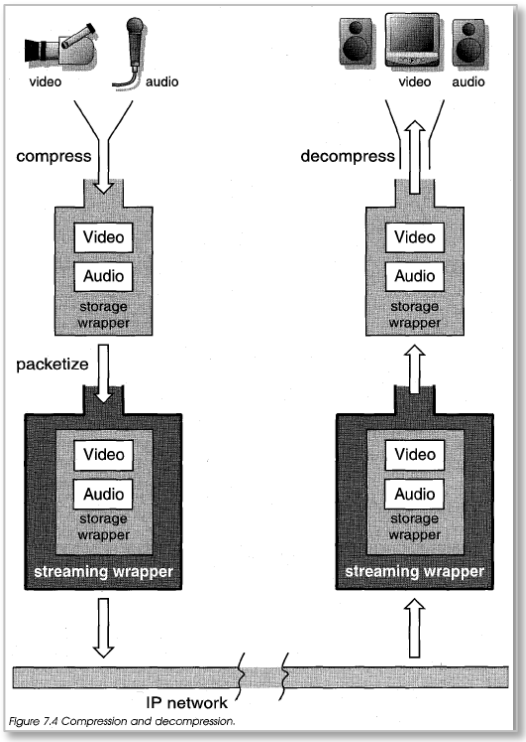


Figure 7.4 Compression and decompression.

186. In particular, *Austerberry* teaches that "[s]treaming media is an exciting addition to the rich media producers' toolbox." EX1014 (*Austerberry*), 15. As shown in FIGS. 7.3, 7.4, and 7.6 above, *Austerberry* teaches that raw audio and video can be captured, processed to a compressed digital file, stored on a content server, encoded into a streamable format, and moved to a streaming server for delivery to users via a network. EX1014 (*Austerberry*), 118-124 (Chapter 7, pp. 134-140). *Austerberry* teaches various encoding methodologies in its Chapters 8 and 9. EX1014 (*Austerberry*), 133-184 (Chapters 9-10, pp. 149-200). *Austerberry* further teaches that encoding processes can be improved by pre-processing the audio and video signals before encoding, including, for example, by adjusting the

video levels, de-interlacing, cropping, and noise reduction. EX1014 (*Austerberry*), 170-184. (Chapter 10, pp. 186-200).

IV. LEVEL OF ORDINARY SKILL IN THE ART

187. In determining the characteristics of a hypothetical person of ordinary skill in the art ("POSITA") of the '911 patent at the time of the claimed invention, I considered several things, including various prior art techniques relating to audio and video content creation, editing, and file sharing and related technologies, the types of problems that such techniques gave rise to, and the rapidity with which innovations were made. I also considered the sophistication of the technologies involved, and the educational background and experience of those actively working in the field at the time. I also considered the level of education that would have been necessary to understand the '911 patent. Finally, I placed myself back in the relevant period of time and considered the colleagues, research associates, and students that I have worked with and supervised in the field of audio and video content creation, editing, and file sharing, and related technologies.

188. I came to the conclusion that a person of ordinary skill in the field of art of the '911 patent would have had at least a bachelor's degree, or the equivalent degree, in computer engineering, computer science, or a related field, and 2-3 years of experience in the research, design, or development of audio and video production, editing, network storage, and streaming systems and related hardware,

software, and firmware, or equivalent experience. A person with less education but more relevant practical experience, or more education and less experience, may also meet this standard.

189. In the 2009-2010 timeframe, and in view of the types of problems encountered in the art and prior art solutions to those problems, a POSITA would have known and had the skills necessary to design, implement, and/or utilize media selection interfaces, recording and mixing tools, encoders, editing functions, networked file storage, and streaming systems. This would also include at least knowledge of relevant video compositing, multi-track time alignment, and user interface design, along with the various techniques and prior art systems discussed above in §§I and III.

190. I believe that I am at least a POSITA and, furthermore, I have supervised those who were also POSITAs. Moreover, I qualified as a POSITA as of 2009-2010. Accordingly, I believe that I am qualified to opine from the perspective of a POSITA regarding the challenged claims.

V. CLAIM CONSTRUCTION

191. For purposes of this Declaration, I have considered the claim language, specification, and portions of the prosecution history of the ’911 patent (and its related patents), to determine the meaning of the claim language as it would have been understood by a POSITA. I understand that the “plain and

ordinary meaning" or *Philips* standard has traditionally been applied in district court litigation, where a claim term is given its plain and ordinary meaning in view of the specification from the viewpoint of a person of ordinary skill in the art.

192. I have applied the *Philips* standard in my analysis. Unless otherwise stated, I have applied the plain and ordinary meaning to all claim terms.

A. Server-Side Performance of Claim Elements

193. In my opinion, it is unclear from the claim language the outer bounds of what—*e.g.*, a person, client device, server, or something else—may perform the steps of the challenged claims. For example, independent claim 1 is reproduced below:

> [1a] 1. A method for generating and sharing audio/video content to a social network, comprising:
> [1b] initiating a content creation process in response to a request from a user;
> [1c] prompting the user to record content;
> [1d] prompting the user to select an audio composition from a list of compositions retrieved from a host server,
> [1e] presenting the user with a record button;
> [1f] presenting the user with a selection of visual media content for use as a background, wherein upon selecting an instance of pre-recorded visual media content from the selection, the user is presented with an interface to selectively edit the instance of pre-recorded visual media content;
> [1i] providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording;
> [1j] generating recorded content based on the recording session by compositing video captured during the recording session with the instance of pre-recorded visual media content, such that the video

captured during the recording session is selectively made transparent to reveal the instance of pre-recorded visual media content;

[1l] displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition;

[1m] selecting a privacy attribute for the recorded content;

[1n] sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute;

[1o] receiving a request to publish the recorded content;

[1r] in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video; and

[1s] publishing the streamable video by copying the streamable video to a media server.

194. In many instances, it appears that the elements of claim 1 could be performed by a client device (*e.g.*, a smartphone) or a server. As discussed in §II.A.2, however, the '911 Patent's specification clearly and repeatedly indicates that performance of the claim elements is controlled by the server. Further, the most general statements of the '911 Patent's alleged invention indicate that the allegedly inventive functions are performed "over a network." *See*, *e.g.*, EX1001 (*'911 Patent*) at Abstract ("[d]isclosed herein are methods and systems for creating and disseminating of audio and video content generated by a user over a network.") and 3:48-53 ("[e]mbodiments of the present disclosure include systems and methods for enabling a user to generate audio content over a network. In one aspect, the present disclosure relates to using a network for generating audio and video content over a network."). A POSITA would have understood these

statements to mean that the processing load of the system was server-side. Indeed, other than provision of a client-side user interface and the use of the client's camera/microphone, there are no specific examples of client-side performance of the claimed elements in the '911 Patent.

195. Taking all of the above into account, it is my opinion that a POSITA would have understood that the elements of the claims are performed on the server side in the context of the challenged claims of the '911 patent.

196. In §VI, I have compared the claims to the prior art in this context. However, to the extent the Board finds that a broader definition is warranted (*e.g.*, so as to include both server- and client-side performance of the claim elements), such a broader definition would still encompass server-side performance of the claim elements, and my opinions below would be unchanged.

197. Moreover, it would also have been obvious by 2009-2010 to move processing activities from the server to the client, or to otherwise share processing between servers and clients in a server/client system, particularly as client device capability improved in the late 2000s due to the introduction of, for example, powerful smartphones. POSITAs at the time were regularly making decisions regarding the assignment of processing chores among client and server devices based on a number of factors, including, for example, the relative processing capabilities of the client and server devices. Thus, it is my opinion that a POSITA

reading the prior art would have found it obvious to move the performance of any one or more of the elements of the claims from a server to a client device such as a smartphone, tablet or other client computing device. Such a move would have been a simple design choice based on factors such as the relative availability of processing power/bandwidth, as noted above.

B. Ambiguity of Other Terms

198. It is my understanding that Snap has asserted that the ambiguous outer bounds of some claim terms render the claims indefinite in the related district court litigation. I do not offer, at this time, an opinion as to those arguments. It is my opinion that the relevant claim elements are understandable enough to compare them to the prior art for purposes of IPR, even if their ambiguous outer bounds would otherwise render the claims indefinite.

C. The Parties' District Court Constructions

199. It is my understanding that both Snap and PO have served Preliminary Claim Constructions in the related District Court case. EXS 1051, 1052. I have reviewed the Parties' proposed constructions for the identified terms. As noted below, adopting either party's construction for the relevant claim terms would not affect my conclusion that the Challenged Claims are taught by the identified Grounds and are therefore obvious.

VI. INVALIDITY

200. Based on my review and analysis of the materials cited herein, my opinions regarding the understanding of a POSITA in 2009-2010, and my training and experience, it is my opinion that a POSITA would have found claims 1-11 of the '911 patent obvious. The reasons for my conclusions are explained below.

A. Ground 1: Claims 1-10 Are Rendered Obvious by *Cohen* in View of *Chu*, *Sherman*, and *Joslin*

201. It is my opinion that a POSITA would have found Claims 1-10 obvious based on the teachings of *Cohen* in view of *Chu*, *Sherman*, and *Joslin* for at least the following reasons.

1. Combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*

202. As discussed in detail herein, *Cohen* teaches a system for "web-based performance collaborations based on multimedia content sharing" and mixing using "an online social network." EX1004 (*Cohen*), ¶¶[0036]-[0037]. A user may select from a list of stored pre-recorded audio or video content as shown in FIG. 4A (EX1004 (*Cohen*), ¶¶[0060], [0090]-[0091], [0094], 0119]-[0126], [0129]-[0130], [0164], [0191]) and video- and audio-record himself/herself singing over the selected audio or video content while it is playing (EX1004 (*Cohen*), ¶¶[0038]-[0040], [0045], [0046], [0048], [0070], [0072]-[0073], [0138]-[0139], [0167], [0175], [0193]-[0194], [0201], [0210], [0212]). *Cohen* teaches that when the recording process is complete, "a preview of the recorded track" can be provided,

and the user can adjust timing or latency before saving the file to permanent storage" EX1004 (*Cohen*), ¶¶[0042], [0049], [0078]-[0082], [0140], [0168]-[0169], [0178]-[0180], [0185]-[0187], [0204], [0211]. The user can also set a "privacy attribute" for the recorded content on *Cohen's* system (*e.g.*, public or private) for their recordings (EX1004 (*Cohen*), ¶¶[0043]-[0044], [0109]-[0110], [0170]) and the recorded content can be migrated to other websites, such as a social media server, by user request (EX1004 (*Cohen*), ¶¶[0053], [0101]-[0105], [0141]-[0149], [0208]).

203. *Cohen* further teaches that its embodiments are described for illustrative purposes, and "various equivalent modifications are possible within the scope of the disclosure" EX1004 (*Cohen*), ¶[0216]. Moreover, *Cohen* teaches that its embodiments "can be applied to other systems" and "can be combined to provide further embodiments." EX1004 (*Cohen*), ¶[0217]. In other words, *Cohen* expressly teaches that its embodiments can be combined with each other, with other systems, and modified to provide alternative functionality.

204. Like *Cohen*, *Chu* is also directed toward a karaoke system that allows a user to record audio and/or video of themselves over preexisting media content selected by the user. *Chu* teaches that prior art karaoke-type devices were known, including devices "which allow a person to perform and record a karaoke selection and to receive a copy of that performance at the conclusion thereof in exchange for

money" (EX1005 (*Chu*), 1:13-21) and systems that recorded the user's video while performing (EX1005 (*Chu*), 1:34-49). *Chu* further explains that these prior art systems were deficient because they forced a user to look at a screen for lyrics rather than a camera, and that known methods to provide backgrounds were deficient. EX1005 (*Chu*), 2:17-23 and 32-36. A POSITA would have understood these deficiencies to be present in systems such as *Cohen's*.

205. *Chu* teaches that its system is an improvement over prior art karaoke-type systems. EX1005 (*Chu*), 5:1-4. In particular, *Chu* teaches (as discussed above), a "personalized karaoke recording studio" that allows a user to audio- and video-record himself singing over a user-selected karaoke song in front of a user-selectable background scene (*e.g.*, an ocean view, street scene, or desert scene) (EX1005 (*Chu*), 2:36-48; 3:9-17, 3:59-4:2, 5:1-16, 5:22-32, 12:49-64), and compositing the video of the background and user's performance using chroma-key technology (EX1005 (*Chu*), 3:19-58, 5:34-48). After recording is complete, the user may review the video and then save it. EX1005 (*Chu*), 4:47-56. The user may also add (at step 140, 144) a title or message to the multimedia content. EX1005 (*Chu*), 16:12-24, 16:46-57. Then, the multimedia content can be permanently saved as, for example, an MPEG file via [MPEG] converter 137. EX1005 (*Chu*), 16:25-39. *Chu* further teaches that "numerous variations and

modifications of the invention will become readily apparent to those familiar with karaoke juke boxes and recording equipment." EX1005 (*Chu*), 17:56-60.

206. A POSITA having *Cohen* and *Chu* (with or without *Sherman* and *Joslin*) before him or her would have been motivated to combine various aspects of *Cohen* and *Chu's* teachings. For example, a POSITA would have been motivated to modify *Cohen's* teachings of audio- and video-recording of a user singing over pre-recorded audio content with the similar process of *Chu* using *Chu's* user-selectable background and compositing functionality, at least in view of *Chu's* teaching that such improvements were desirable *vis-à-vis* prior art systems similar to *Cohen*, and *Cohen's* teaching that various modifications to its system were possible. In combination, these teachings would have provided an improved system for creating a multimedia file that includes additional user-selectable content (*e.g.*, a user-selectable background) in addition to the underlying audio content and a video of the user singing, and compositing functionality where the user is placed in the background. A POSITA would have understood that the addition of more user-selectable content in the user-created multimedia content and the compositing functionality would have been recognized as highly desirable by 2009-2010 (as evidenced by the repeated teachings of the desirability of such functionality in *Chu*, *Sherman*, *Joslin*, and the prior art discussed in §I.)

207. As also discussed herein, *Sherman* teaches a "video karaoke system" that "allow[s] dubbing an actor's voice" in a video clip. *Sherman* (EX1006), Abstract, ¶[0002], ¶[0024]. *Sherman* provides a series of user interface screens to operate its system, by which a user can select from a list a movie clip to record over. *Sherman* (EX1006), ¶[0014]. *Sherman's* system plays the movie clip while the user is recorded. *Sherman* (EX1006), ¶[0016]. The user may repeat the process for each actor in the scene. *Sherman* (EX1006), ¶[0019]. Additionally, *Sherman* teaches that images and user video can be inserted into the selected movie clip. *Sherman* (EX1006), ¶[0024]. First, *Sherman* teaches that static portions of the movie clip can be segmented and replaced with another background or video. *Sherman* (EX1006), ¶[0024]. Second, *Sherman* teaches computer 20 may be connected to a video camera "that will capture either still images of the user, or optionally capture a video file of the user's head as he speaks the selected actor's lines." *Sherman* (EX1006), ¶[0024]. Then, the selected actor is replaced by the captured video by various techniques. *Sherman* (EX1006), ¶[0024]. The video clip can be saved and edited. *Sherman* (EX1006), ¶¶[0017], [0020]. The file components can be processed and encoded together with " the original music score and background track as a standard video file, such as in MPEG, AVI, Windows Media, QuickTime, or Real Video format. In this manner, the user may distribute

the modified movie clip to friends and others via any available distribution medium." *Sherman* (EX1006), ¶[0023].

208. In one embodiment, *Sherman* (EX1006) teaches functionality where "the system software may be used to prepare video clips for electronic distribution as announcements, invitations, greetings, etc." *Sherman* (EX1006), ¶[0038]. In this embodiment, an invitee will be directed to a website for the invitation where "a highly individualized video clip [with] their favorite actors or singers deliver[ing] their particular message" is provided. *Sherman* (EX1006), ¶[0038]. *Sherman* also notes that on-line distribution is viable as video compression technology has advanced. *Sherman* (EX1006), ¶[0041]. *Sherman* further teaches that "those skilled in this art will understand how to make changes and modifications in the present invention to meet their specific requirements or conditions." *Sherman* (EX1006), ¶[0062].

209. A POSITA having *Cohen*, *Chu*, and *Sherman* (with or without *Joslin*) before him or her would have been motivated to combine various aspects of *Cohen*, *Chu*, and *Sherman's* teachings. For example, a POSITA would have been motivated to modify *Cohen* and *Chu's* combined teachings of providing user-selectable backgrounds for multimedia creation with *Sherman's* teachings that static portions of its background movie clip can be segmented and replaced with another background or video. *Sherman* (EX1006), ¶[0024]. In combination, these

teachings would have provided an improved system for creating and sharing a multimedia file that includes additional user-selectable content (*e.g.*, a user-selectable and more user-editable background) in addition to the underlying audio content and a video of the user singing over the content in front of the background. A POSITA would have understood that the addition of more user-editing capabilities for the background in the user-created multimedia content would have been recognized as highly desirable by 2009-2010, as evidenced by the desired use of backgrounds in *Chu*, *Sherman*, and *Joslin*, and the prior art discussed in §I (*see*, *e.g.*, the teachings that special effects and customization of multimedia was desirable in *Manico* (EX1012) at ¶¶[0072]-[0074]) and *Gentile* (EX1013), ¶[0061]).

210. In another example, a POSITA would have been motivated to modify *Cohen* (as shown in FIG.5B) and *Chu's* teachings of sharing their user-recorded videos with *Sherman's* teachings of processing and encoding the components of such videos into video files (*e.g.*, MPEG) and electronically distributing the files, such as by using them on an invitation website. Indeed, a POSITA would have understood that *Sherman's* invitation creation option could have been directly incorporated (or otherwise used) into *Cohen* as an additional option in FIG. 5B to provide added functionality for *Cohen's* system. For example, a POSITA would have understood that adding another alternative to the "post" to Facebook,

MySpace, *etc*. option taught by *Cohen*, such as "create invitation" would have been desirable. In combination, these teachings provide an improved system for creating and sharing a multimedia file. A POSITA would have understood that the addition of more distribution methods to share the user-created content would have been recognized as highly desirable by 2009-2010, as evidenced by *Cohen*, *Chu*, *Sherman*, and *Joslin's* teachings of content distribution, and the prior art discussed in §I.

211. *Joslin* is directed to another video karaoke system and teaches that prior art methods of placing a user in a background scene, including video karaoke, were deficient. *Joslin* (EX1007), 1:33-57. *Joslin* teaches that its multi-camera and editing functionality improve upon such systems. *Joslin* (EX1007), 1:58-2:23. Specifically, as discussed herein, *Joslin* teaches a system that "inserts a participant realistically into familiar background media" (such as a movie) to create new video content using chroma key techniques and stores the new recording "on a digital server for later playback." *Joslin* (EX1007) Abstract, 1:61-67. *Joslin's* system includes cameras 1, 5, media server 11, and production switcher 14, as shown in FIGS. 2 and 3. *Joslin* (EX1007), 6:65-7:12. *Joslin* teaches that its background media can be selected by the user from a "digital library." *Joslin* (EX1007), 2:51-59. *Joslin* further teaches that "images of a live participant are inserted, real time, as an actor" in the selected background media. *Joslin* (EX1007), 3:45-65. The

participant's performance may then be stored in a digital storage device for viewing. *Joslin* (EX1007), 2:39-44. *Joslin* also teaches its system provides a "means for retrieving a participant's performance video" from the performance media library where it has been processed, encoded, and stored as an MPEG-2 video, "and modifying the format and resolution to compressed digital video for internet video streaming, and uploading to a server for later download by the participant via the internet." *Joslin* (EX1007), 3:36-44, 10:33-39.

212. A POSITA having *Cohen*, *Chu*, *Sherman*, and *Joslin* before him would have been motivated to combine various aspects of *Cohen*, *Chu*, *Sherman*, and *Joslin's* teachings. For example, a POSITA would have been motivated to modify *Cohen*, *Chu*, and *Sherman's* teachings of creating and sharing multimedia content creation with the processing, encoding, and publishing functionality of *Joslin* at least because *Joslin* teaches a particular methodology for implementing the sharing teachings of *Cohen*, *Chu*, and *Sherman* (*e.g.*, processing and encoding the file and sending it to a site for streaming) that a POSITA would have understood could have been directly incorporated (or otherwise used) into the combination of *Cohen*, *Chu*, and *Sherman*, either as a methodology for implementing one of the existing options (*e.g.*, one of the options of FIG. 5B) or as another option that could be listed in FIG. 5B to provide added functionality for *Cohen's* system. In combination, these teachings provide an improved system for

creating and publishing a multimedia file, characteristics a POSITA would have recognized as highly desirable by 2009-2010, as evidenced by *Cohen*, *Chu*, *Sherman*, and *Joslin's* teachings of content distribution, and the prior art discussed in §I.

213. Accordingly, in view of the teachings of *Cohen*, *Chu*, *Sherman*, and *Joslin* identified above and with regard to the specific claim elements below, a POSITA would have been motivated to provide a multimedia content generation and sharing system that utilizes the basic functionality of *Cohen*, the ability to add user-selected backgrounds and composite the backgrounds with a user-created video as taught by *Chu*, the background editing and electronic invitation creation functionality taught by *Sherman*, and the processing, encoding, and publishing functionality taught by *Joslin* to provide an improved combined multimedia creation and sharing system that provides additional editing functionality for a user, additional sharing options, and additional methodologies for creating sharable files.

214. Beyond the specific motivations to combine *Cohen*, *Chu*, *Sherman*, and *Joslin* provided by the references themselves, further support for such motivation can be found in a POSITA's general knowledge at the time, such as described by the references identified in §I. For example, a POSITA would have been well aware of teachings that adding additional compositing, editing, sharing,

and file creation methodologies were desirable in view of the references discussed in §I. *See*, *e.g.*, EX1009 (*Corset*) at ¶¶[0001]-[0005], EX1010 (*Relan*) at ¶¶[0004]-[0009] and [0018], EX1011 (*Gauseride*) at ¶¶[0004]-[0009], EX1012 (*Manico*) at ¶¶[0002]-[0008], EX1013 (*Gentile*) at ¶¶[0003]-[0008], EX1014 (Austerberry), *passim*, EX1015 (*YouTube*) at 1, 4, 23, 80, 82. Each of these references would have informed a POSITA's general understanding as of 2009-2010 that it was desirable to combine *Cohen*, *Chu*, *Sherman*, and *Joslin* as described herein.

215. Beyond the specific motivations to combine *Cohen*, *Chu*, *Sherman*, and *Joslin* provided by the references themselves and a POSITA's general understanding, a POSITA would have found it obvious to combine *Cohen*, *Chu*, *Sherman*, and *Joslin's* teachings, and would have had a reasonable expectation of success in doing so, at least because each reference is in the same technical field of multimedia content creation (the technical field of the '911 Patent) and each teaches similar techniques for creating multimedia content using existing content and a user video, and sharing it with others. A POSITA would have recognized that these similar known techniques: (i) would have been combined according to known methods to yield predictable results; (ii) would have been simply substituted for one another to obtain predictable results; (iii) would have been implemented in a resultant system to provide the respective improvements taught by *Cohen*, *Chu*, *Sherman*, and *Joslin*; and (iv) reflect a finite number of identified,

predictable solutions that would have been combined with a reasonable expectation of success, as described herein. For example, each of *Cohen*, *Chu*, *Sherman*, and *Joslin* teach various recording, compositing, previewing, sharing, publishing, and content playback functionality during a user's recording session, along with supporting hardware, software, and user interfaces, that a POSITA would have been motivated to use interchangeably in a resulting combination.

216. In other words, a POSITA would have also had a reasonable expectation of success in modifying *Cohen*, *Chu*, *Sherman*, and *Joslin*'s systems with each other's teachings because each reference is directed to very similar multimedia creation systems that provide similar features and functionality and have common components. For example, each of *Cohen*, *Chu*, *Sherman*, and *Joslin* use cameras and microphones to capture a user's performance, each use various processing devices to composite audio and video to create a new multimedia file, each provide some mechanism to select the underlying audio or video content a user is recording over, each provide some storage mechanism for selectable files and the user's created multimedia, and each provide some mechanism for distributing the user's performance. Thus, a POSITA would have been able to utilize the teachings of *Cohen*, *Chu*, *Sherman*, and *Joslin* interchangeably, including to improve aspects of the multimedia creation and distribution process taught by each.

217. Therefore, at the time of the alleged invention of the claims of the '911 patent, a POSITA would have been motivated to, and it would have been obvious to a POSITA having the teachings of *Cohen*, *Chu*, *Sherman*, and *Joslin* before him or her (along with the other knowledge explained above) to, combine the teachings of *Cohen*, *Chu*, *Sherman, and Joslin* as described above (and below) to provide an improved multimedia creation system, with a reasonable expectation that such combination would have been successful.

2. Independent Claim 1

218. It is my opinion that *Cohen* in view of *Chu*, *Sherman*, and *Joslin* renders the limitations of Claim 1 obvious.

[1a]	**A method for generating and sharing audio/video content to a social network, comprising:**

219. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1a], rendering it obvious.

220. I understand that a preamble generally does not state a claim limitation. However, to the extent it is considered a limitation in this instance, it is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1a], rendering it obvious. For example, *Cohen* teaches a method for generating and sharing audio/video content (*e.g.*, a user of *Cohen's* system creates multimedia content and saves the content for other users' access and use) to a social network (*e.g.*, *Cohen's* system is a multi-user network that allows users

access to shared multimedia content) for at least the reasons discussed in elements [1b]-[1s] below. *See also, e.g.,* EX1004 (*Cohen*) at ¶[0036] ("Embodiments of the present disclosure include systems and methods for web-based performance collaborations based on multimedia content sharing, for example, through an online interface.") and ¶[0037] ("In one aspect, the present disclosure relates to using an online social network for web-based musical collaborations and audio/multimedia content mixing."). In the context of the remaining teachings of *Cohen* discussed herein, a POSITA would have understood the collaborations and mixing to be audio/video content creation.

221. In addition to the above, each of *Chu*, *Sherman*, and *Joslin* also teaches element [1a], rendering it obvious, for at least the reasons discussed in elements [1b]-[1s] below. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* with any of *Chu*, *Sherman*, and *Joslin*. With respect to element [1a] (and the following elements [1b]-[1s]), for example, this is at least because each reference is in the same technical field of multimedia content creation (the technical field of the '911 Patent) and each teaches similar known techniques for creating multimedia content using existing content and a user video, and sharing it with others.

222. Further, methods for generating and sharing audio/video content to a social network were generally known by POSITAs by 2009-2010 (*see, e.g.*, §I).

Thus, to the extent this feature was somehow found not to be taught by *Cohen* (and/or *Chu*, *Sherman*, or *Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

223. Further, during prosecution of the '911 patent, PO identified particular paragraphs of the underlying '687 Application as supporting element [1a]:

> The claimed subject matter as recited in **independent claim 1** is drawn to a method for generating and sharing audio/video content to a social network. See, e.g., ¶¶ [0036], [0105]. The

EX1002 (*'911 Patent File History*), 53. The paragraphs cited for support are as follows:

> **[0036]** In one aspect, the present disclosure relates to using a network for generating audio and video content over a network.

> **[0105]** After the recording session, the user is presented with the options of previewing the recording with the selected pre-recorded composition, recording the audio/video content, and/or saving the mixed multimedia content. In one embodiment, when the user saves the recorded content and the recorded content is published. The recording (e.g., audio content, video content) can be saved upon user request, for example, when the user determines that the recording is satisfactory.

EX1002 (*'911 Patent File History*), 148, 165.

224. It appears that the portions of the '687 Application identified by PO above as providing written description for element [1a] were substantially copied from *Cohen* (EX1004) into the '687 Application as discussed above in §II.D. *See*, *e.g.*, the following paragraphs of *Cohen*:

[0039] In one aspect, the present disclosure relates to recording an audio track or video content over a network, in some instances, in real-time or in near real-time.

[0049] The recording (e.g., mixed audio track, acappela track, video content) can be saved upon user request, for example, when the user determines that the recording is satisfactory. In most instances, the recording user can optionally make the recording or the performance art piece generated from the recording accessible to other users. For example, other users can listen to the recorded track or view the video content/performance art piece via the web interface and provide comments and/or ratings.

[0140] After the recording session, the recording user is presented with the options of previewing the recording mixed with the selected multimedia content (e.g., a selected beat), re-recording the audio or video content, and/or saving the mixed multimedia content. In one embodiment, when the user saves the recorded content, the recorded content is published and listed as a challenge to the original content. Tracks that are challenges to one another may be displayed and indicated as such that users can browse different vocal expressions or physical gestures (e.g., rap, sing, etc.) recorded over the same beat or the same multimedia content. Perusing users can comment as well as rate the challenges.

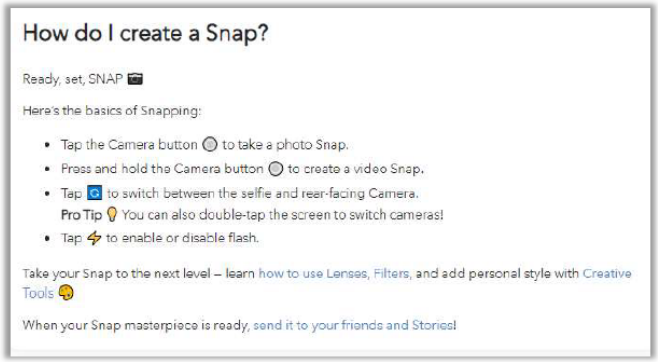
EX1004 (*Cohen*), ¶¶[0039], [0140].

225. More particularly, the following table compares *Cohen's* ¶¶[0039], [0049] and [0140] with the '687 Application's ¶¶[0036] and [0105]. The text in red is the same between the two documents.

EX1004 (*Cohen*), ¶¶[0039], [0140] [0049]	EX1002 (*'911 Patent File History*), 148 (¶[0036]), 165 (¶[0105])
[0039] "In one aspect, the present disclosure relates to recording an audio track or video content over a network, in some instances, in real-time or in near real-time."	[0036] "In one aspect, the present disclosure relates to using a network for generating audio and video content over a network."
[0140] "After the recording session, the recording user is presented with the options of previewing the recording mixed with the selected multimedia content (e.g., a selected beat), re-recording the audio or video content, and/or saving the mixed multimedia content. In one embodiment, when the user saves the recorded content, the recorded content is published and listed as a challenge to the original content …"	[0105] "After the recording session, the user is presented with the options of previewing the recording with the selected pre-recorded composition, recording the audio/video content, and/or saving the mixed multimedia content. In one embodiment, when the user saves the recorded content and the recorded content is published. ..."
[0049] "The recording (e.g., mixed audio track, acappela track, video content) can be saved upon user request, for example, when the user determines that the recording is satisfactory …."	[0105] "… The recording (e.g., audio content, video content) can be saved upon user request, for example, when the user determines that the recording is satisfactory."

226. Because PO asserted the portions of the '687 Application cited above provide support for element [1a], these substantially similar portions of *Cohen* must also teach element [1a], rendering it obvious.

227. Finally, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

A method for generating and sharing audio/video content to a social network, comprising;	***Whether or not the preamble is limiting, the Snapchat App implements a method for generating and sharing audio/video content to a social network. See, e.g.:***
	 (https://support.snapchat.com/en-US/article/capture-a-snap) (last visited January 9, 2023).

EX1038 (*Infringement Contentions*), 6-7.

228. Therefore, to the extent that element [1a] states a limitation, it is my opinion that element [1a] is taught by the combination of *Cohen*, *Chu*, *Sherman,* and *Joslin*.

[1b] initiating a content creation process in response to a request from a user;

229. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman, and Joslin* teaches element [1b], rendering it obvious.

230. Specifically, it is my opinion that element [1b] is rendered obvious by *Cohen* because *Cohen* teaches initiating a content creation process (*e.g.*, the multimedia content creation process described in elements [1c]-[1s]) in response to a request from a user (*e.g.*, a user requesting access to *Cohen's* system and/or

requesting user interfaces, such as those of FIGS. 4A, 4B). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0068], [0070], [0071], and [0092]-[0094], and FIGS. 1, 2, 4A, 4B.[6, 7]

231. In more detail, *Cohen* (EX1004) renders this element obvious because it teaches that the content creation process of elements [1c]-[1s] is begun (initiated)[8] by a user seeking access to *Cohen's* system, such as by logging in and/or requesting the display of user interfaces like those of FIGS. 4A, 4B. This functionality is provided by communications module 204, which manages communications with clients (EX1004 (*Cohen*) at ¶[0068]), including the management of "log-on requests received from one or more users browsing the web-based performance collaboration site" (EX1004 (*Cohen*) at ¶[0070]). The

[6] The citations to *Cohen*, *Chu*, *Sherman*, *Joslin, Lei* and any other background art provided for each element in my analysis herein are intended to be exemplary rather than exhaustive. The elements of the Challenged Claims include very basic multimedia content creation processes that are often taught throughout the identified references. I reserve the right to identify other teachings, or combinations of teachings, of the identified references in response to any position that PO may advance.

[7] Where I cite to particular paragraphs or passages of a reference referring to a figure of the reference, the citation should be understood to include the figure. Similarly, when I cite a particular figure of a reference, the citation should be understood to encompass any passages or paragraphs of the reference relating to the figure.

[8] The ordinary meaning of initiate is, for example: (i) "to begin or initiate" (EX1039; *Collins*); (ii) "to begin, set going, or originate" (EX1040; *Webster's*); (iii) "cause (a process or action) to begin" (EX1041; *Oxford*); (iv) "to set going by taking the first step" (EX1042; *American Heritage*); (v) "to begin, or otherwise set an operation or process in motion" (EX1044; *Wiley*). As there does not appear to be any special meaning attached to "initiate" in the '911 patent, a POSITA would have understood the ordinary meaning applies.

interfaces themselves are provided by *Cohen's* user interface module 214, which "identifies user requests" and provides user interfaces such as FIGS. 4A, 4B. EX1004 (*Cohen*) at ¶¶[0092]-[0094]. *See also* EX1004 (*Cohen*) at ¶[0164]. And *Cohen* teaches that "the communications module 204 may have access rights to peripheral devices on a session-by-session basis or for a predetermined duration of time, as specified by a user " (EX1004 (*Cohen*) at ¶[0071]), reinforcing that users have to request access to the system to initiate the content creation process.[9]

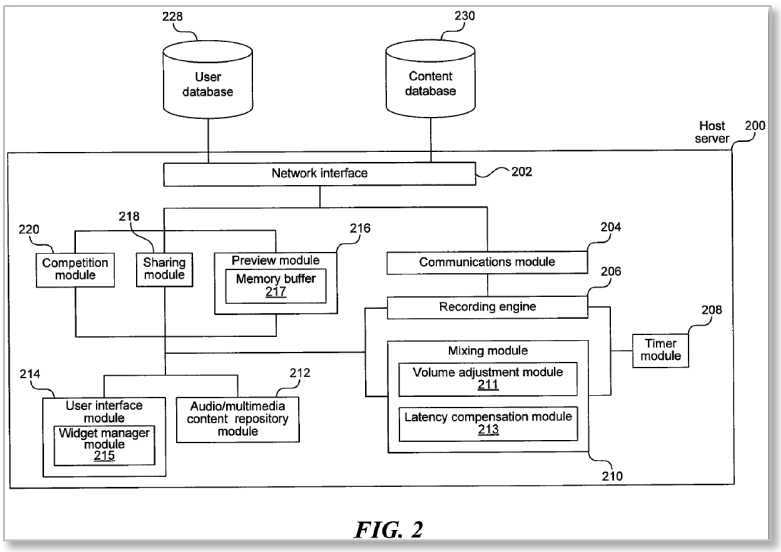


FIG. 2

232. As discussed above, PO argued during prosecution (in an appeal brief) that the Examiner had not shown that *Cohen* teaches element [1b] as follows:

[9] As discussed above, to the extent I identify teachings of different embodiments of *Cohen* here, and for the remaining elements, *Cohen* expressly teaches that its embodiments may be combined with each other. *See*, *e.g.*, EX1004 (*Cohen*), ¶[0217] ("[t]he elements and acts of the various embodiments described above can be combined to provide further embodiments"). Thus, a POSITA would have a suggestion and motivation to combine these embodiments and would have considered it obvious to do so.

> Though Paragraph [0164]—that cited by the Examiner—discloses a video recording process, it does so *outside* the context of simultaneous aural playback of a selected audio composition during the video recording. Cohen, [0164], Figure 7; *see* [0163]–[0171]. Indeed, in the context of video, Cohen purposes such videos for visual playback during *audio* recording, rather than as the product of audio playback during *video* recording. *See* Cohen [0095]. Thus, Cohen does *not* disclose "initiating a content creation process in response to a request from a user," as claimed by the Applicant. None of the cited references, either alone or in combination, disclose this element.

EX1002 (*'911 Patent File History*), 57.

233. PO's appeal brief argument is wrong. PO's argument seems to be that *Cohen* does not teach a "content creation process" and therefore cannot teach "initiating a content creation process." But *Cohen* does teach a "content creation process" for at least the reasons I explain in elements [1c]-[1s] below (including in the context of simultaneous aural playback as explained in element [1i]). The distinction PO tries to make, that *Cohen's* videos are only for playback during audio recording,[10] is simply baseless. *Cohen* expressly teaches audio ***and*** video recording during audio playback (*see*, *e.g.*, elements [1i] and [1j], below). And, as discussed above, *Cohen* teaches "initiating a content creation process in response to a request from a user." That is all that is required by element [1b].

234. Moreover, even if *Cohen* was deficient in any regard (it is not), *Chu* also teaches the features of element [1b] because *Chu* teaches initiating a content

[10] Moreover, PO did not explain in its briefing why "content creation process" should be limited in the manner it proposes.

creation process (*e.g.*, the multimedia content creation process described in elements [1c]-[1s]) in response to a request from a user (*e.g.*, a user entering *Chu's* booth and interacting with start screen 100 to begin the karaoke performance process). *See*, *e.g.*, EX1005 (*Chu*) at 2:49-54, 11:21-36 ("Upon entering karaoke recording studio booth 10 the booth occupant 21 is presented with a start screen 100," which "contains initial instructions to the booth occupant 21"), 8:63-9:7 (keyboard 66 for booth occupant to communicate with the system).

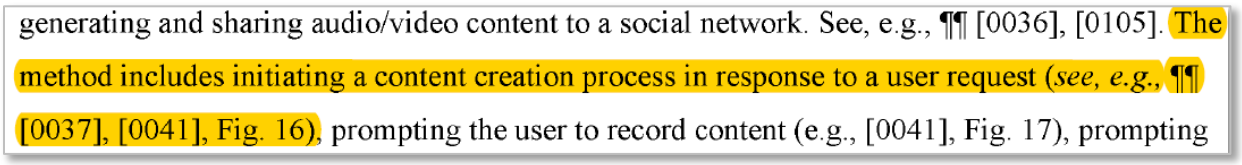
235. Alternatively and additionally, *Sherman* also teaches the features of element [1b]. Specifically, *Sherman* teaches initiating a content creation process (*e.g.*, the movie clip creation process described in elements [1c]-[1s]) in response to a request from a user (*e.g.*, a user opening *Sherman's* software application, accessing *Sherman's* system, and/or navigating to the user interface shown in FIG. 2). *See*, *e.g.*, EX1006 (*Sherman*) at ¶[0013] ("the computer 20 will also run the software that enables the various functions of the system of the present invention"), ¶[0014] ("The software may operate by displaying successive screens to the user on the computer monitor 40").

236. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Joslin*) in view of *Chu* and/or *Sherman*. For example, this is because each of *Cohen*, *Chu*, *Sherman*, and *Joslin* is in the same technical field of multimedia content creation (the technical field of the '911

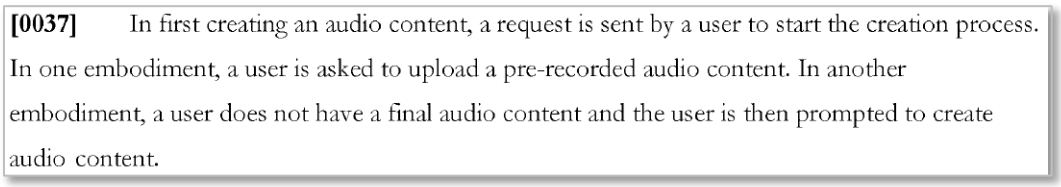
Patent) and teaches various user interfaces, lists, buttons, and prompts to facilitate their processes, which a POSITA would have recognized as similar known techniques that he or she would have been motivated to use interchangeably in a resulting combination.

237. Further, initiating a content creation process in response to a request from a user was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.B). Thus, to the extent this feature was somehow found not to be taught by *Cohen*, *Chu*, or *Sherman* (or *Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

238. Still further, during prosecution of the '911 patent, PO identified the following parts of the underlying '687 Application as supporting element [1b]:


generating and sharing audio/video content to a social network. See, e.g., ¶¶ [0036], [0105]. The method includes initiating a content creation process in response to a user request (*see, e.g.*, ¶¶ [0037], [0041], Fig. 16), prompting the user to record content (e.g., [0041], Fig. 17), prompting

EX1002 (*'911 Patent File History*), 53. The cited portions are as follows:


[0037] In first creating an audio content, a request is sent by a user to start the creation process. In one embodiment, a user is asked to upload a pre-recorded audio content. In another embodiment, a user does not have a final audio content and the user is then prompted to create audio content.

[0041] The recording session of an audio or video recording, or a combination thereof, can be initiated via the user interface, by clicking a button on the audio recorder/player for example. Before the recording session begins, playback of an audio recording or a video recording is typically stopped if playback is currently occurring. Once playback has paused/stopped, the user is provided with a countdown indicator to the initiation of the recording session. At the initiation of the recording session, the composition, prerecorded composition or video recording is playing. When the recording session has ended (e.g., by user request), the recording user has the option of previewing the recorded content. If the user recorded over a pre-recorded composition or pre-recorded video recording, the user can listen to or view the results of the audio and video synchronization.

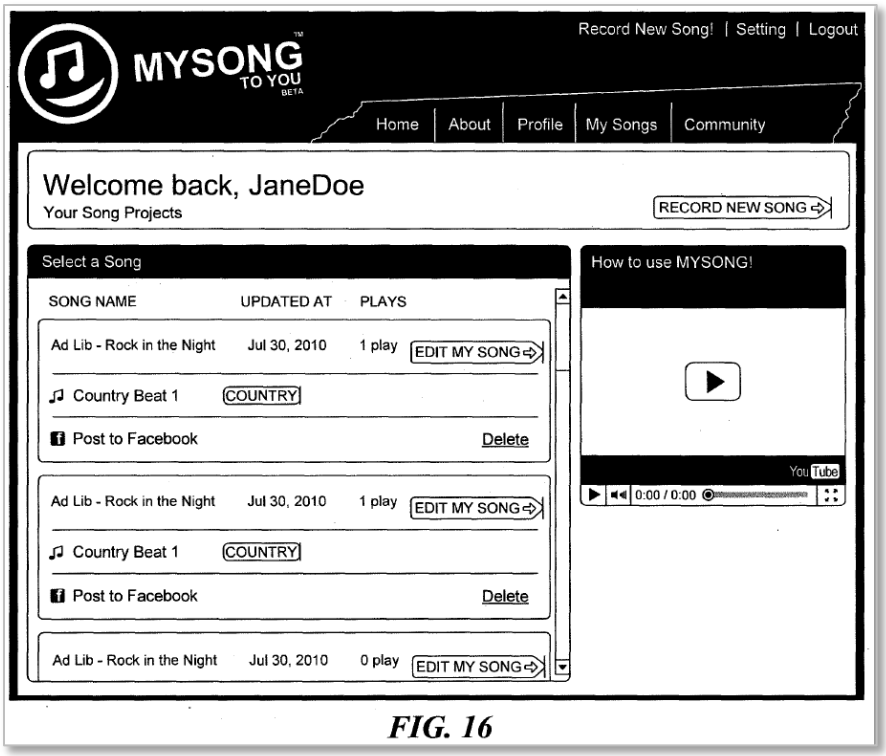


FIG. 16

EX1002 (*'911 Patent File History*), 148, 149, 191.

239. It appears that the portions of the '687 Application identified by PO above as providing written description for element [1b] were substantially copied from *Cohen* (EX1004) into the '687 Application as discussed above in §II.D. *See*, *e.g.*, the following paragraph of *Cohen*:

[0048] A recording session of audio, video, or a combination thereof, can also be initiated via the user interface by clicking a button on the audio player/recorder widget, for example. Before the recording session begins, typically playback of an audio track or video is stopped if playback is currently occurring. Once playback is paused/stopped, the user is provided with a countdown indicator to the initiation of the recording session. At the initiation of the recording session, the audio track or video content to which the recording user is recording over is played. No track is played during the recording session, in the situation when the user is not recording over another track or other multimedia content. When the recording session has ended, for example, by user request, the recording user has the option of previewing the recorded content. If the user recorded over another piece of multimedia content, the user can listen to or view the results of the multimedia mixing.

EX1004 (*Cohen*), ¶[0048].

240. More particularly, the following table compares *Cohen's* ¶[0048] with the '687 Application's ¶¶[0037] and [0041]. The text in red is the same between the two documents. The text in blue indicates the concepts are the same between the two documents.

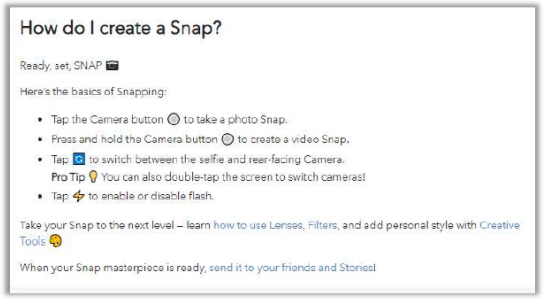
EX1004 (*Cohen*), ¶[0048]	EX1002 (*'911 Patent File History*), 149 (¶[0041])
[0048] "A recording session of audio, video, or a combination thereof, can also be initiated via the user interface by clicking a button on the audio player/recorder widget, for example. Before the recording session begins, typically playback of an audio track or video is stopped if playback is currently occurring. Once playback is paused/stopped, the user is provided with a countdown indicator to the initiation of the recording session. At the initiation of the recording session, the audio track or video content to which the recording user is recording over is played. No track is played during the recording session, in the situation when the user is not recording over another track or other multimedia content. When the recording session has ended, for example, by user request, the recording user has the option of previewing the recorded content. If the user recorded over another piece of multimedia content, the user can listen to or view the results of the multimedia mixing."	[0041] "The recording session of an audio or video recording, or a combination thereof, can be initiated via the user interface, by clicking a button on the audio recorder/player for example. Before the recording session begins, playback of an audio recording or a video recording is typically stopped if playback is currently occurring. Once playback has paused/stopped, the user is provided with a countdown indicator to the initiation of the recording session. At the initiation of the recording session, the composition, prerecorded composition or video recording is playing. When the recording session has ended (e.g., by user request), the recording user has the option of previewing the recorded content. If the user recorded over a pre-recorded composition or pre-recorded video recording, the user can listen to or view the results of the audio and video synchronization."

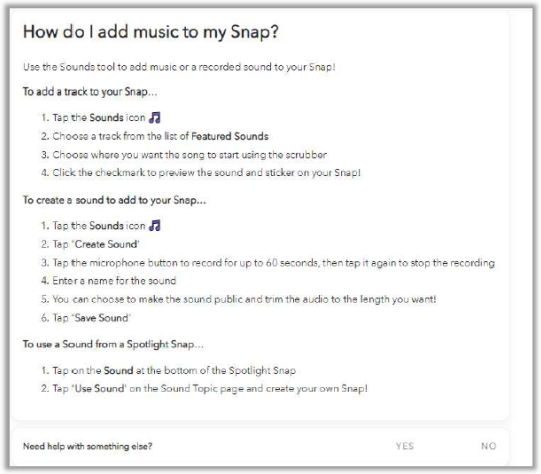
241. The concepts of ¶[0037] of the '687 Application also appear to be taken from *Cohen*, such as from ¶[0070].

242. Because PO asserted the portions of the '687 Application cited above provide support for element [1b], the similar portions of *Cohen* must also teach element [1b], rendering it obvious.

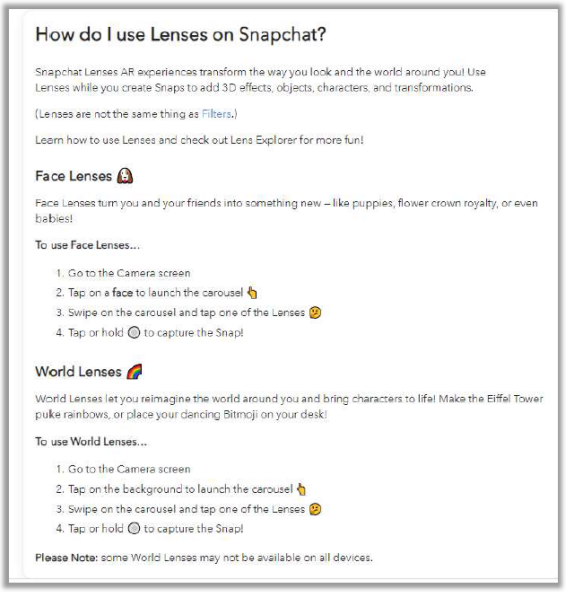
243. Finally, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

<table>
<tr><td>initiating a content creation process in response to a request from a user:</td><td>The Snapchat App initiates a content creation process in response to a request from a user, as shown below.

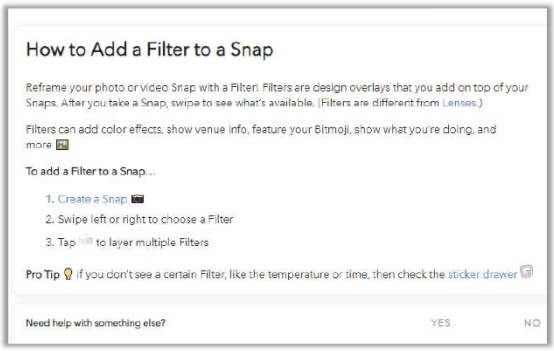
The Snapchat App presents a user with an interface that initiates a content creation process in response to a request from the user by prompting the user to begin recording, select audio compositions, and apply filters and backgrounds.</td></tr>
<tr><td></td><td>  </td></tr>
<tr><td></td><td> 
(https://support.snapchat.com/en-US/article/capture-a-snap) (last visited January 9, 2023).</td></tr>
</table>



(https://support.snapchat.com/en-US/article/add-music) (last visited January 9, 2023).



(https://support.snapchat.com/en-US/a/face-world-lenses) (last visited January 9, 2023).



(https://support.snapchat.com/en-US/a/geofilters) (last visited January 9, 2023).

EX1038 (*Infringement Contentions*) at 7-12.

244. Therefore, it is my opinion that element [1b] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[1c] prompting the user to record content;

245. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1c], rendering it obvious.

246. Specifically, it is my opinion that element [1c] is rendered obvious by *Cohen* because *Cohen* teaches prompting the user to record content (*e.g.*, when a user receives access to *Cohen's* system, he is prompted by the system to record content by the system sending and the user receiving and viewing user interfaces that have interactive elements soliciting and providing the mechanisms allowing the user to record content, such as those of FIGS. 4A, 4B). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0068], [0092]-[0094], [0127], [0128], and [0131], and FIGS. 1, 2, 4A, and 4B.

247. In more detail, *Cohen* (EX1004) teaches that, after a user has gained access to the *Cohen* system (*see* element [1b]), user interfaces like those of FIGS. 4A, 4B (*see* below) are provided to the user (via user interface module 214), which

provide various solicitations and mechanisms (*e.g.*, prompting)[11] to facilitate the user's recording of content. These user interfaces display information to the user on the user's screen indicating that the system is ready for user input to record content. For example, *Cohen* teaches that user interface 400 of FIG. 4A "includes a number of selectable tabs allowing the user to select to view a listing of track entries (e.g., tab 402), beat entries (e.g., tab 404), or video entries (e.g., tab 409). The record tab 406 and the upload tab 408 are also selectable for a user to record or upload multimedia content including audio or video content." EX1004 (*Cohen*) at ¶[0128]. The tabs allowing users to select listings of tracks, beats, or video as part of the process to record content (described in more detail in elements [1d]-[1j]) are prompts to record content, as they indicate that the program is awaiting input and solicit user participation in the recording process. In other words, a POSITA would have recognized the tabs as being part of *Cohen's* recording process that the user

[11] The ordinary meaning of prompt is, for example: (i) "to urge (someone to do something)" (EX1039; *Collins*); (ii) "to induce (someone) to action" (EX1040; *Webster's*); (iii) "cause (someone) to ta course of action" (EX1041; *Oxford*); (iv) "to move to act; spur; incite" (EX1042; *American Heritage*); (v) "1. In command-driven systems, one or more symbols that indicate where users are to enter commands … 2. Displayed text indicating that a computer program is waiting for input from the user" (EX1043; *Microsoft*); (vi) "a symbol or message which is displayed on a monitor, especially that of a computer, indicating that input is awaited, and when provided will be entered there" (EX1044; *Wiley*); and (vii) "a message or character displayed to remind the user that an input is expected" (EX1045; *Collins*). As there does not appear to be any special meaning attached to "prompt" in the '911 patent, a POSITA would have understood the ordinary meaning applies.

would click on to proceed, which is a solicitation and mechanism to proceed with *Cohen's* recording process. Nothing else is required by "prompt" in this element.

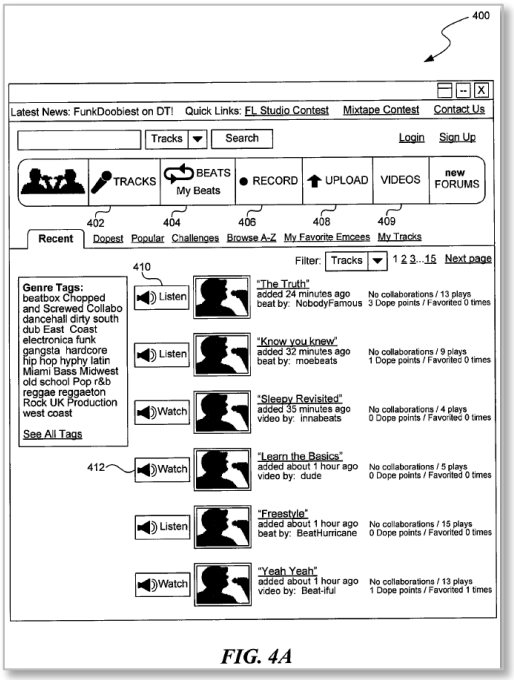


FIG. 4A

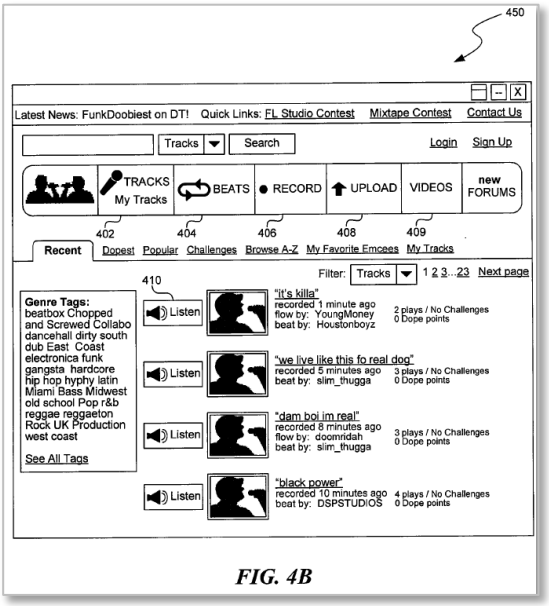


FIG. 4B

248. Further, the record tab 406 is a direct prompt for the user to record content. User interface module 214 generates the user interfaces of *Cohen*, such as those of FIGS. 4A and 4B. EX1004 (*Cohen*) at ¶¶[0092]-[0093]. *See also* EX1004 (*Cohen*) at ¶[0094] ("user interface module 214 identifies user requests and displays a listing of beats, tracks, and/or video content" as shown in FIGS. 4A and 4B), ¶[0127], ¶[0131], and ¶[0133].

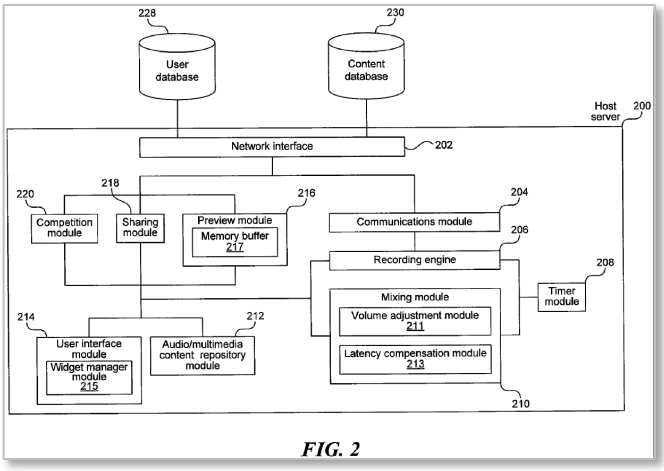
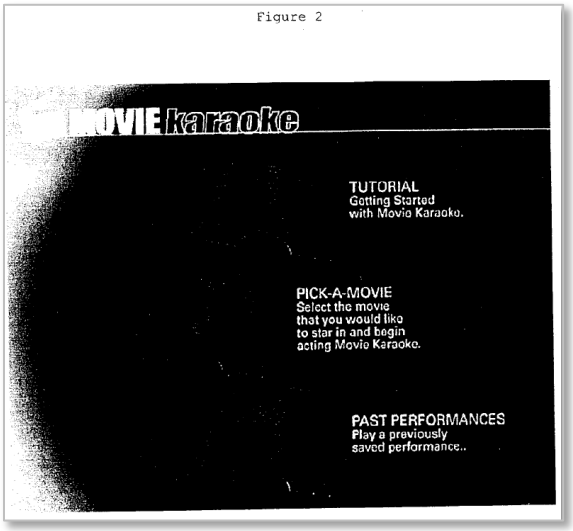


FIG. 2

Additionally, *Cohen's* FIG. 4A embodiment includes, for example, a contest link. This is also a prompt to record content.

249. Moreover, even if *Cohen* was deficient in any regard (it is not), *Sherman* also teaches the features of element [1c] because *Sherman* teaches prompting the user to record content (*e.g.*, *Sherman's* software includes an initial screen that prompts a user to pick a movie to begin its "Movie Karaoke" process as shown in FIG. 2). *See*, *e.g.*, EX1006 (*Sherman*) at ¶[0014] ("The software may operate by displaying successive screens to the user on the computer monitor 40, wherein each screen contains a number of different choices among which the user must select one. Thus, in one preferred embodiment as illustrated by FIG. 2, an initial screen will present the user with the option of selecting a movie for a new recording, playing a previously recorded performance, or reviewing help topics."), and FIG. 2.



250. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Chu* and *Joslin*) in view of *Sherman*. For example, this is because each of *Cohen*, *Chu*, *Sherman*, and *Joslin* is in the same technical field of multimedia content creation (the technical field of the '911

Patent) and teaches various user interfaces, lists, buttons, and prompts to facilitate their processes, which a POSITA would have recognized as similar known techniques that he would have been motivated to use interchangeably in a resulting combination.

251. Further, prompting a user to record content was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.B). Thus, to the extent this feature was somehow found not to be taught by *Cohen* or *Sherman* (or *Chu* or *Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

252. Further, during prosecution of the '911 patent, PO identified the following parts of the underlying '687 Application as supporting element [1c]:

> [0037], [0041], Fig. 16), prompting the user to record content (e.g., [0041], Fig. 17), prompting

EX1002 (*'911 Patent File History*), 53. The cited paragraph 41 and FIG. 16 are as follows:

> **[0041]** The recording session of an audio or video recording, or a combination thereof, can be initiated via the user interface, by clicking a button on the audio recorder/player for example. Before the recording session begins, playback of an audio recording or a video recording is typically stopped if playback is currently occurring. Once playback has paused/stopped, the user is provided with a countdown indicator to the initiation of the recording session. At the initiation of the recording session, the composition, prerecorded composition or video recording is playing. When the recording session has ended (e.g., by user request), the recording user has the option of previewing the recorded content. If the user recorded over a pre-recorded composition or pre-recorded video recording, the user can listen to or view the results of the audio and video synchronization.

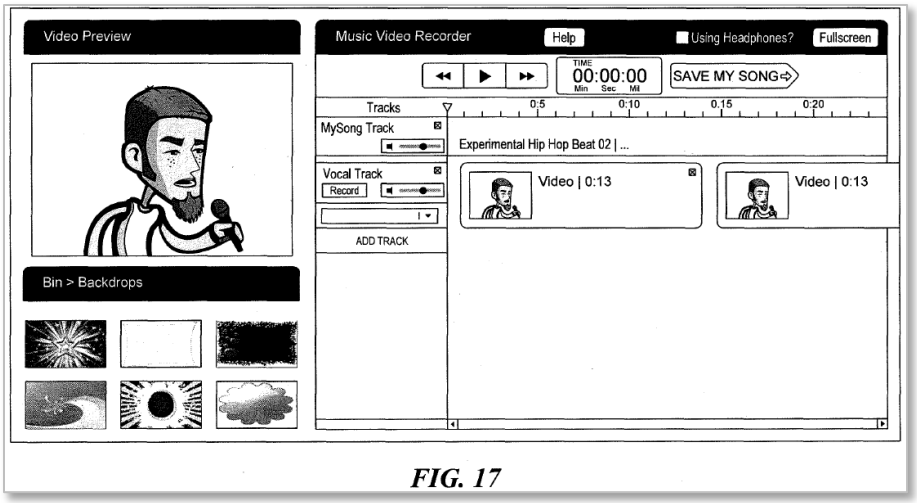


FIG. 17

EX1002 (*'911 Patent File History*), 149, 192.

253. It appears that the portions of the '687 Application identified by PO above as providing written description for element 1[c] were substantially copied from *Cohen* into the '687 Application as discussed above in §II.D. *See*, *e.g.*, the following paragraph of *Cohen*:

> **[0048]** A recording session of audio, video, or a combination thereof, can also be initiated via the user interface by clicking a button on the audio player/recorder widget, for example. Before the recording session begins, typically playback of an audio track or video is stopped if playback is currently occurring. Once playback is paused/stopped, the user is provided with a countdown indicator to the initiation of the recording session. At the initiation of the recording session, the audio track or video content to which the recording user is recording over is played. No track is played during the recording session, in the situation when the user is not recording over another track or other multimedia content. When the recording session has ended, for example, by user request, the recording user has the option of previewing the recorded content. If the user recorded over another piece of multimedia content, the user can listen to or view the results of the multimedia mixing.

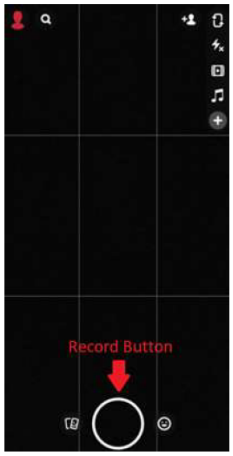
EX1004 (*Cohen*), ¶[0048].

254. More particularly, the following table compares *Cohen's* ¶[0048] with the '687 Application's ¶[0041]. The text in red is the same between the two documents. The text in blue indicates the concepts are the same between the two documents.

EX1004 (*Cohen*), ¶[0048]	**EX1002 (*'911 Patent File History*), 149 (¶[0041])**
[0048] "A recording session of audio, video, or a combination thereof, can also be initiated via the user interface by clicking a button on the audio player/recorder widget, for example. Before the recording session begins, typically playback of an audio track or video is stopped if playback is currently occurring. Once playback is paused/stopped, the user is provided with a countdown indicator to the initiation of the recording session. At the initiation of the recording session, the audio track or video content to which the recording user is recording over is played. No track is played during the recording session, in the situation when the user is not recording over another track or other multimedia content. When the recording session has ended, for example, by user request, the recording user has the option of previewing the recorded content. If the user recorded over another piece of multimedia content, the user can listen to or view the results of the multimedia mixing."	[0041] "The recording session of an audio or video recording, or a combination thereof, can be initiated via the user interface, by clicking a button on the audio recorder/player for example. Before the recording session begins, playback of an audio recording or a video recording is typically stopped if playback is currently occurring. Once playback has paused/stopped, the user is provided with a countdown indicator to the initiation of the recording session. At the initiation of the recording session, the composition, prerecorded composition or video recording is playing. When the recording session has ended (e.g., by user request), the recording user has the option of previewing the recorded content. If the user recorded over a pre-recorded composition or pre-recorded video recording, the user can listen to or view the results of the audio and video synchronization."

255. Because PO asserted the portions of the '687 Application cited above provide support for element [1c], the similar portions of *Cohen* must also teach element [1c], rendering it obvious.

256. Still further, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

prompting the user to record content;	***The Snapchat App prompts the user to record content, as shown below.***
	The Snapchat App prompts the user to record content. When the Snapchat App is opened, the Snapchat App presents the user with a record button. 

EX1038 (*Infringement Contentions*) at 12-13.

257. PO appears to assert that element 1[c] is met by the Record Button in the accused Snapchat application. To the extent PO argues that the "prompt" of this element is the record button itself, that element is also taught by *Cohen* for at least the reasons I explain with respect to element [1e], below.

258. Finally, as discussed above in §V.C, Snap and PO have served Preliminary Proposed Claim Constructions in the related District Court case. EXS

1051, 1052. It is my opinion that element [1c] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* regardless of which Party's construction(s) is utilized. For example, Snap has proposed that the meaning of [1c] is "initiating, by the server, display of a prompt for the user to record content." EX1051, 3. This comports with my analysis in §V.A that a POSITA would have understood that the elements of the Challenged Claims are performed on the server side. Snap's construction is taught for at least the reasons above. For example, *Cohen* expressly teaches that user interface module 214 on the server generates the user interfaces of *Cohen* that provide the prompting described above. PO has proposed that the meaning of [1c] is "encouraging the user, through a user interface, to record audio/video content by presenting a "record" button." EX1052, 6-7. This is also taught for at least the reasons above and in [1e]. For example, the solicitations and mechanisms to facilitate recording of *Cohen* and *Sherman* discussed above teach encouragement of a user through a user interface to record content, and presenting a record button to the user as part of such solicitations and encouragement is taught by *Cohen* and *Sherman* for at least the reasons discussed in [1e] (either through successive user interface screens or simply by the presentation of the record button as PO seems to argue).

259. Therefore, it is my opinion that element [1c] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[1d] prompting the user to select an audio composition from a list of compositions retrieved from a host server;

260. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1d], rendering it obvious.

261. Specifically, it is my opinion that limitation [1d] is rendered obvious by *Cohen* because *Cohen* teaches prompting the user (*e.g.*, by providing an interactive web page such as shown in FIGS. 4A, 4B, including user-selectable category tabs, by way of user interface module 214 of FIG. 2) to select an audio composition from a list of compositions (*e.g.*, the user is prompted to select multimedia content from a list of multimedia content as shown in FIGS. 4A, 4B, provided by user interface module 214 of FIG. 2) retrieved from a host server (*e.g.*, the list of multimedia content, and the multimedia content itself, is retrieved from content database 230 and/or audio/multimedia repository module 212 via user interface module 214 shown in FIGS. 2 and 3B). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0046], [0090]-[0091], [0093], [0094], [0123]-[0129], [0131]-[0133], [0156] [0169]. [0188], [0191], [0195], [0196], and [0206], and FIGS. 1, 2, 3A, 3B, 4A, and 4B.

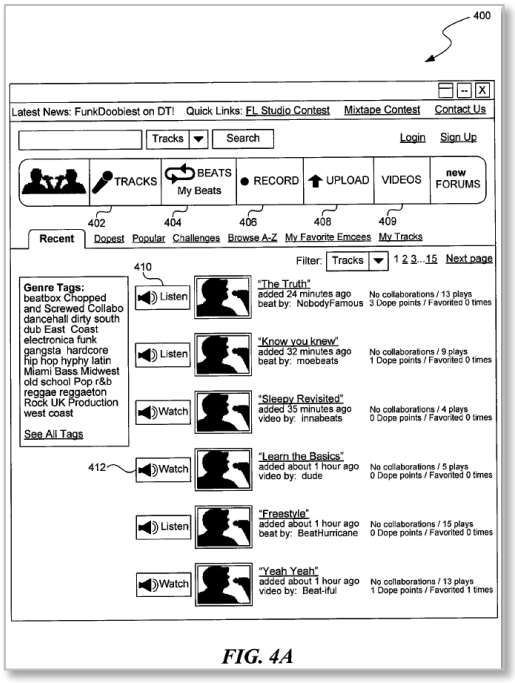


FIG. 4A

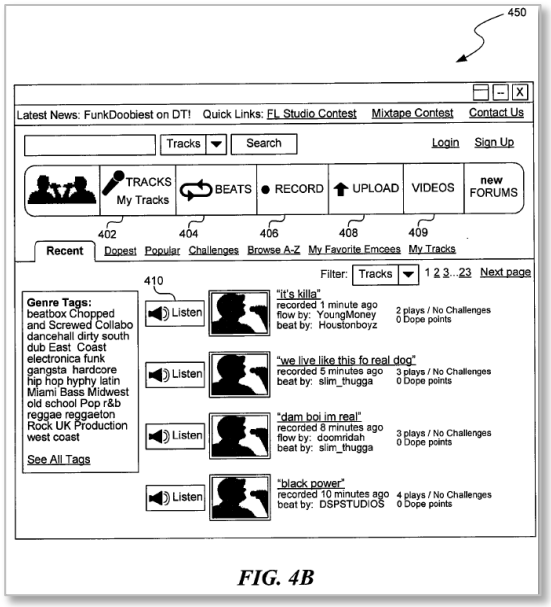


FIG. 4B

262. In more detail, *Cohen* (EX1004) teaches providing, via user interface module 214 located at the server side, user interfaces (such as web pages, applications, or widgets like those shown in FIGS. 4A and 4B) that prompt a user (through the display of the user interface to a user at client 102A-102N) to select multimedia content (including audio and/or video compositions) from lists of such multimedia content (such as the list of tracks shown in FIG. 4A or 4B) that are retrieved from a server (such as by user interface module 214 providing the lists of FIGS. 4A, 4B by communicating with content database 230 and displaying in FIGS. 4A, 4B the available multimedia).

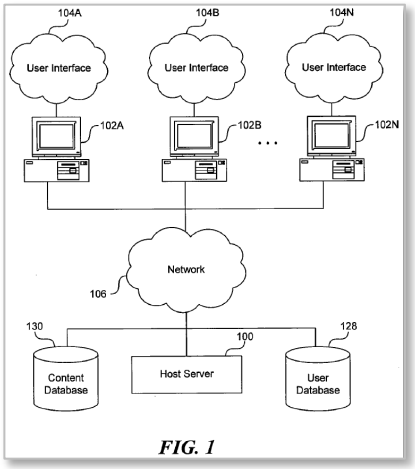


FIG. 1

See, *e.g.*, EX1004 (*Cohen*) at ¶[0046] ("users can browse listings of audio tracks or

videos on the website provided by other users"), ¶[0094] ("user interface module 214 identifies user requests and displays a listing of beats, tracks, and/or video content. The user request can be generated by an action indicating whether the user wishes to browse through beats, tracks, or video content, for example, via clicking on a tab associated with beats, tracks, or video content. The user interfaces showing listings of beats, tracks, or video content tracks are illustrated with further reference to FIGS. 4A-B, respectively"), ¶¶[0090]-[0091] (server 200 includes audio/multimedia repository module 212 that stores user content (e.g., user generated and/or user provided audio/video/image content), ¶[0093] (user interface module 214 provides user interfaces such as shown in FIGS. 4-6, including the lists of FIGS. 4A and 4B), ¶¶[0123]-[0126] (content database 230/330 stores multimedia content), ¶[0169] (multimedia content is saved in system database to be accessible by user and others via a web interface according to privacy settings), ¶[0127] ("FIG. 4A illustrates an example user interface 400 of a listing of recently added tracks, according to one embodiment"), ¶[0128] ("user interface 400 includes a number of selectable tabs

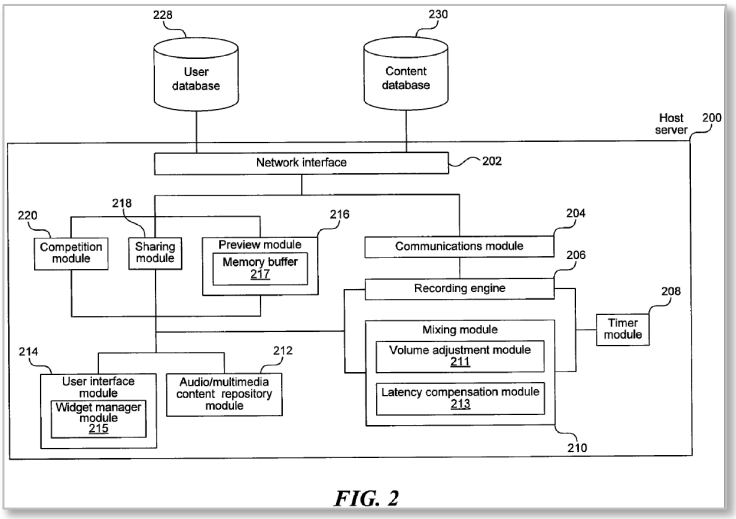


FIG. 2

allowing the user to select to view a listing of track entries (e.g., tab 402), beat entries (e.g., tab 404), or video entries (e.g., tab 409). … User interface 400 is a listing of beat entries when the beats tab 404 is selected. The listing includes multiple beats based on the applied filter (e.g., last 24 hours, last week, last month, etc.) selected."). *See also* EX1004 (*Cohen*) at ¶[0129], [0131]-[0133], [0156] ("user interface of screenshot 630 includes a sub-browser (e.g., beats browser) having a listing of entries associated with beats (or rhythms, melodies)"), [0188], [0191], [0195], [0196], and [0206]. A POSITA would have understood the display of a selectable list in *Cohen* to be a prompt to the user to select from that list, as that is the purpose of providing the selectable list.

263. Additionally, a POSITA would have understood that the various modules of *Cohen's* host server 200 could have been implemented in one server or multiple servers, as well-known in the art and specifically taught by *Cohen*. *See, e.g.*, EX1004 (*Cohen*) at ¶[0117] ("the components of the host server 200 are a functional unit that may be divided over multiple computers and/or processing units. Furthermore, the functions represented by the devices can be implemented individually or in any combination thereof, in hardware, software, or a combination of hardware and software. Different and additional hardware modules and/or software agents may be included in the host server 200 without deviating from the spirit of the disclosure.") and ¶[0116] ("The host server 200 can be

implemented using one or more processing units, such as server computers, UNIX workstations, personal computers, and/or other types of computes and processing devices. … For example, the components of the host server may be implemented on a single computer, multiple computers, and/or in a distributed fashion.") Thus, a POSITA would have considered such elements as content database 230 and audio/multimedia repository module 212 described above to be implementable on a single server together with other modules or separate servers individually. Thus, a POSITA would have understood content database 230 (or other content storage in *Cohen*) may be implemented singly as its own "host server," which would also satisfy this element.[12] *See also* element [1n].

264. Moreover, even if *Cohen* was deficient in any regard (it is not), *Chu* also teaches the features of element [1d] because *Chu* teaches prompting the user (*e.g.*, by central processing unit providing categories of music to the customer 21 by way of viewing screen 28) to select an audio composition from a list of compositions (*e.g.*, the user is prompted to select a category and is then presented with a listing of song titles on the viewing screen) retrieved from a host server (*e.g.*, the list of multimedia content, and the multimedia content itself, is presented by central processing unit 76 and retrieved from laser disc 70). *See*, *e.g.*, EX1005

[12] This analysis would also apply to the remaining elements of the Challenged Claims to the extent PO seeks to differentiate any of the remaining claim elements based on a particular server or module performing the claimed functionality.

(*Chu*), 12:34-48 ("[O]nce the central processing unit 76 has verified that the correct amount of money has been received the message to the customer 21 that is displayed on the viewing screen 28 also includes different categories of music, such as rock music, traditional music, oldies, country music, and possibly other categories. The customer 21, through an appropriate selection on the keyboard 66, may select any one of these categories. The central processing unit 76 thereupon proceeds to present the customer 21 with a listing of [titles] within the selected category. The customer 21 may scroll through this list using the arrow keys on the keyboard 66 until an available selection has been highlighted. The customer 21 thereupon makes his or her selection [by] pressing the enter key on the keyboard 66"), 3:59-4:2 ("In preparing for the recording session the user selects from among various alternatives an audio sound track to be played"), 5:1-16 (the system includes "an audio selection karaoke storage device for electronically storing a plurality of alternatively selectable karaoke musical compositions"), 9:8-17 ("the system includes an audio selection storage means in the form of a laser disc 70 permanently mounted in the equipment enclosure 26"), 9:18-25 ("The laser disc 70 electronically stores a plurality of alternatively selectable musical compositions that include both lyrics and music"), and 9:26-45 ("central processing unit 76 is programmed to provide a means for transmitting to the video display monitor 42 indicia of the different selectable music compositions that are stored in the audio

selection storage laser disc 70. The central processing unit 76 also is programmed to form a means responsive to the occupant input selection keyboard 66 for providing signals to the audio selection storage laser disc 70 for selecting a single one of the selectable karaoke music compositions stored on the laser disc 70").

265. While *Chu* teaches that its audio compositions and list are retrieved by central processing unit 76 and storage laser disc 70 that are part of *Chu's* karaoke booth, a POSITA would have found it obvious to arrange the central processing unit 76 and storage laser disc 70 (or similar storage means) in a "host server" configuration as taught by *Cohen* (*e.g.*, in an adjacent room or remote location), as that was considered equivalent structure at the time of *Chu*, and certainly by 2009-2010 (and *Chu* teaches (at 17:55-58) that "numerous variations and modifications of the invention will become readily apparent to those familiar with karaoke juke boxes and recording equipment"). Similarly, while *Sherman* teaches its software is provided on computer 20, a POSITA would have found it obvious to arrange the software on a "host server" as taught by *Cohen*. In both cases, a POSITA would have considered it obvious to provide the functionality on the server-side for at least the reasons discussed above in §V.A. Indeed, many of the references discussed in §I teach providing networked systems including server-based storage of multimedia used to create new multimedia.

266. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Sherman* and/or *Joslin*) in view of *Chu*. For example, this is because each of *Cohen*, *Chu*, *Sherman*, and *Joslin* is in the same technical field of multimedia content creation (the technical field of the '911 Patent) and teaches various user interfaces, lists, buttons, and prompts to facilitate their processes, which a POSITA would have recognized as similar known techniques that he would have been motivated to use interchangeably in a resulting combination.

267. Further, prompting a user to select an audio composition from a list of compositions retrieved from a host server was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.C). Thus, to the extent this feature was somehow found not to be taught by *Cohen* or *Chu* (and/or *Sherman* or *Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

268. Still further, during prosecution of the '911 patent, PO identified the following parts of the underlying '687 Application as supporting element [1d]:

> [0037], [0041], Fig. 16), prompting the user to record content (e.g., [0041], Fig. 17), prompting the user to select an audio composition from a list of compositions retrieved from a host server (e.g., ¶ [0038], [0081], Fig. 3, Fig. 4, Fig. 16), and presenting the user with a record button (e.g.,

EX1002 (*'911 Patent File History*), 53. The cited portions are as follows:

[0038] The user must select from a list of compositions (e.g., pre-recorded beats, rhythms, scores). The composition may be a retrieved from a library of compositions, provided (e.g., recorded) by another member on the network. In one embodiment, the process of selecting a composition allows the user to view a list of compositions and to preview the sound of each pre-recorded composition.

[0081] The user interface module **204,** in some embodiments presents a page view for the selected listing, with further reference to **FIG. 3-4,** and detects selection of an audio content, a composition, a beat, and/or video through the listing entries, with further reference to **FIG. 5.** The page view allows the user to further view detailed information regarding the selected multimedia content. The page view may further allow the user to request playback of the multimedia content. The user interface module **204** can adjust the functions and services available through the page view user interface, for example, dependent on whether the page view is for audio content, a composition, a beat, or a video recording.

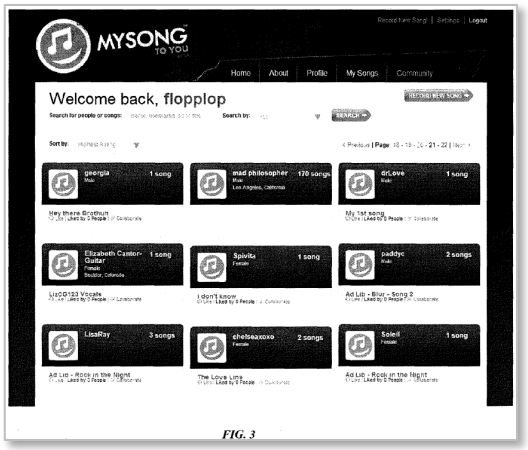


FIG. 3

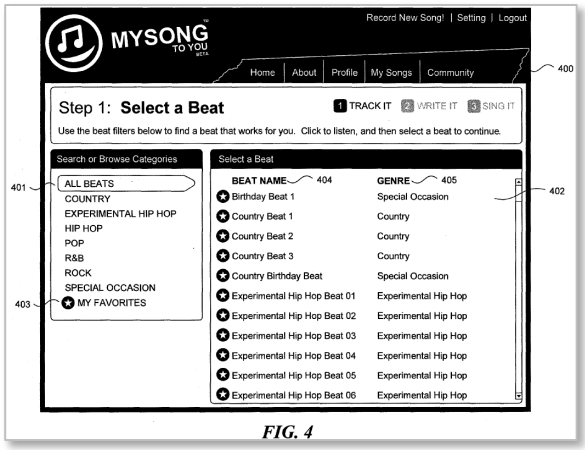


FIG. 4

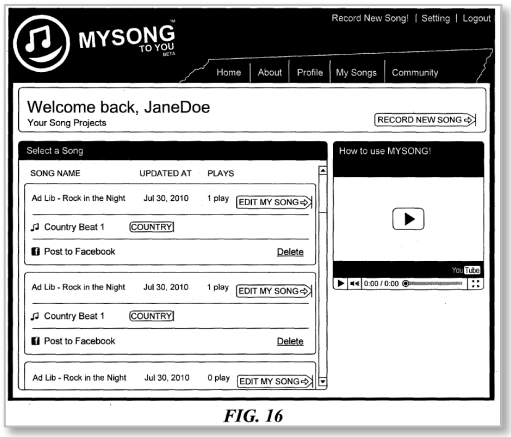


FIG. 16

EX1002 (*'911 Patent File History*), 148, 159, 178, 179, 191.

269. It appears that the portions of the '687 Application identified by PO above as providing written description for element 1[d] were substantially copied from *Cohen* (EX1004) into the '687 Application as discussed above in §II.D. *See*, *e.g.*, the following paragraphs of *Cohen*:

> **[0046]** Users can record their own audio or video productions over another user's production (e.g., a beat). For example, users can browse listings of audio tracks or videos on the website provided by other users. The audio tracks may be mixed tracks of lyrics and rhythms (e.g., beats). A mixed track may be the collaborative result of multiple users of the web-based service. The users need not be physically proximal to one another to participate in a musical collaboration session. For example, a mixed track can be a product of a user providing a rhythm (e.g., a beat) and a vocal production (e.g., sing, solo, duet, whistle, rap, melody, etc.) of another user. The mixed track can also be a product of a rhythm and vocal production of the same user. Similarly, a performance art piece can be a product of a combination of audio content and video content provided by users that may be in physically disparate locations.

> **[0047]** In most instances, a collaborative recording session can be requested and performed on demand. Since audio tracks and video content provided by users are stored on a server, the physical presence of each participant of the collaborative recording session is not necessary. The requested track for a recording session can be provided on-demand. For example, a user can select to sing or record a video over a track (e.g., rhythm, beat, melody) listed on the website. The user may, in some instances, preview a portion of the track or video by performing playback using an audio player/recorder widget in the user interface.

[0095] The user interface module **214**, in some embodiments, detects selection of a video, a beat and/or a track through the listing entries and presents a page view for the selected listing, for example, with further reference to FIG. **5**. The page view allows the user to further view detailed information regarding the selected multimedia content. The page view may further allow the user to request playback of the multimedia content. The user interface module **214** can adjust the functions and services available through the page view user interface, for example, dependent on whether the page view is for a video, a beat, or a track. In a page view of a video, a record button may be displayed such that a user can record audio over the video. In the page view of a beat, a record button is also typically displayed such that a user can generate a record request over the beat, for example, upon a mouse click on the record button. In the page view of a track, a challenge button is typically displayed such that users can request to challenge the track selected.

EX1004 (*Cohen*), ¶¶[0046], [0047], and [0095].

270. More particularly, the following table compares *Cohen's* ¶[0046] and ¶[0095] and FIG. 4B with the '687 Application's ¶[0038] and ¶[0081] and FIG. 4. The text in red is the same between the two documents. The text in blue indicates the concepts are the same between the two documents.

EX1004 (*Cohen*), ¶[0046], ¶[0047], ¶[0095], FIG. 4B	EX1002 (*'911 Patent File History*), 148 (¶[0038]), 159 (¶[0081]), FIG. 4
[0046] "Users can record their own audio or video productions over another user's production (e.g., a beat). For example, users can browse listings of audio tracks or videos on the website provided by other users …" [0047] "… Since audio tracks and video content provided by users are stored on a server, the physical presence of each participant of the collaborative recording session is not necessary. The requested track for a recording session can be provided on-demand. For example, a user can select to sing or record a video over a track (e.g., rhythm, beat, melody) listed on the website."	[0038] "The user must select from a list of compositions (e.g., pre-recorded beats, rhythms, scores). The composition may be a retrieved from a library of compositions, provided (e.g., recorded) by another member on the network. In one embodiment, the process of selecting a composition allows the user to view a list of compositions and to preview the sound of each pre-recorded composition."
[0095] "The user interface module 214, in some embodiments, detects selection of a video, a beat and/or a track through the listing entries and presents a page view for the selected listing, for example, with further reference to FIG. 5. The page view allows the user to further view detailed information regarding the selected multimedia content. The page view may further allow the user to request playback of the multimedia content. The user interface module 214 can adjust the functions and services available through the page view user interface, for example, dependent on whether the page view is for a video, a beat, or a track ..."	[0081] "The user interface module 204, in some embodiments presents a page view for the selected listing, with further reference to FIG. 3-4, and detects selection of an audio content, a composition, a beat, and/or video through the listing entries, with further reference to FIG. 5. The page view allows the user to further view detailed information regarding the selected multimedia content. The page view may further allow the user to request playback of the multimedia content. The user interface module 204 can adjust the functions and services available through the page view user interface, for example, dependent on whether the page view is for audio content, a composition, a beat, or a video recording."

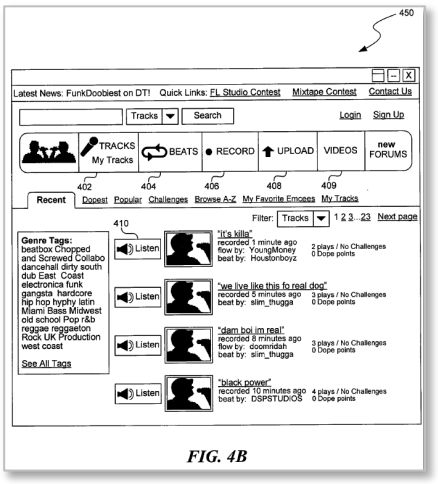


FIG. 4B

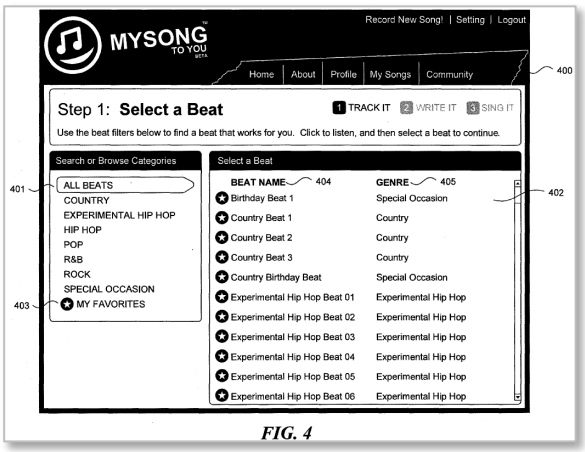
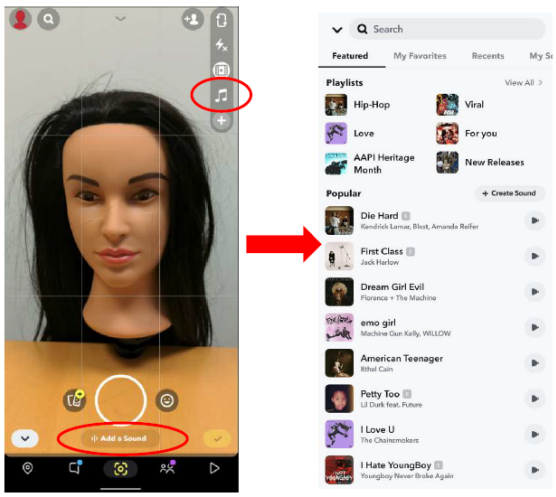


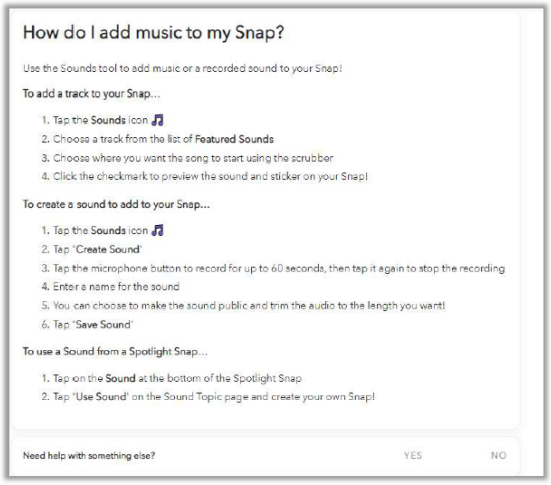
FIG. 4

271. Because PO asserted the portions of the '687 application cited above provide support for element [1d], the similar portions of *Cohen* must also teach element [1d], rendering it obvious.

272. Still further, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

prompting the user to select an audio composition from a list of compositions retrieved from a host server;	***The Snapchat App prompts the user to select an audio composition from a list of compositions retrieved from a host server, as shown below:*** The Snapchat App prompts the user to "Add a Sound." When a user clicks the "Add a Sound" button, or the music icon in the upper-right toolbar, the Snapchat App presents the user with a list of audio compositions retrieved from a host server.





How do I add music to my Snap?

Use the Sounds tool to add music or a recorded sound to your Snap!

To add a track to your Snap...

1. Tap the **Sounds** icon
2. Choose a track from the list of **Featured Sounds**
3. Choose where you want the song to start using the scrubber
4. Click the checkmark to preview the sound and sticker on your Snap!

To create a sound to add to your Snap...

1. Tap the **Sounds** icon
2. Tap "**Create Sound**"
3. Tap the microphone button to record for up to 60 seconds, then tap it again to stop the recording
4. Enter a name for the sound
5. You can choose to make the sound public and trim the audio to the length you want!
6. Tap "**Save Sound**"

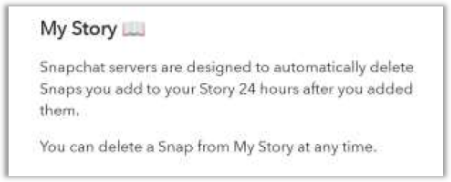
To use a Sound from a Spotlight Snap...

1. Tap on the **Sound** at the bottom of the Spotlight Snap
2. Tap "**Use Sound**" on the Sound Topic page and create your own Snap!

Need help with something else? YES NO

(https://support.snapchat.com/en-US/article/add-music) (last visited January 9, 2023).

On information and belief, the list of compositions presented to the user is retrieved from a Snap host server. *See, e.g.*:



My Story

Snapchat servers are designed to automatically delete Snaps you add to your Story 24 hours after you added them.

You can delete a Snap from My Story at any time.

(https://support.snapchat.com/en-US/a/when-are-snaps-deleted (last visited January 9, 2023).

EX1038 (*Infringement Contentions*) at 14-17.

273. Finally, as discussed above in §V.C, Snap and PO have served Preliminary Proposed Claim Constructions in the related District Court case. EXS

1051, 1052. It is my opinion that element [1d] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* regardless of which Party's construction(s) is utilized. For example, Snap has proposed that the meaning of "prompting the user to select an audio composition" in [1d] is "initiating, by the server, display of a prompt for the user to select an audio composition." EX1051, 3. This comports with my analysis in §V.A that a POSITA would have understood that the elements of the Challenged Claims are performed on the server side. Snap's construction is taught for at least the reasons above. For example, *Cohen* expressly teaches that user interface module 214 generates the user interfaces of *Cohen* that provide the prompting described above. PO has proposed that the meaning of "prompting the user to select an audio composition" in [1d] is "encouraging the user, through a user interface, to select an audio composition from a list." EX1052, 7-8. This is also taught for at least the reasons above. For example, *Cohen* and *Chu's* teaching of the provision of selectable lists on user interfaces discussed above teach encouraging users to select from the lists.

274. Therefore, it is my opinion that element [1d] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[1e] presenting the user with a record button;

275. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1e], rendering it obvious.

276. Specifically, it is my opinion that limitation [1e] is rendered obvious by *Cohen* because *Cohen* teaches presenting the user with a record button (*e.g.*, a user is presented with various record or challenge buttons, such as shown in FIGS. 5A, 5B, and 6A, by way of user interface module 214 of FIG. 2). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0041], [0048], [0095], [0097], [0100], [0137], [0139], [0150]-[0154], [0164], [0183], [0197], and [0206], and FIGS. 1, 2, 5A, 5B, 6A.

277. In more detail, *Cohen* (EX1004) teaches presenting, via user interface module 214 at the server, the user with various buttons that, when pressed, will result in a recording session beginning, including record button 602 in FIG. 6A and challenge button in FIGS. 5A and 5B. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0095] ("In a page view of a video, a record button may be displayed such that a user can record audio over the video. In the page view of a beat, a record button is also typically displayed such that a user can generate a record request over the beat, for example, upon a mouse click on the record button. In the page view of a track, a challenge button is typically displayed such that users can request to challenge the track selected"), ¶[0097] ("The user interface module 214 can also generate and provide, in the same or different user interface, a pause

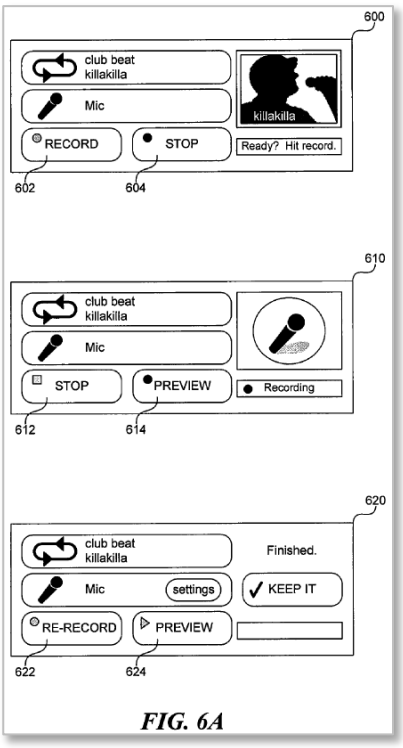


FIG. 6A

button to pause the playback of a performance art piece and/or a challenge button for a challenger to initiate a recording session of an audio track over a beat to generate a challenger track. … The user interface can further include, for example, a record button for initiating a recording session and a stop button for terminating the recording session"), ¶[0137] ("In one embodiment, the audio player/recorder widget 502 (or multimedia player/recorder widget) includes a challenge button. … [that] allows a user to record over the same beat as that used in the track listed in the audio player/recorder widget 502. The challenge button may also allow a user to record video over a track or beat"), ¶[0151] ("Screenshot 600 is an example user interface of a widget (e.g., multimedia player/recorder widget) suitable for controlling audio or video playback and audio or video recording. … In one embodiment, while a beat is being played, the widget includes a record button 602 and a stop button 604"), and ¶[0152] ("In one embodiment, the record button 602, when selected by a user, allows the user to record over the beat or video currently being played."). *See also* EX1004 (*Cohen*) at ¶[0041], ¶[0048], ¶[0100], ¶[0139], ¶[0150], ¶[0154], ¶[0164], ¶[0183], ¶[0197], and ¶[0206].

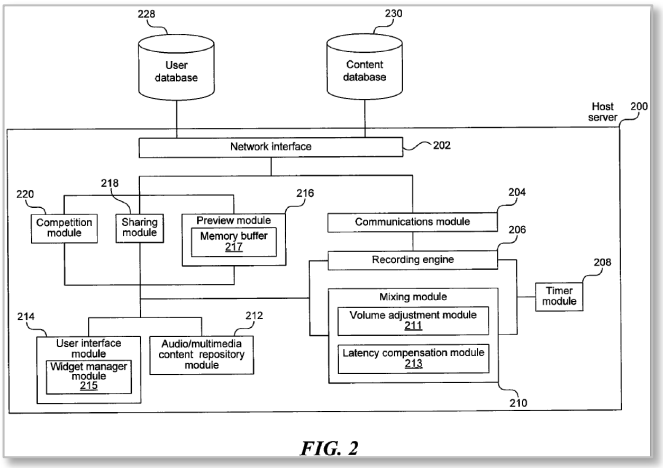


FIG. 2

278. As discussed above, PO argued during prosecution that the Examiner had not shown that *Cohen* teaches element [1e] as follows:

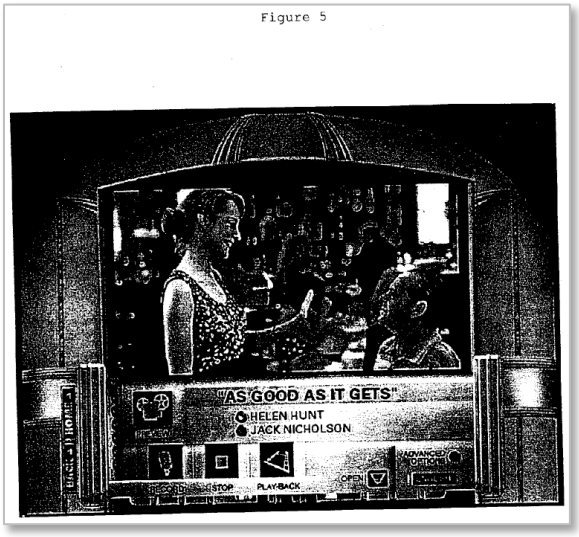
> The Examiner asserts that Cohen discloses "presenting the user with a record button" in Paragraph [0174]. But Paragraph [0174] discloses no such button: it simply provides that "When the record request is received, in process 804, an indication of initiation of a recording session is presented via the service site." Paragraph [0173] merely provides that a user "can select to record a sound production over the beat"—even if this is read to disclose a "button," which it does not, it does not disclose the step of "*presenting* a record button." A physical button that is already present on a device, for example, has not been "presented" to a user. Thus the Examiner has not shown Cohen discloses this element, and none of the cited references, either alone or in combination, disclose this element.

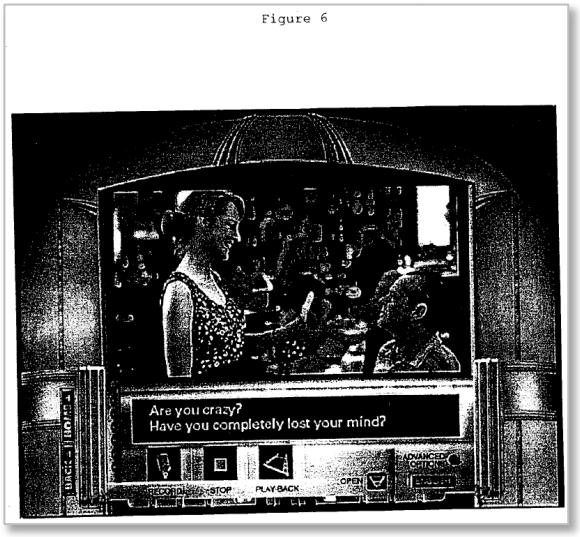
EX1002 (*'911 Patent File History*), 58.

279. PO's appeal brief argument misrepresents *Cohen*. As discussed above, *Cohen* explicitly and repeatedly teaches "presenting the user with a record button," including in the very paragraphs copied from *Cohen* into the '687 Application (*see* below). In view of these repeated teachings, PO's arguments with respect to ¶[0173] and ¶[0174] of *Cohen* are difficult to understand, especially where PO apparently tries to distinguish *Cohen* on the basis of a "physical button," of which there is no explicit teaching in *Cohen*. *Cohen's* record buttons are presented via the user interface screens just like that discussed in the '911 patent. Thus, PO's arguments are irrelevant in view of *Cohen's* teachings.

280. Moreover, even if *Cohen* was deficient in any regard (it is not), *Sherman* also teaches the features of element [1e]. Specifically, *Sherman* teaches presenting the user with a record button (*e.g.*, a user is presented with a record

button as shown in FIGS. 5 and 6. *See*, *e.g.*, EX1006 (*Sherman*) at ¶[0015] ("With continued reference to FIG. 5, another option may allow the user to record over an actor's voice") and FIGS. 5 and 6 (reproduced below).





281. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Chu* and/or *Joslin*) in view of *Sherman*. For example, this is because each of *Cohen*, *Chu*, *Sherman*, and *Joslin* is in the same technical field of multimedia content creation (the technical field of the '911 Patent) and teaches various user interfaces, lists, buttons, and prompts to facilitate their processes, which a POSITA would have recognized as similar known techniques that he or she would have been motivated to use interchangeably in a resulting combination.

282. Further, presenting a user with a record button was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.B). Thus, to the extent this feature was

somehow found not to be taught by *Cohen*, *Chu*, or *Sherman* (or *Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

283. Still further, during prosecution of the '911 patent, PO identified the following parts of the underlying '687 Application as supporting element [1e]:

> (e.g., ¶ [0038], [0081], Fig. 3, Fig. 4, Fig. 16), and presenting the user with a record button (e.g., [0084], [0086], [0103]).

EX1002 (*'911 Patent File History*), 53. The cited portions are as follows:

> **[0084]** The audio/multimedia player/recorder **222** of the user interface module **214** can also generate and provide, in the same or different user interface, a play button for the playback of an audio recording or composition and/or a reverse/forward button for a user to change the timing of an audio recording over a composition. The composition can be a beat and/or melody provided by the user or another user. The audio/multimedia player/recorder **222** can further include, for example, a record button for initiating a recording session and a stop button for terminating the recordingsession.

> **[0086]** In some embodiments, the user interface module **214** adjusts buttons on the player according to the playback status of an audio recording, for example, with further reference to **FIG. 8.** When no recording is occurring, a play and/or record button can be displayed and are selectable. In addition, when a recording session has ended, for example, a re-record button, review button, cancel button and/or a play button can be displayed, with further reference to **FIG. 9.**

[0103] The user interface display **900** of audio recorder/player may be different before recording, during the recording session, and after the recording session. The different user interface displays are illustrated with further reference to **FIGURE 8, 9, 10, and FIGURE 11.** In one embodiment, the player/recorder includes a record button and a stop button. The record button can be used by the recording user to generate an initiation request to start the recording session. The stop button can be used to stop playback of the multimedia content currently being played. A countdown to the initiation of the recording session thus begins. In most instances, if the user is recording over a composition or pre-recorded video recording, the content is played at the initiation of the recording session. The initiation request to record or stop is typically generated by a single action (e.g., a click of the pointing device) on the record or stop button.

EX1002 (*'911 Patent File History*), 160, 164.

284. It appears that the portions of the '687 Application identified by PO above as providing written description for element 1[e] were substantially copied from *Cohen* (EX1004) into the '687 Application as discussed above in §II.D. *See*, *e.g.*, the following paragraphs of *Cohen*:

[0097] The user interface module **214** can also generate and provide, in the same or different user interface, a pause button to pause the playback of a performance art piece and/or a challenge button for a challenger to initiate a recording session of an audio track over a beat to generate a challenger track. The challenger track can be provided by another user to challenge other mixed tracks. The user interface can further include, for example, a record button for initiating a recording session and a stop button for terminating the recording session.

[0100] In some embodiments, the user interface module **214** adjusts buttons on a player according to the playback status of an audio track, for example, with further reference to FIG. **6**A. When no playback is occurring, a play and/or record button can be displayed and are selectable. When playback is occurring, a stop/pause button is displayed and selectable. In addition, when a recording session has ended, for example, a re-record button and/or a preview button can be displayed.

[0139] Once the challenge button is selected, a recording session generally begins with the detection of the recording user's audio or video input device (e.g., microphone). Once the input device is accessible, the user can click the record button of the audio player/recorder widget **502** (or multimedia player/recorder widget) to initiate a recording session over the beat or any other selected multimedia content. The user can stop the recording anytime by clicking the stop button of the audio player/recorder widget **502**. The user interface display of audio player/recorder widget **502** may be different before recording, during the recording session, and after the recording session. The different user interface displays are illustrated with further reference to FIG. **6**A.

[0152] In one embodiment, the record button **602**, when selected by a user, allows the user to record over the beat or video currently being played. The record button **602** can be used by the recording user to generate an initiation request to initiate the recording session. The initiation request is typically generated by a single action (e.g., a click of the pointing device) on the record button **602**. For example, when the record button **602** is activated, playback of the beat is stopped if the beat is currently playing. A countdown to the initiation of the recording session thus begins. In most instances, if the user is recording over a beat, the beat is simultaneously played at the initiation of the recording session.

EX1004 (*Cohen*), ¶¶[0097], [0100], [0139], [0152].

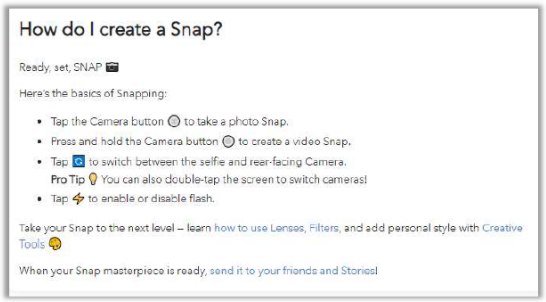
285. More particularly, the following table compares *Cohen's* ¶¶[0097], [0100], [0139], [0152] with the '687 Application's ¶[0084], [0086], [0098], [0103]. The text in red is the same between the two documents. The text in blue indicates the concepts are the same between the two documents.

EX1004 (*Cohen*), ¶[0097], ¶[0100], ¶[0139], ¶[0151], ¶[0152]	EX1002 (*'911 Patent File History*), 160 (¶[0084], ¶[0086]), 164 (¶[0103])
[0097] "The user interface module 214 can also generate and provide, in the same or different user interface, a pause button to pause the playback of a performance art piece and/or a challenge button for a challenger to initiate a recording session of an audio track over a beat to generate a challenger track. The challenger track can be provided by another user to challenge other mixed tracks. The user interface can further include, for example, a record button for initiating a recording session and a stop button for terminating the recording session."	[0084] "The audio/multimedia player/recorder 222 of the user interface module 214 can also generate and provide, in the same or different user interface, a play button for the playback of an audio recording or composition and/or a reverse/forward button for a user to change the timing of an audio recording over a composition. The composition can be a beat and/or melody provided by the user or another user. The audio/multimedia player/recorder 222 can further include, for example, a record button for initiating a recording session and a stop button for terminating the recording session."
[0100] "In some embodiments, the user interface module 214 adjusts buttons on a player according to the playback status of an audio track, for example, with further reference to FIG. 6A. When no playback is occurring, a play and/or record button can be displayed and are selectable. When playback is occurring, a stop/pause button is displayed and selectable. In addition, when a recording session has ended, for example, a re-record button and/or a preview button can be displayed."	[0086] "In some embodiments, the user interface module 214 adjusts buttons on the player according to the playback status of an audio recording, for example, with further reference to FIG. 8. When no recording is occurring, a play and/or record button can be displayed and are selectable. In addition, when a recording session has ended, for example, a re-record button, review button, cancel button and/or a play button can be displayed, with further reference to FIG. 9."
[0139] "… The user interface display of audio player/recorder widget 502 may be different before recording, during the recording session, and after the recording session. The different user interface displays are illustrated with further reference to FIG. 6A."	[0103] "The user interface display 900 of audio recorder/player may be different before recording, during the recording session, and after the recording session. The different user interface displays are illustrated with further reference to FIGURE 8, 9, 10,

EX1004 (*Cohen*), ¶[0097], ¶[0100], ¶[0139], ¶[0151], ¶[0152]	EX1002 (*'911 Patent File History*), 160 (¶[0084], ¶[0086]), 164 (¶[0103])
	and FIGURE 11 …"
[0151] "…. In one embodiment, while a beat is being played, the widget includes a record button 602 and a stop button 604 …"	[0103] "… In one embodiment, the player/recorder includes a record button and a stop button. ..."
[0152] "… The record button 602 can be used by the recording user to generate an initiation request to initiate the recording session. …"	[0103] "… The record button can be used by the recording user to generate an initiation request to start the recording session ..."
[0151] "… The stop button 604 can be used to pause and/or stop playback of the multimedia content currently being played."	[0103] "… The stop button can be used to stop playback of the multimedia content currently being played. ..."
[0152] "… The initiation request is typically generated by a single action (e.g., a click of the pointing device) on the record button 602. For example, when the record button 602 is activated, playback of the beat is stopped if the beat is currently playing. A countdown to the initiation of the recording session thus begins. In most instances, if the user is recording over a beat, the beat is simultaneously played at the initiation of the recording session.	[0103] "… A countdown to the initiation of the recording session thus begins. In most instances, if the user is recording over a composition or pre-recorded video recording, the content is played at the initiation of the recording session. The initiation request to record or stop is typically generated by a single action (e.g., a click of the pointing device) on the record or stop button."

286. Because PO asserted that certain portions of the '687 Application cited above provide support for element [1e], the similar portions of *Cohen* must also teach element [1e], rendering it obvious.

287. Finally, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

<table>
<tr><td>presenting the user with a record button;</td><td>The Snapchat App presents the user with a record button, as shown below.</td></tr>
<tr><td></td><td>The Snapchat App presents the user with a record button.
 
</td></tr>
<tr><td></td><td> 

(https://support.snapchat.com/en-US/article/capture-a-snap) (last visited January 9, 2023).</td></tr>
</table>

EX1038 (*Infringement Contentions*) at 17-19.

288. Therefore, it is my opinion that element [1e] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[1f] presenting the user with a selection of visual media content for use as a background, wherein upon selecting an instance of pre-recorded visual media content from the selection, the user is presented with an interface to selectively edit the instance of pre-recorded visual media content;

289. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1f], rendering it obvious.

290. Specifically, it is my opinion that element [1f] is rendered obvious by *Cohen*, *Chu*, and *Sherman* because: (i) *Cohen* teaches users recording video content of themselves over audio (or audio/video) content as described in elements [1i] and [1j] and below (*see*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0040], [0046], [0072], [0114], and [0212], and FIGS. 1, 2, 3A, 3B, 5A, 5B, 6A), and (ii) *Chu* and *Sherman* teach presenting the user with a selection of visual media content for use as a background while recording (*e.g.*, *Chu's* system, via CPU 76, provides a selection of background scenes (e.g., an ocean view, a lively street scene, a desert scene, etc. and/or *Sherman's* system provides a selection of movie scenes) (*see*, *e.g.*, EX1005 (*Chu*), Abstract, 3:9-17, 3:59-4:2, 5:22-32, 9:18-45, and 12:49-64, and FIGS. 2 and 3; and *Sherman* (EX1006), ¶¶[0003]-[0006], [0012]-[0014], [0020], and [0024], and FIGS. 4-7), wherein upon selecting an instance of pre-recorded visual media content from the selection (*e.g.*, *Chu's* system, via CPU 76, allows the user to select a background scene to appear behind the user while the user is video-recorded singing a karaoke song as described in element [1j] and/or

Sherman's system allows the user to select a movie scene to appear behind the user while the user is video-recorded speaking lines from the movie scene as described in element [1j]) (*see*, *e.g.*, EX1005 (*Chu*), Abstract, 3:9-17, 3:59-4:2, 5:22-32, 9:18-45, and 12:49-64 and *Sherman* (EX1006), ¶¶[0003]-[0006], [0012]-[0014], [0020], and [0024] and FIGS. 2 and 3, and FIGS. 4-7), the user is presented with an interface to selectively edit the instance of pre-recorded visual media content (*e.g.*, *Sherman's* system allows the user, via *Sherman's* user interfaces, to segment out static portions of the scene and replace them with other backgrounds or videos) (*see*, *e.g.*, *Sherman* (EX1006), ¶¶[0003]-[0006], [0012]-[0014], [0020], and [0024], and FIGS. 4-7).

291. In more detail, *Cohen* (EX1004) teaches users recording video content of themselves over audio (or audio/video) content via, *e.g.*, recording engine 206 at the server side. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0040] ("Audio tracks and video content can be produced by a user in the vicinity of an audio input device (e.g., microphone) or imaging device (e.g., camera, video recorder, web-cam) that is coupled to a computing device connected to a network. The video content can be uploaded or recorded. The video can be recorded using an imaging device in concurrence with or separate from an audio recording process. The video can be of a user generating the audio production or other types of theatrical performances of the user"), ¶[0046] ("Users can record their own audio or video productions over

another user's production (e.g., a beat)"), ¶[0072] (teaching recording engine 206 performs the recording), ¶[0114] ("the competition module 220 also records the video of the challenger during the recording session.") ¶[0212] ("video content may be recorded using an imaging device (e.g., camera, web-cam, etc.) connected to the user device. In one embodiment, the video recording occurs when the audio recording is occurring. For example, in process 1404, the user is video recorded over the network while the user is recording the audio track.").

292. Further, *Chu* teaches, in advance of a video karaoke session, providing, by its CPU, a selection of background scenes (*e.g.*, an ocean view, a lively street scene, a dessert scene, etc.) to a user (*e.g.*, via a user interface), allowing the user to select a background scene to appear behind the user while the user is being video-recorded singing a karaoke song. *See*, *e.g.*, EX1005 (*Chu*), Abstract ("a user is provided with a selection of background scenes from which to choose"), 3:9-17 ("the user selects a particular background scene from among a plurality of alternatively selectable, electronically stored background image scenes. … Typically, the background scene involves a moving sequence that appears to be occurring directly behind the image of the face of the user"), 12:49-64 ("The central processing unit 76 thereupon presents a message at step 110 in FIG. 3 requesting from the customer 21 a selection of background scenes from among those different background scenes stored on the hard disk 72. The customer makes

a selection of scenes which may, for example, include such background scenes as an ocean view, a lively street scene, a desert scene, and possibly other varied but reasonable different background scenes. The customer thereupon performs the selection"). *See also* EX1005 (*Chu*), 3:59-4:2 (teaching background may be associated with a song), 5:22-32 (backgrounds may be electronically stored in the system), 9:18-25 (same), and 9:26-45 (central processing unit 76 manages background selections), and FIGS. 2 and 3 (reproduced below). A POSITA would have understood the foregoing to be teaching providing a user interface to allow the selection functionality.

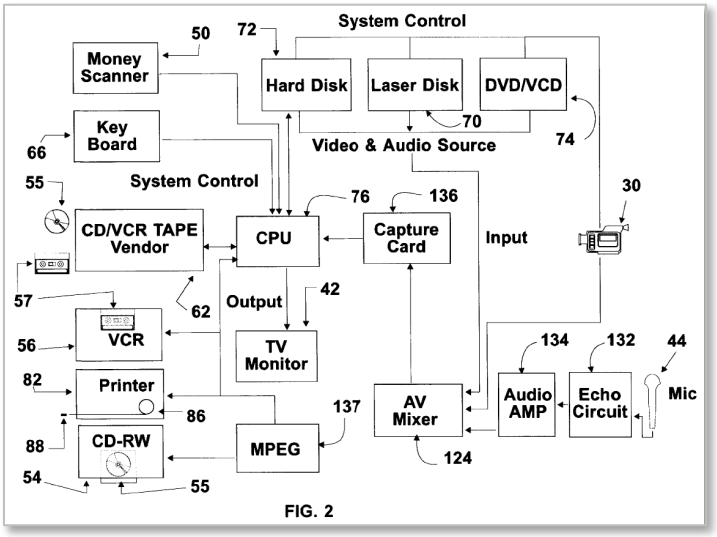


FIG. 2

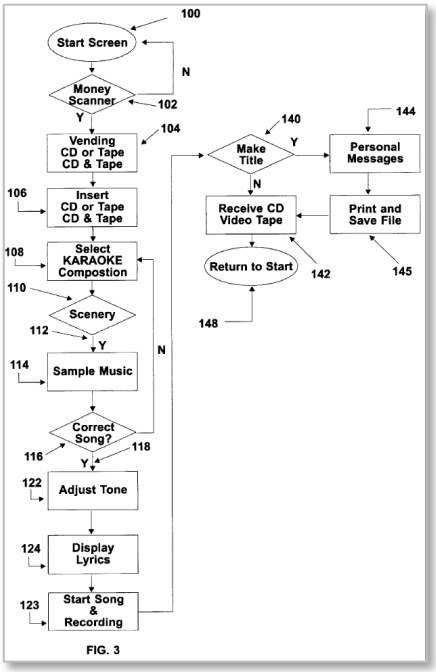


FIG. 3

293. Still further, *Sherman* teaches selecting a film clip including video and sound tracks for a user to video-record himself/herself over. *Sherman* (EX1006), ¶¶[0003]-[0006]. To enable this, *Sherman* teaches providing listings of

available movie clips for a user to select such that the user may record over one or more actors' voices, as shown in FIG. 4. *Sherman* (EX1006), ¶[0014], FIGS. 4-7. The movie clips are stored in storage device 50, which may be a remote server. *Sherman* (EX1006), ¶¶[0012]-[0013]. *Sherman* teaches that this functionality (and all functionality of *Sherman* described herein) is provided by *Sherman's* software residing on its computer 20. *Sherman* (EX1006), ¶[0013], FIG. 1.

294. *Sherman* further teaches that the video clip can be edited by: (i) the user video recording himself/herself and inserting the video into the film clip to replace an actor, as discussed in element [1i] and [1j]; and (ii) replacing static portions of the film clip with a different background or video. *Sherman* (EX1006), ¶[0024] ("Yet another option that may be offered by the system software of the invention is editing the visual elements of the movie clip. Users can select photographs to be superimposed/inserted into the video, thus inserting themselves into the scene. Another possibility is to segment out the static background of a scene and replace it with another background or even video, thus completely altering the context of the video"). *See also* FIGS. 4-7, reproduced below.

Figure 4

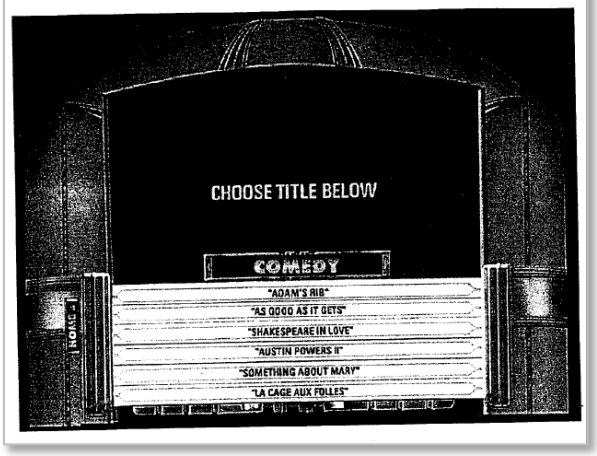


Figure 5



Figure 6

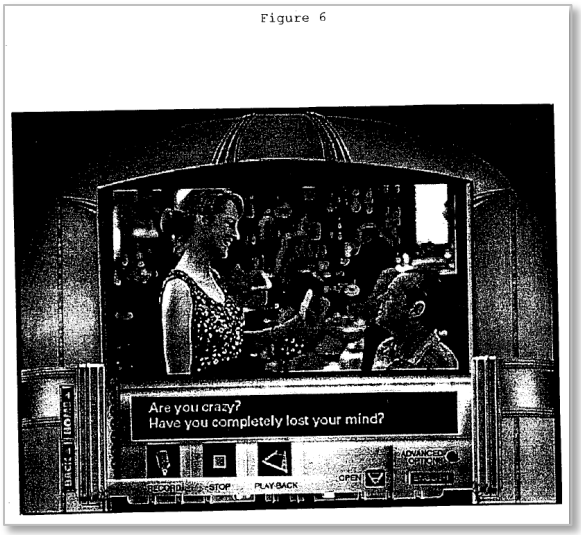


Figure 7



295. *Sherman* also teaches that various other editing functions for the recorded scenes are available, including sound and brightness/contrast. *Sherman* (EX1006), ¶[0020], FIG. 7 (reproduced above).

296. A POSITA would have understood that *Sherman's* teaching of providing the user with the ability to "edit the visual elements of the movie clip," and particularly the editing functionality of replacing segments of the static background of a scene, is the selective editing of the movie scene (the pre-recorded

content) of element [1f]. Moreover, a POSITA would have understood that the mechanism for doing so would be a user interface such as otherwise taught by *Sherman* (*e.g.*, FIGS. 4-7), or would have considered it obvious to provide such a user interface as that is how all the remaining functions of *Sherman* are provided to the user (and in view of the user interfaces in *Cohen*, *Chu*, *Joslin*, and the general knowledge in the art as demonstrated in the references discussed in §I). To the extent a temporal requirement is found in element [1f] (*e.g.*, that the interface be presented immediately after the background selection), a POSITA would also have considered it obvious that the user interface would have been activated upon selection of the movie scene, as that would have been the logical time to activate editing functionality such that the user would be able to see it during recording.

297. Additionally and alternatively, as described in element [10p], *Chu* teaches providing an interface to allow the user to incorporate a title or personal message to the user's performance recording. A POSITA would have understood that a similar interface could have been provided to add text to the pre-recorded visual media content upon its selection, which a POSITA would have considered to be an editing function. While *Chu* teaches its interface is provided near the end of *Chu's* exemplary recording process, to the extent there is a temporal requirement for the presentation of the interface in this claim element, a POSITA would have found it obvious to provide an interface similar to *Chu's* earlier in its process in

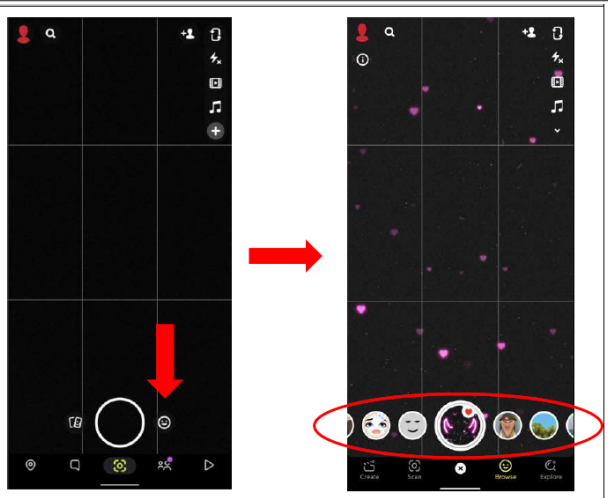
conjunction with the background selection as adding text is simply another input to *Chu's* multimedia content creation process and there is no criticality to the timing of its input.

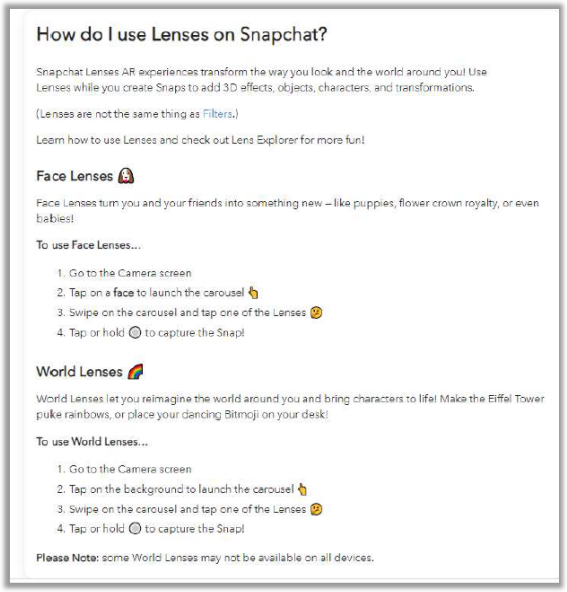
298. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Joslin*) in view of *Chu* and *Sherman*. For example, a POSITA would have been motivated to modify *Cohen* and *Chu's* teachings of providing user-selectable backgrounds for multimedia creation with *Sherman's* teachings that static portions of its background movie clip can be segmented and replaced with another background or video to provide an improved system for creating a multimedia file that includes additional user-selectable content (*e.g.*, a user-selectable and highly user-editable background) in addition to the underlying audio content and a video of the user singing over the content in front of the background, which a POSITA would have recognized to be desirable in 2009-2010.

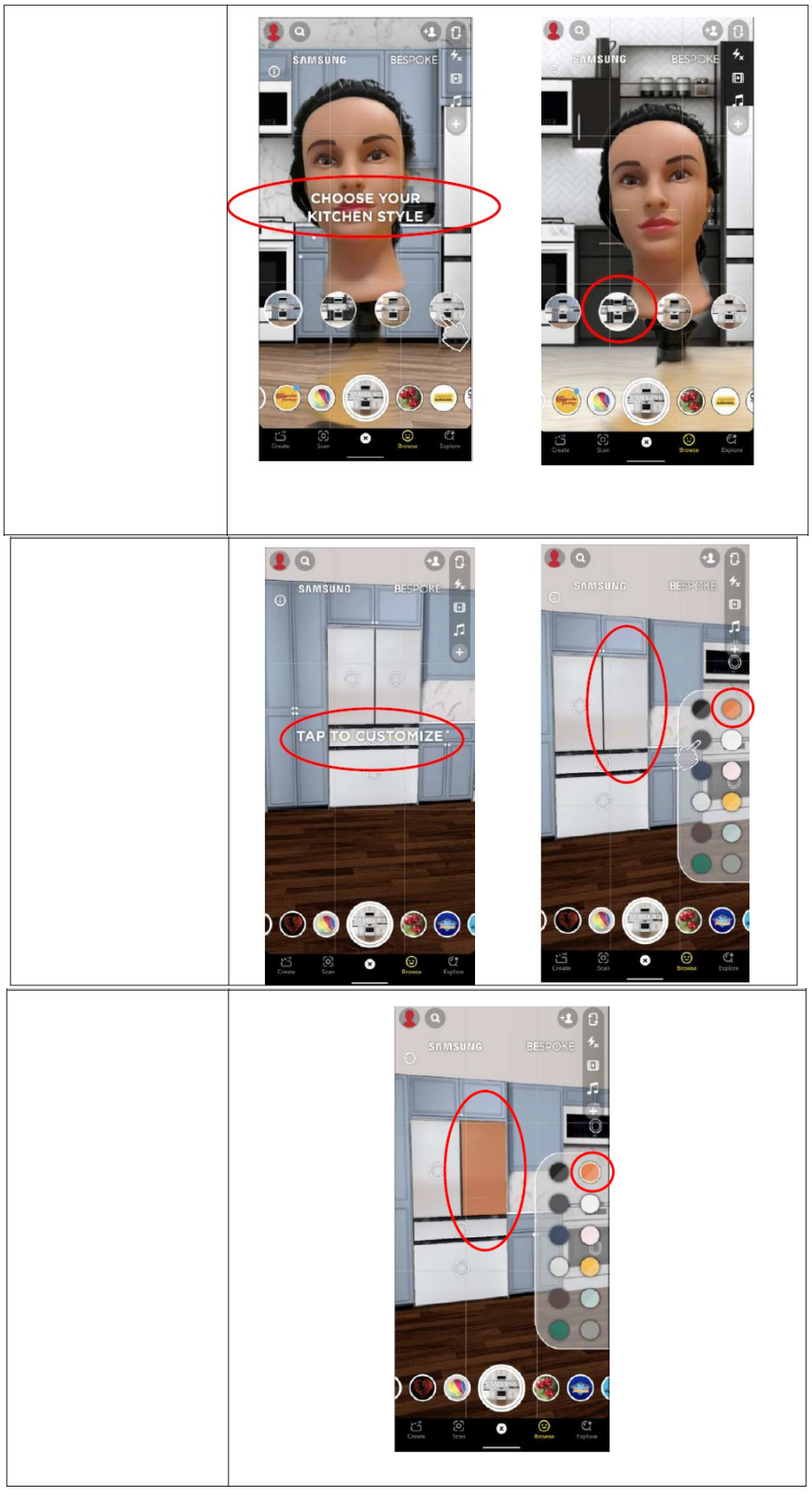
299. Further, using a system-supplied background of pre-recorded visual media content, including presenting the user with a selection of visual media content for use as a background and allowing the user to edit the background was generally known by POSITAs by 2009-2010 (*see, e.g.*, §§I.C I.D I.E). Thus, to the extent this feature was somehow found not to be taught by *Cohen*, *Chu*, and *Sherman,* (and *Joslin*), it would have been obvious to a POSITA to configure

Cohen, *Chu*, and *Sherman's* process (with or without the teachings of *Joslin*) to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

300. Still further, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

presenting the user with a selection of visual media content for use as a background,	***The Snapchat App presents the user with a selection of visual media content for use as a background, as shown below*** The Snapchat App presents the user with a "Lenses" button, and when a user clicks on the Lenses button, the Snapchat App presents the user with a selection of visual media content that the user can select to use as a background.
	

	
	(https://support.snapchat.com/en-US/a/face-world-lenses) (last visited January 9, 2023).
wherein upon selecting an instance of pre-recorded visual media content from the selection, the user is presented with an interface to selectively edit the instance of pre-recorded visual media content:	***The Snapchat App, upon allowing a user to select an instance of pre-recorded visual media content from the selection, presents the user with an interface to selectively edit the instance of pre-recorded visual media content, s shown below:*** In the example below, after the user has selected a "Samsung" background, the Snapchat App presents the user with an interface to edit the background. The user can select different "kitchen styles" as well as edit the color of specific kitchen appliances.



EX1038 (*Infringement Contentions*) at 19-25.

301. Finally, as discussed above in §V.C, Snap and PO have served Preliminary Proposed Claim Constructions in the related District Court case. EXS 1051, 1052. It is my opinion that element [1f] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* regardless of which Party's construction(s) is utilized. For example, Snap has proposed that the meaning of "an interface to selectively edit the instance of pre-recorded visual media content" in [1f] is (if not indefinite due to its ambiguous outer bounds), an "interface, provided by the server, to selectively edit, on the server, the instance of pre-recorded visual media content." EX1051, 3. This comports with my analysis in §V.A that a POSITA would have understood that the elements of the Challenged Claims are performed on the server side. Snap's construction is taught for at least the reasons above. For example, a POSITA would have considered the provision of the claimed interface to be obvious based on *Chu* and *Sherman's* teachings of user interfaces for background selection and editing, and providing such functionality by a server to be obvious based on the combination of *Cohen*, *Chu*, and *Sherman's* teachings, and in view of common knowledge in the art, as discussed above. PO has proposed that the meaning of "an interface to selectively edit the instance of pre-recorded visual media content" in [1f] is "a graphical user interface by which a user can edit all or a portion of the instance of pre-recorded visual media content." EX1052, 5-6. This

is also taught for at least the reasons above based on *Chu* and *Sherman's* teachings of user interfaces for background selection and editing.

302. Therefore, it is my opinion that element [1f] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[1i][13] providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording;

303. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1i], rendering it obvious.

304. Specifically, it is my opinion that element [1i] is rendered obvious by *Cohen* because *Cohen* teaches providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording (*e.g.,* during a recording session, *Cohen's* system provides playback of the pre-recorded audio or visual content selected from the list discussed in element [1d] while a user is recording new audio or video content by way of user interface module 214 and recording engine 206 of FIG. 2). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0046]-[0048], [0074], [0114], [0137], [0138], [0150], [0152], [0173], [0175], and [0200], and FIGS. 1, 2, 5A, 5B, 6A.

[13] Element numbers are non-sequential so that like elements are consistently labeled in the three independent claims.

305. In more detail, *Cohen* (EX1004) teaches that, during a recording session, its system plays the pre-recorded audio or visual content that a user has selected (*see* element [1d]) while the user is recording new audio or video content, allowing the user to hear the pre-recorded audio or visual content as it plays. *See, e.g.*, EX1004 (*Cohen*), ¶¶[0048] ("A recording session of audio, video, or a combination thereof, can also be initiated via the user interface by clicking a button on the audio player/recorder widget, for example. … At the initiation of the recording session, the audio track or video content to which the recording user is recording over is played."), [0074] ("During a recording session, the recording engine 206 can perform simultaneous aural playback of a beat to the recording user during a recording session when the recording user has requested to record over the beat."), [0114] ("The competition module 220 can initiate a recording session to capture audio detected by the user's audio input device (*e.g.*, microphone) while performing audible playback of the beat to the user, for example, responsive to detection of a click of a pointing device on the challenge button in the user interface. … In one embodiment, the competition module 220 also records the video of the challenger during the recording

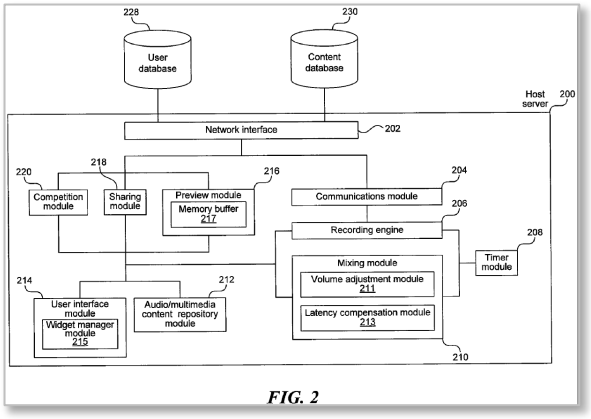


FIG. 2

session."), [0138] ("For example, the user can generate a vocal expression (e.g., rap, sing, speak, and/or any other form of vocalization) or a physical gesture/act that can be recorded with a beat when the challenge button is clicked. The track representing the beat is usually simultaneously played back during the recording session triggered by the challenge button"), and [0152] ("In one embodiment, the record button 602, when selected by a user, allows the user to record over the beat or video currently being played. … In most instances, if the user is recording over a beat, the beat is simultaneously played at the initiation of the recording session."). *See also* EX1004 (*Cohen*) at ¶[0046], ¶[0047], ¶[0137], ¶[0150], ¶[0173], ¶[0175], and ¶[0200].

306. Nevertheless, as discussed above, PO argued during prosecution that the Examiner had not shown that *Cohen* teaches element [1i] as follows:

> The Examiner asserts that Cohen discloses "providing simultaneous aural playback of the composition during a recording session," citing to Paragraph 0074. That paragraph, though, consistent with Cohen's direction to recording audio over beats, provides only that the recording engine "can perform simultaneous aural playback of a beat to the recording user during a recording session *when the recording user has requested to record over a beat*." (emphasis added). Consistent with the overall purpose of Cohen, and as shown by the language "record over a beat," this type of request is for audio—not video—recording sessions. *See* Cohen Abstract, [0062] ("Users can also, in some embodiments, record audio tracks over tracks such as tracks comprising beats….").

> Where Cohen does disclose video recording—i.e., in context of its "competition" module in Paragraph 114—it does so only after a user request to challenge a full audio "track." [0113]. As Cohen explains, "[t]he competition module 220 can receive a user request to challenge a mixed audio *track* which is typically generated from a beat and a vocal expression") (emphasis added), *compare* [0114] ("The competition module 220 can initiate a recording session to capture audio detected … while performing audible playback of the *beat* to the user"). The audio that is played during a recording session in Cohen is *not* a "composition" that was prompted to the user to select. Cohen thus does not disclose "providing simultaneous aural playback of the composition during a recording session" where the composition is an audio composition selected from a list of compositions—as claimed by the Applicant. None of the cited references, either alone or in combination, disclose this element.

EX1002 (*'911 Patent File History*), 58.

307. PO's appeal brief argument misrepresents *Cohen*. As discussed above, *Cohen* explicitly and repeatedly teaches "providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording." PO seems to be arguing that the only video recording taught by *Cohen* (EX1004) is in conjunction with its competition module and challenge functionality which, in PO's view, is somehow not covered by the claims. This characterization of *Cohen* is wrong. *First*, *Cohen's* video recording functionality is not limited to the "challenge" embodiments; *Cohen* repeatedly teaches video recording functionality in a number of embodiments, and that its embodiments may be combined with each other. *See*, *e.g.*, EX1004 (*Cohen*), ¶[0217]. *Second*, a video recording session initiated from a challenge button is no different from a video recording process initiated by a record button in *Cohen*. As discussed above, both processes record video over various selected

underlying compositions as they are playing. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0046] ("Users can record their own audio or video productions over another user's production (e.g., a beat). … Similarly, a performance art piece can be a product of a combination of audio content and video content provided by users that may be in physically disparate locations"), ¶[0047] ("For example, a user can select to sing or record a video over a track (e.g., rhythm, beat, melody) listed on the website"), and ¶[0137] ("The challenge button may also allow a user to record video over a track or beat."). A POSITA would have understood each of these descriptions to be utilizing the simultaneous playback of the underlying multimedia content while a video is being recorded (as each describes recording "over" other multimedia content, which a POSITA would have understood to mean simultaneous audio playback during video recording in the context of *Cohen* based at least on the teachings above), or would have considered it obvious to use such simultaneous playback in view of *Cohen's* teachings.

308. Additionally, as discussed in §II.B.3, the Examiner of the '911 Patent allowed the Challenged Claims after an Examiner's Amendment modifying each of the independent claims to specify that the simultaneous aural playback recited in the claims was of an "audio" composition (EX1002 (*'911 Patent File History*), 8-18). It is unclear to me, and the Examiner did not explain, just how this slight modification of the claims would have rendered them patentable over the

Examiner's combinations. And, in any event, it does not distinguish the claims from *Cohen*, for at least the reasons above.

309. Moreover, even if *Cohen* was deficient in any regard (it is not), *Chu* also teaches the features of element [1i] because *Chu* teaches providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording (*e.g.,* during a performance recording, *Chu's* system provides audible playback of the chosen musical composition (*see* element [1d]) through speakers). *See*, *e.g.*, EX1005 (*Chu*), 14:38-48 ("During the performance the DVD/VCD audio and video player 74 plays the selected, chosen musical composition from the karaoke storage laser disc 70 by playing the music thereon so that it is audible to the performer 21 through the speakers 46 and 48.") and 14:49-64 ("As indicated in FIG. 2, several events occur concurrently during the performance of the chosen karaoke selection. Specifically, a number of different inputs are fed to an audio/video mixer 124. The music of the selected karaoke composition is transmitted as an audio signal from the audio and video player 74 shown diagrammatically in FIG. 2. … At the same time the video image from the video camera 30 is transmitted to the audio/video mixer 124. At the same time, the vocal performance of the performer 21 is transmitted as an audio signal from the microphone 44 through an echo circuit 132 and an audio amplifying circuit 134 to the audio/video mixer 124"), and FIGS. 2

and 3 (reproduced below). *See also* EX1005 (*Chu*), Abstract, 1:6-21, 3:36-48, 5:1-16, 9:26-45.

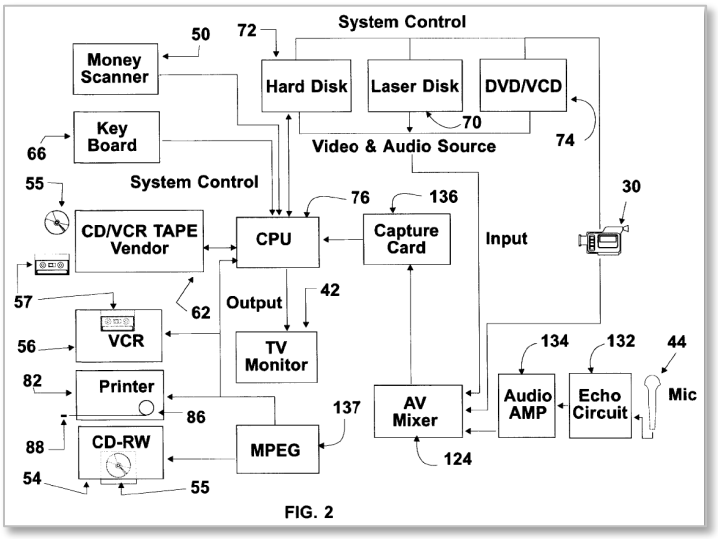


FIG. 2

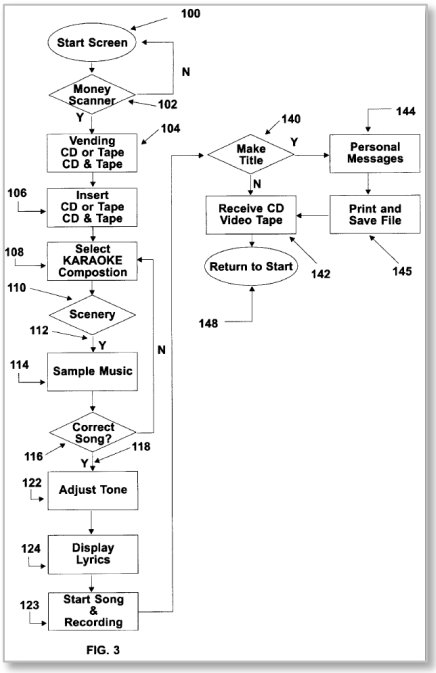


FIG. 3

310. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Sherman* and *Joslin*) in view of *Chu*. For example, this is because each of *Cohen*, *Chu*, *Sherman*, and *Joslin* is in the same technical field of multimedia content creation (the technical field of the '911 Patent) and teaches recording, compositing, previewing, sharing, publishing, and content playback functionality during a user's recording session that a POSITA would have been motivated to use interchangeably in a resulting combination.

311. Further, providing simultaneous aural playback of a pre-recorded audio composition during a new recording session, thereby permitting the user to hear the composition during recording, was generally known by POSITAs by

2009-2010 (*see, e.g.*, §I.B). Thus, to the extent this feature was somehow found not to be taught by *Cohen* and/or *Chu* (or *Sherman*, and/or *Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

312. Further, during prosecution of the '911 patent, PO identified the following parts of the underlying '687 Application as supporting element [1i]:

visual media content (e.g. [0118], Fig. 20). During a recording session, the method includes providing simultaneous aural playback of the selected composition, permitting the user to hear the composition during recording (e.g., [0068]). The recorded content is generated based on the

EX1002 (*'911 Patent File History*), 53. The cited portion is as follows:

[0068] Once the user requests to record an audio or a video recording, the recording engine **206** presents an indication of the initiation of the recording session. For example, the recording engine **206** can countdown to the initiation and present an indicator (e.g., visual and/or aural indicator) of the countdown status. When countdown ends, the recording engine **206** begins to record audio and/or video detected from the audio and/or video input device. In one embodiment, the recording session begins when the user generates the request without additional indication provided by the recording engine **206.** During a recording session, the recording engine **206** can perform simultaneous aural playback of a composition to the recording user during a recording session when the recording user has requested to record over the composition.

EX1002 (*'911 Patent File History*), 156.

313. As shown in the excerpts above and below, it appears that the portion of the '687 Application identified by PO above as providing written description for element 1[i] was substantially copied from *Cohen* into the '687 Application as discussed above in §II.D.

[0074] Once the user requests to record an audio track or a video, the recording engine **206** presents an indication of the initiation of the recording session. For example, the recording engine **206** can countdown to the initiation and present an indicator (e.g., visual indicator and/or aural indicator) of the countdown status. When countdown ends, the recording engine **206** begins to record audio or video detected from the audio or video input device. In some embodiments, the recording session begins when the user generates the request without additional indication provided by the recording engine **206**. During a recording session, the recording engine **206** can perform simultaneous aural playback of a beat to the recording user during a recording session when the recording user has requested to record over the beat.

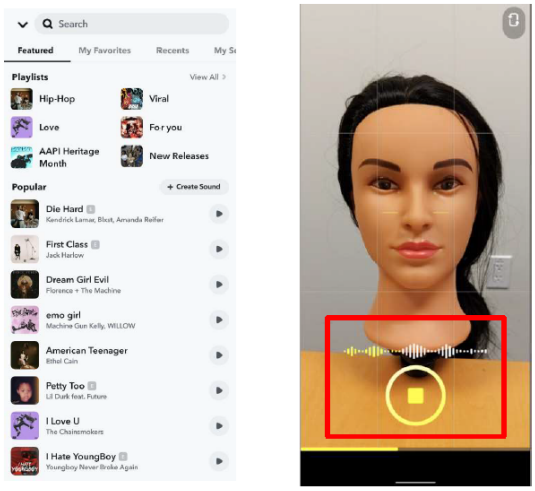
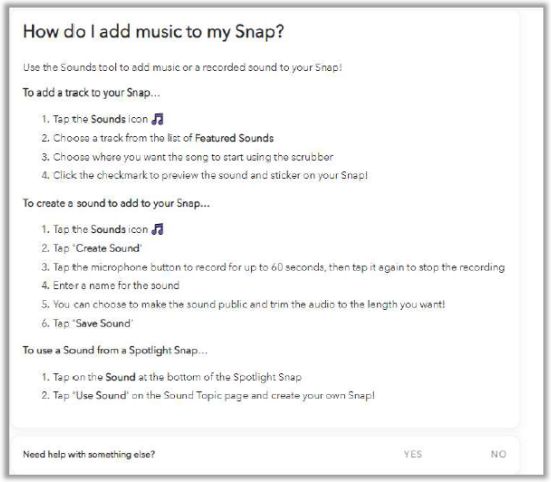
EX1004 (*Cohen*), ¶[0074].

314. More particularly, the following table compares *Cohen's* ¶[0074] with the '687 Application's ¶[0068]. The text in red is the same between the two documents. The text in blue indicates the concepts are the same between the two documents.

EX1004 (*Cohen*), ¶[0074]	EX1002 (*'911 Patent File History*), 156 ¶[0068]
Once the user requests to record an audio track or a video, the recording engine 206 presents an indication of the initiation of the recording session. For example, the recording engine 206 can countdown to the initiation and present an indicator (e.g., visual indicator and/or aural indicator) of the countdown status. When countdown ends, the recording engine 206 begins to record audio or video detected from the audio or video input device. In some embodiments, the recording session begins when the user generates the request without additional indication provided by the recording engine 206. During a recording session, the recording engine 206 can perform simultaneous aural playback of a beat to the recording user during a recording session when the recording user has requested to record over the beat.	Once the user requests to record an audio or a video recording, the recording engine 206 presents an indication of the initiation of the recording session. For example, the recording engine 206 can countdown to the initiation and present an indicator (e.g., visual and/or aural indicator) of the countdown status. When countdown ends, the recording engine 206 begins to record audio and/or video detected from the audio and/or video input device. In one embodiment, the recording session begins when the user generates the request without additional indication provided by the recording engine 206. During a recording session, the recording engine 206 can perform simultaneous aural playback of a composition to the recording user during a recording session when the recording user has requested to record over the composition.

315. Because PO asserted the portions of the '687 Application cited above provide support for element [1i], the similar portions of *Cohen* must also teach element [1i], rendering it obvious.

316. Still further, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording;	***The Snapchat App provides simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording, as shown below:*** A user can select an audio composition before beginning to record. Once a user has selected an audio composition, the Snapchat App will play the selected audio composition during the recording session.
	
	 (https://support.snapchat.com/en-US/article/add-music) (last visited January 9, 2023).

EX1038 (*Infringement Contentions*) at 26-28.

317. Finally, as discussed above in §V.C, Snap and PO have served Preliminary Proposed Claim Constructions in the related District Court case. EXS 1051, 1052. It is my opinion that element [1i] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* regardless of which Party's construction(s) is

utilized. For example, Snap has proposed that, to the extent the ambiguous outer bounds of "recording session" does not render this term indefinite, the meaning of "providing simultaneous aural playback of the audio composition during a recording session" in [1i] is "providing, by the server, simultaneous aural playback of the audio composition during a recording session." EX1051, 3. This comports with my analysis in §V.A that a POSITA would have understood that the elements of the Challenged Claims are performed on the server side. Snap's construction is taught for at least the reasons above. For example, *Cohen* expressly teaches that user interface module 214 and recording engine 206—both on the server side—provide the functionality of [1i] as described above. PO has proposed that the meaning of "providing simultaneous aural playback of the audio composition during a recording session" in [1i] is "plain and ordinary meaning" and that the meaning of "recording session" is a "period of time during which recording takes place." EX1052, 9-10, 12. This is also taught for at least the reasons above, as *Cohen* teaches a "recording session" lasting a time period defined by, for example, a user interacting with recording and stop buttons. *See also* element [1j] and claim 2.

318. Therefore, it is my opinion that element [1i] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[1j] generating recorded content based on the recording session by compositing video captured during the recording session with the instance of pre-recorded visual media content, such that the video captured during the recording session is selectively made transparent to reveal the instance of pre-recorded visual media content;

319. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1j], rendering it obvious.

320. Specifically, it is my opinion that element [1j] is rendered obvious by *Cohen* and *Chu* because: (i) *Cohen* teaches generating recorded video content based on the recording session (*e.g.*, *Cohen's* system records video content via recording engine 206 and communication module 204 of FIG. 2) (*see*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0039], [0040], [0046]-[0048], [0072]-[0073], [0085], [0090]-[0091], [0101], [0114], [0118]-[0126], [0135], [0137], [0139], [0151], [0163], [0182], [0184], [0212], and [0213], and FIGS. 1, 2, 5A, 5B, 6A), and (ii) *Chu* teaches compositing video captured during the recording session with the instance of pre-recorded visual media content (*e.g.*, *Chu* composites the content selected as discussed in element [1f] with video of users), such that the video captured during the recording session is selectively made transparent to reveal the instance of pre-recorded visual media content (*e.g.*, various portions of the captured video are made transparent during the compositing process). *See*, *e.g.*, EX1005 (*Chu*) at 1:6-21, 2:36-48, 3:19-58, 5:1-48, 9:26-10:16, 14:49-16:11, 16:25-39, FIGS. 2-3. In addition, the '911 Patent also states the compositing

process in (ii) is well-known. EX1001, 17:22-25 ("the user interface allows for a technique of compositing two frames together, wherein one image is selectively made transparent to reveal the other image, as well known in the prior art").

321. In more detail, *Cohen* (EX1004) teaches generating recorded video (and audio) content based on the recording session via, *e.g.*, recording engine 206 at the server. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0040] ("Audio tracks and video content can be produced by a user in the vicinity of an audio input device (e.g., microphone) or imaging device (e.g., camera, video recorder, web-cam) that is coupled to a computing device connected to a network. … The video can be of a user generating the audio production or other types of theatrical performances of the user"), ¶[0046] ("Users can record their own audio or video productions over another user's production (e.g., a beat)"), ¶[0047] ("a user can select to sing or record a video over a track (e.g., rhythm, beat, melody) listed on the website"), ¶[0048] ("A recording session of audio, video, or a combination thereof, can also be initiated via the user interface by clicking a button on the audio player/recorder widget, for example. … At the initiation of the recording session, the audio track or video content to which the recording user is recording over is

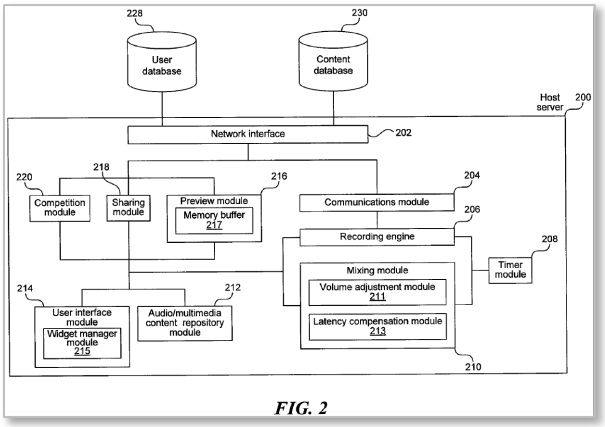


FIG. 2

played"), ¶¶[0072]-[0073] (recording engine 206 handles recording processes and communications with client devices), ¶[0114] ("The competition module 220 can initiate a recording session to capture audio detected by the user's audio input device (e.g., microphone) while performing audible playback of the beat to the user, for example, responsive to detection of a click of a pointing device on the challenge button in the user interface. … In addition, the challenger track can be combined with a video or image to generate a performance art piece, such as a music video. The video or the image can be provided by the challenger or another user. In one embodiment, the competition module 220 also records the video of the challenger during the recording session"), and ¶[0137] ("The challenge button may also allow a user to record video over a track or beat."). *See also* EX1004 (*Cohen*) at ¶[0085] (teaching video recording and mixing with stored content), ¶¶[0090]-[0091] (content stored in audio/multimedia repository module 212), ¶¶[0118]-[0126] (teaching storing user content in database 328), ¶[0135] (teaching recorder widget), ¶[0139] (teaching recording audio and video), ¶[0151] (teaching a recording widget), ¶[0163] (teaching a recording process), ¶[0182]] (teaching a recording process), ¶[0184] (teaching how recording begins), ¶[0212] (teaching recording in real time), ¶[0213] (teaching recording process).

322. Further, as discussed above, *Chu* teaches a video karaoke system where a user video-records himself/herself performing over a music track and in

front of a user-selected background which is composited with the user video. *See* elements [1i], [1f], and §III.C. More specifically, as part of this process, *Chu* teaches compositing: (i) pre-recorded content selected as discussed in element [1f] (*e.g.*, selected from a list as described in element [1f]); with (ii) the video content of a user recorded during a recording session, such that the recorded video of the user is selectively made transparent to reveal portions of the pre-recorded visual media content (*e.g.*, the content selected in element [1f]), by way of AV mixer 124 that combines the user video and background images and superimposes the user video on the background via a chroma key process (the same process described by the '911 patent, see EX1001 ('911 patent), 17:8-10). *See*, *e.g.*, EX1005 (*Chu*), 14:49-64 ("As indicated in FIG. 2, several events occur concurrently during the performance of the chosen karaoke selection. Specifically, a number of different inputs are fed to an audio/video mixer 124. The music of the selected karaoke composition is transmitted as an audio signal from the audio and video player 74 shown diagrammatically in FIG. 2. Concurrently, the chosen background scene selected from the hard disk 72 is also transmitted by the DVD/VCD player 74. The chosen background scene is typically a moving scene formed of a number of sequential frames of the selected background subject. At the same time the video image from the video camera 30 is transmitted to the audio/video mixer 124. At the same time, the vocal performance of the performer 21 is transmitted as an audio

signal from the microphone 44 through an echo circuit 132 and an audio amplifying circuit 134 to the audio/video mixer 124"), 14:65-15:9 ("the uniformly colored backdrop 34 is located directly behind the performer 21 and in linear alignment with the video camera 30, the one-way mirror 36, and the performer 21. The video camera 30 produces images of the backdrop 34 that are electronically distinguishable from the images of the performer 21 by means of an audio video mixer 124 which serves as a filter. ***The audio video mixer 124 combines the images from the video camera 30 and the selected image scene from the video storage background hard disk 72 such that the video images from the video camera 30 are superimposed upon the image scene*** from the hard disk 72") (emphasis added), 15:10-26 ("The audio video mixer 124 employed may be a digital audio video mixer, Model WJ-MX20, manufactured by Panasonic Broadcast and Television Systems Company. ***One function of the audio video mixer 124 is to provide a chroma key. The chroma key performs the process of replacing portions of one video signal with another by replacing those portions of the first video signal having a certain color range with corresponding portions of a second video signal. The audio video mixer 124 electronically filters from the selected background image scene from the hard disk 72 all portions thereof except those upon which the images of the backdrop 34 are superimposed***. Since the entire area surrounding the head and upper body portion of the performer 21

will appear as images of the backdrop to the video camera 30, it is these areas of the background scene from the hard disk 72 that are passed from the audio video mixer 124 to the capture card 136") (emphasis added), 15:32-56 (discussing capture card 136), 15:46-56 ("The capture card 136 takes the information transmitted to it and transforms that information into a digital format or language understandable to the hard drive in the central processing unit 76. This digitized information is then passed to the central processing unit 76. The portion of the backdrop 34 directly behind the performer 21 is not visible to the video camera 30. Therefore, the area of the chosen background scene from the hard disk 72 upon which the image of the performer 21 is superimposed is filtered out of the image information transmitted from the capture card 136 to the central processing unit 76"), 15:57-65 ("As a consequence, the resultant image transmitted from the capture card 136 to the central processing unit 76 is an image of the performer 21 that masks that portion of the chosen background scene from the hard disk 72 that lies directly behind the performer 21. The image of the performer 21 therefore does not appear as a double exposure or phantom image on top of the chosen background scene, but rather appears to be an image of the performer 21 performing in front of the chosen background scene"), 15:66-16:11 ("The filtered image from the capture card 136 is transmitted by the central processing unit 76 to a temporary storage area in the hard disk 72. Once the performance has been

completed the temporarily stored data on the hard disk 72 is transmitted by the central processing unit 76 to the appropriate recorder 54 and/or 56"). *See also* EX1005 (*Chu*), 1:6-21, 2:36-48, 3:19-58, 5:1-48, 9:26-10:16, 16:25-39 (MEPG converter 137), FIGS. 2 and 3.

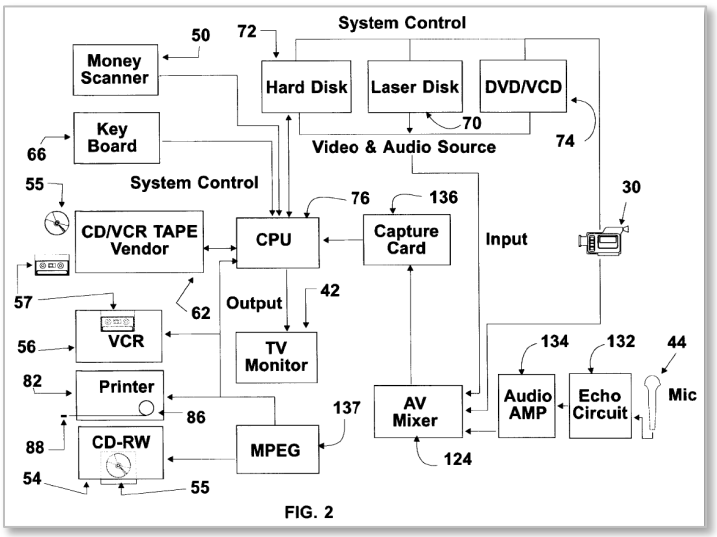


FIG. 2

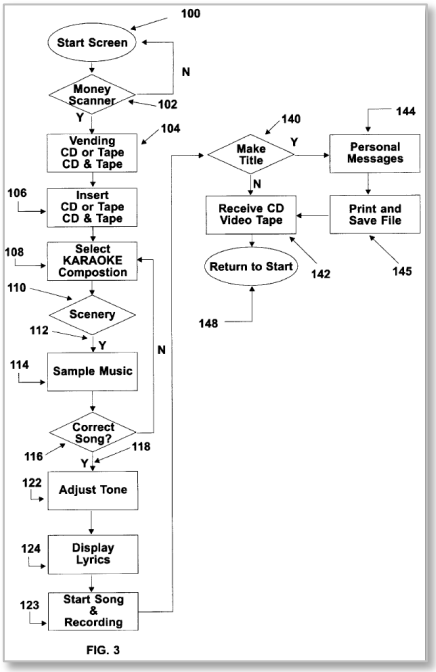


FIG. 3

323. A POSITA would have understood that the chroma key process of *Chu* would composite the user video and background images by selectively making the user video transparent to reveal portions of the pre-recorded visual media content (*e.g.*, the background images). This is the process which *Chu* is describing when it teaches "superimposing" and "replacing potions" of one signal with the other in the emphasized portions above. A POSITA would have understood superimposing/replacing a portion of the user video with a portion of the background video to be another way of saying that the portion of the user video is

made transparent so the background image can be seen. *See* §I.D (e.g., see *Gauseride* (EX1011), ¶[0026] ("[c]hroma key is a technique for blending two images, in which a color (or a small color range) from one image is removed (or made transparent), revealing another image."). As indicated in the '911 Patent (EX1001 (*'911 Patent*), 17:22-25), this technique is well-known in the prior art. Indeed, the term "chroma-key" (or "color key electronic inset") dates back to 1958, as RCA Victor invented the technique and then popularized the term in describing the process of adding special effects video background to their television broadcasts (https://worldradiohistory.com/Archive-Radio-Age/Electronic-Age-1958-Winter.pdf) and has since been used interchangeably by practitioners with "blue-screen" or "green-screen" video compositing processes. A POSITA would also have found it obvious to incorporate *Chu's* functionality on *Cohen's* host server configuration for at least the reasons discussed above and in §V.A.

324. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Sherman* and *Joslin*) in view of *Chu*. For example, a POSITA would have been motivated to modify *Cohen's* teachings of audio- and video-recording of a user singing over pre-recorded audio content with the similar process of *Chu* using *Chu's* user-selectable background and compositing functionality. In combination, these teachings provide an improved system for creating a multimedia file that includes additional user-selectable

content (*e.g.*, a user-selectable background) in addition to the underlying audio content and a video of the user singing over the content in front of the background, and compositing functionality where the user is placed in the background. A POSITA would have understood that the addition of more user-selectable content in the user-created multimedia content and the compositing functionality would have been recognized as highly desirable by 2009-2010.

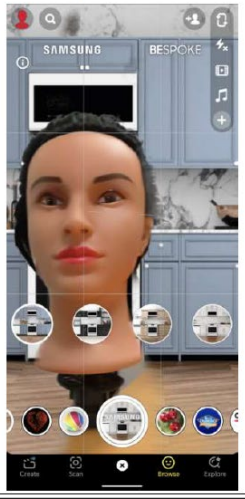
325. Additionally, *Sherman* (EX1006) and *Joslin* (EX1007) also both teach compositing their respective user videos with backgrounds. See, e.g., *Sherman* (EX1006), ¶[0024] and *Joslin* (EX1007) Abstract, 5:10-34. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* and *Chu* in view of *Sherman* and *Joslin*. For example, this is because each of *Cohen*, *Chu*, *Sherman*, and *Joslin* is in the same technical field of multimedia content creation (the technical field of the '911 Patent) and teaches various recording, compositing, previewing, sharing, publishing, and content playback functionality during a user's recording session that a POSITA would have been motivated to use interchangeably in a resulting combination. A POSITA would also have found it obvious to incorporate *Sherman's* and/or *Joslin's* functionality into *Cohen's* host server configuration for at least the reasons discussed above and in §V.A.

326. Further, generating recorded content based on the recording session by compositing video captured during the recording session with the instance of

pre-recorded visual media content, such that the video captured during the recording session is selectively made transparent to reveal the instance of pre-recorded visual media content was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.D). Indeed, as discussed above, the '911 Patent indicates that "the user interface allows for a technique of compositing two frames together, wherein one image is selectively made transparent to reveal the other image, ***as well known in the prior art***." EX1001 (*'911 Patent*), 17:22-25 (emphasis added). Thus, to the extent this feature is somehow found not to be taught by *Cohen*, *Chu*, *Sherman*, and *Joslin*, it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

327. Still further, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

generating recorded content based on the recording session by compositing video captured during the recording session with the instance of pre-recorded visual media content, such that the video captured during the recording session is selectively made transparent to reveal the instance of pre-recorded visual media content:	***The Snapchat App generates recorded content based on the recording session by compositing video captured during the recording session with the instance of pre-recorded visual media content, such that the video captured during the recording session is selectively made transparent to reveal the instance of pre-recorded visual media content, as shown below:***

	In the example below, the Snapchat App makes the video captured during the recording session selectively transparent to reveal the pre-recorded visual media  
	content. Specifically, the background of the video captured, including the water bottle, is made transparent.

EX1038 (*Infringement Contentions*) at 29-31.

328. Finally, as discussed above in §V.C, Snap and PO have served Preliminary Proposed Claim Constructions in the related District Court case. EXS 1051, 1052. It is my opinion that element [1j] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* regardless of which Party's construction(s) is utilized.

329. For example, Snap has proposed that the meaning of "generating recorded content" in [1j] is "generating, by the server, recorded content." EX1051, 3. This comports with my analysis in §V.A that a POSITA would have understood that the elements of the Challenged Claims are performed on the server side. Snap's construction is taught for at least the reasons above. For example, *Cohen* expressly teaches that recording engine 206 and communication module 204 at the server generate the recorded content as described above. PO has proposed that the

meaning of "generating recorded content" in [1j] is "generating and recording content." EX1052, 10-11. This is also taught for at least the reasons above as *Cohen* expressly teaches the generation and recording of content via recording engine 206 and communication module 204 and its various storage options such as repository module 212, content database 328, *etc*.

330. Snap has also proposed that the meaning of "compositing" in [1j] is "compositing, by the server." EX1051, 3. This comports with my analysis in §V.A that a POSITA would have understood that the elements of the Challenged Claims are performed on the server side. Snap's construction is taught for at least the reasons above. For example, a POSITA would have considered the provision of compositing functionality to be obvious based on *Chu*, *Sherman*, and *Joslin's* teachings of various compositing operations (and the '911 Patent's concession that such operations were known), and that providing such functionality server-side to be obvious based on the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin's* teachings for at least the reasons discussed above and in §V.A. PO has proposed that the meaning of "compositing" in [1j] is "plain and ordinary meaning." EX1052, 11-12. This is also taught for at least the reasons above.

331. Snap has also proposed that the meaning of "selectively made transparent" in [1j] is indefinite. EX1051, 3. As discussed above, I do not offer, at this time, an opinion as to this argument. It is my opinion that "selectively made

transparent" is understandable enough to compare it to the prior art for purposes of IPR, even if its ambiguous outer bounds would otherwise render this element, and the Challenged Claims, indefinite. PO has proposed that the meaning of "selectively made transparent" in [1j] must be construed in the context of the longer phrase "the video captured during the recording session is selectively made transparent," which PO alleges means "all or a portion of the video captured during the recording session is made transparent." EX1052, 12-13. This is also taught for at least the reasons above, as *Chu*, *Sherman*, and *Joslin* each teach making at least a portion of captured video transparent (or a POSITA would have considered it obvious to do so based on their teachings). I do note that this construction is unclear inasmuch as it permits "all" of the captured video to be made transparent, which wouldn't result in compositing. Moreover, this proposed construction does not specify whether it is "all or a portion" of a particular image or temporal portions of a video, which are different concepts.

332. Therefore, it is my opinion that element [1j] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[1l]	**displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition;**

333. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1l], rendering it obvious.

334. Specifically, it is my opinion that element [1l] is rendered obvious by *Cohen* because *Cohen* teaches displaying a preview of the recorded content to the user (*e.g.*, a preview of the video recording discussed in element [1j] is provided by preview module 216 of FIG. 2), wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition (*e.g.*, timing/latency of the newly recorded content may be adjusted relative to the underlying audio selected as discussed in element [1d] by latency compensation module 213 of FIG. 2). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0042], [0047], [0048], [0078]-[0080], [0082], [0083], [0086]-[0089], [0100], [0140], [0153], [0154], [0168], [0176], [0178], [0185], [0187], [0204], and [0211], FIGS. 1, 2, 6A.

335. In more detail, *Cohen* (EX1004) teaches providing previews of its recorded multimedia content after it is recorded. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0042] ("Once the user has completed the recording process, a preview of the recorded track can be aurally played over the network back to the recording user and the video can be visibly played over the network to the user. Typically, the recorded content is stored in the buffer (e.g., memory buffer) after recording when being played for preview"), ¶[0047] ("The user may, in some instances, preview a portion of the track or video by performing playback using an audio player/recorder widget in the user interface"), ¶[0048] ("When the recording

session has ended, for example, by user request, the recording user has the option of previewing the recorded content. If the user recorded over another piece of multimedia content, the user can listen to or view the results of the multimedia mixing"), ¶[0078]-[0079] (teaching preview module 216 handles the preview functionality), and FIGS 2 and 6A (reproduced below).

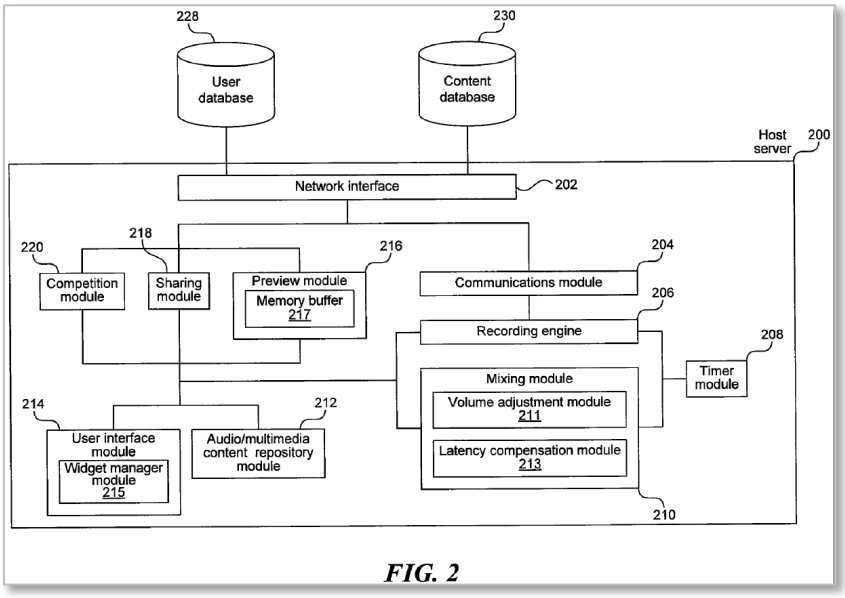


FIG. 2

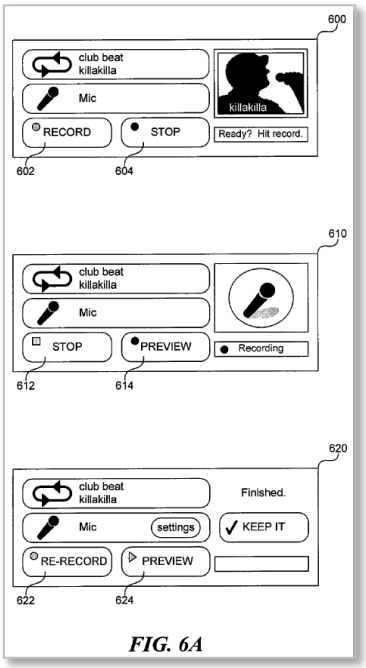


FIG. 6A

336. Further, *Cohen* (EX1004) teaches allowing the user to adjust the timing or latency of the recorded multimedia content relative to the underlying audio (or audio/video) content. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0080] ("the preview allows the user to make any adjustments to the recorded content (e.g., color, volume, frequency, speed, etc.). For example, the preview of what a mixed track would sound like enables the recording user to request any adjustment in the recorded track and/or the beat when they are mixed together"), ¶[0082] ("the

preview of the mixed track or mixed multimedia content enables the recording user to request latency adjustment between the pieces of multimedia content to be mixed together. Since one or more of the tracks is typically recorded over a network, network delays could cause the recording of the track to be delayed in time. The amount of latency adjustment can be manually determined, system determined, or predetermined. The nature of the latency can be introduced from any number of sources including but not limited to, user delay, network delay, and/or device delay, etc"), ¶[0083] ("The mixed track can be previewed by the user and subsequently stored, for example, in the audio repository module 212 or any other memory storage unit. Prior to mixing, the user can configure any settings that need to be performed in the process of mixing such as volume adjustments or latency adjustments between the tracks to be mixed"), ¶[0086] ("Additional mixing functions of the mixing module 210 can include but are not limited to, gain adjustment, pan adjustment, volume adjustment, mutes, solo controls, equalizer adjustments, compression, special effects, speed adjustment, latency compensation (adjustment), time delays, synchronization, filtering, noise removal/cancellation, and/or spectral analysis"), ¶[0087] ("One embodiment of the mixing module 210 further includes a volume adjustment module 211 and/or a latency compensation module 213"), ¶[0088] (teaching functions of latency compensation module 213 including, "[f]or mixing audio content and video content, the latency can be

compensated for by time delaying one of the pieces depending on the amount of delay introduced during the recording process"), and ¶[0089] ("latency compensation module 213 computes the latency for a particular client used by the recording user for recording the audio track or video content based on network delay or other delays. For example, the latency can be computed by determining statistical attributes for various recordings and their associated delays. Latency can also be computed for a particular client device on a session-by-session basis, for example, by pinging the client device and tracking the delay."). *See also,* for both elements, *e.g.,* EX1004 (*Cohen*) at ¶[0100], ¶[0140], ¶[0153], ¶[0154], ¶[0168], ¶[0176], ¶[0178], ¶[0185], ¶[0187], ¶[0204], and ¶[0211]. A POSITA would have understood that *Cohen's* latency adjustment functionality would have been provided via its user interface, or would have considered it obvious to do so, because it is *Cohen's* user that changes the timing or latency and a POSITA would have considered it obvious to implement such user interaction via a user interface, and because *Cohen's* other user-interaction functionality is provided through user interfaces.

337. Further, displaying a preview of recorded content to the user, and allowing the user to change the timing or latency of various components of the recorded content relative to each other was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.E). Thus, to the extent this feature was somehow found not to be

taught by *Cohen* (and/or *Chu*, *Sherman*, and *Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

338. Further, during prosecution of the '911 patent, PO identified the following parts of the underlying '687 Application as supporting element [1l]:

> After recording, a preview of the recorded content is displayed to the user, which enables timing and latency adjustments of the recorded content relative to the selected audio composition (e.g., [0072], [0073], [0093], Fig. 5). A privacy attribute is selected for the recorded content, and the

EX1002 (*'911 Patent File History*), 53. The cited portions are as follows:

> **[0072]** The preview module **216** is also, in some embodiments, coupled to the audio/multimedia content repository module **212** to access multimedia content stored in the repository. The preview module **216** is, in some embodiments, able to receive, manage, and/or execute a request to preview a particular audio content, composition, or video content. A preview typically occurs after a new recording or a new upload of a composition, audio, or video recording. After the preview, the preview module **216** can discard or save the file based on user request. In some embodiments, a preview occurs for pre-recorded compositions whereby the content is previously created and was previously stored in the audio/multimedia repository module **212.**

> **[0073]** In one embodiment, the preview module **216** provides a preview/aural playback of an audio recording after the recording session has ended. The preview module **216** also enables a recording user to preview how the synchronization of a composition and an audio recording would sound like when played together by performing simultaneous aural playback of the audio recording and the composition (e.g., beat). Similarly, the preview module **216** could further enable a recording user to preview the synchronization of audio content/recording along with a video recording/content. The preview would thus allow the recording user to decide to save or discard the recorded content and re-record. In addition, the preview allows the user to make any adjustments to the recorded content (e.g., sound or imaging effects, fade-in, fade-out, frequency, timing, etc.). For example, the recording user can change the underlying composition and/or the timing or latency adjustment (e.g., to the beat) of the audio recording for the synchronization of the composition and audio recording.

[0093] **FIG. 5** illustrates an example user interface previewing a pre-recorded composition by playing the selected item. In one embodiment, each entry listing **501** of audio content is clickable by a user to request a preview of the composition associated with the entry listing. When the listing **501** is clicked, the entry expands and more information is revealed. The user interface **500** also includes selectable tabs for users to adjust the volume for the preview of the pre-recorded composition. Additional information regarding the composition such as approval, comments, and/or ratings can also be shown.

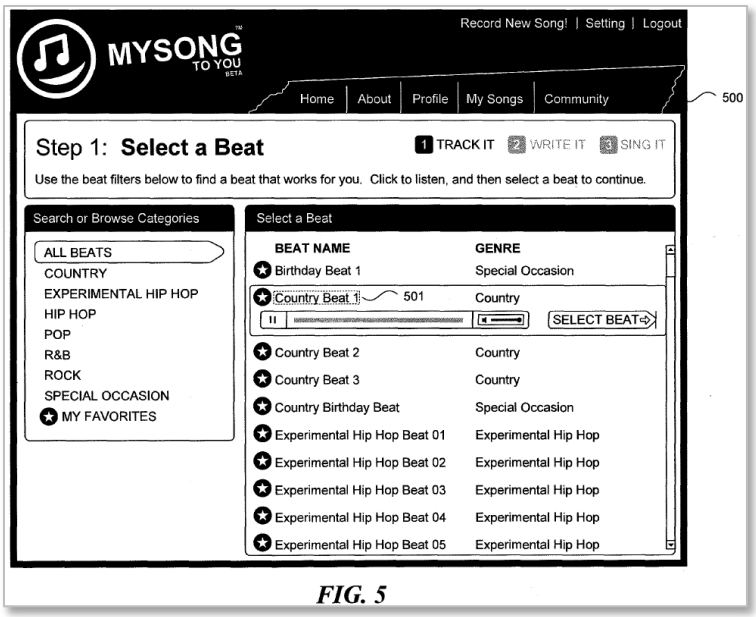


FIG. 5

EX1002 (*'911 Patent File History*), 157, 162, 180.

339. It appears that the portions of the '687 Application identified by PO above as providing written description for element [1l] were substantially copied from *Cohen* (EX1004) into the '687 Application as discussed above in §II.D. *See*, *e.g.*, the following paragraphs of *Cohen*:

[0079] The preview module **216** is also, in some embodiments, coupled to the audio/multimedia content repository module **212** to access multimedia content stored in the repository. The preview module **216** is, in some embodiments, able to receive, manage, and/or execute a request to preview a particular track. A preview typically occurs after a new recording or a new upload of an audio track or video content. After the preview, the preview module **216** can discard or save the file based on user request. In some embodiments, a preview occurs for saved audio content, for example, for content stored in the audio/multimedia repository module **212**.

[0080] In one embodiment, the preview module **216** provides aural playback of a preview of mixing the first audio track and the second audio track after the recording session has ended. The preview module **216** enables a recording user to preview what a mix of a recorded track and a beat would sound like when mixed together by performing simultaneous aural playback of the first audio track (e.g., recorded track) and the second audio track (e.g., beat). Similarly, the preview module **216** could further enable a recording user to preview a mix of video content and an audio track. The preview would thus allow the recording user to decide to save the recorded content or to discard the recorded content and re-record. In addition, the preview allows the user to make any adjustments to the recorded content (e.g., color, volume, frequency, speed, etc.). For example, the preview of what a mixed track would sound like enables the recording user to request any adjustment in the recorded track and/or the beat when they are mixed together.

[0130] In one embodiment, each entry listing with audio content includes a listen icon **410** that is clickable by a user to request playback of the beat associated with the entry listing. When the listen icon **410** is clicked, another user interface for the beat can be displayed. The user can comment on the beat on this page for example. The user can also add the beat as a favorite beat. Additional information regarding the beat, such as, tags, comments and/or ratings can be shown on this page, as illustrated with further reference to the example user interface of FIG. **5**. In one embodiment, each entry listing with video content includes a watch icon **412** that is clickable by a user to request playback of the video associated with the entry listing. In general, video content is associated with audio content and upon request of video playback, the associated audio content is aurally played as well.

EX1004 (*Cohen*), ¶¶[0079], [0080], [0130].

340. More particularly, the following table compares *Cohen's* ¶¶[0079], [0080], and [0130] with the '687 Application's ¶¶[0072], [0073], and [0093]. The

text in red is the same between the two documents. The text in blue indicates the concepts are the same between the two documents.

EX1004 (*Cohen*), ¶¶[0079], [0080], and [0130]	**EX1002 (*'911 Patent File History*), 157 (¶¶[0072], [0073]), 162 (¶[0093])**
[0079] "The preview module 216 is also, in some embodiments, coupled to the audio/multimedia content repository module 212 to access multimedia content stored in the repository. The preview module 216 is, in some embodiments, able to receive, manage, and/or execute a request to preview a particular track. A preview typically occurs after a new recording or a new upload of an audio track or video content. After the preview, the preview module 216 can discard or save the file based on user request. In some embodiments, a preview occurs for saved audio content, for example, for content stored in the audio/multimedia repository module 212."	[0072] "The preview module 216 is also, in some embodiments, coupled to the audio/multimedia content repository module 212 to access multimedia content stored in the repository. The preview module 216 is, in some embodiments, able to receive, manage, and/or execute a request to preview a particular audio content, composition, or video content. A preview typically occurs after a new recording or a new upload of a composition, audio, or video recording. After the preview, the preview module 216 can discard or save the file based on user request. In some embodiments, a preview occurs for pre-recorded compositions whereby the content is previously created and was previously stored in the audio/multimedia repository module 212."
[0080] "In one embodiment, the preview module 216 provides aural playback of a preview of mixing the first audio track and the second audio track after the recording session has ended. The preview module 216 enables a recording user to preview what a mix of a recorded track and a beat would sound like when mixed together by performing simultaneous aural playback of the first audio track (e.g., recorded track) and the second	[0073] "In one embodiment, the preview module 216 provides a preview/aural playback of an audio recording after the recording session has ended. The preview module 216 also enables a recording user to preview how the synchronization of a composition and an audio recording would sound like when played together by performing simultaneous aural playback of the audio recording and the composition (e.g., beat). Similarly, the

EX1004 (*Cohen*), ¶¶[0079], [0080], and [0130]	EX1002 (*'911 Patent File History*), 157 (¶¶[0072], [0073]), 162 (¶[0093])
audio track (e.g., beat). Similarly, the preview module 216 could further enable a recording user to preview a mix of video content and an audio track. The preview would thus allow the recording user to decide to save the recorded content or to discard the recorded content and re-record. In addition, the preview allows the user to make any adjustments to the recorded content (e.g., color, volume, frequency, speed, etc.). For example, the preview of what a mixed track would sound like enables the recording user to request any adjustment in the recorded track and/or the beat when they are mixed together."	preview module 216 could further enable a recording user to preview the synchronization of audio content/recording along with a video recording/content. The preview would thus allow the recording user to decide to save or discard the recorded content and re-record. In addition, the preview allows the user to make any adjustments to the recorded content (e.g., sound or imaging effects, fade-in, fade-out, frequency, timing, etc.). For example, the recording user can change the underlying composition and/or the timing or latency adjustment (e.g., to the beat) of the audio recording for the synchronization of the composition and audio recording."
[0130] "In one embodiment, each entry listing with audio content includes a listen icon 410 that is clickable by a user to request playback of the beat associated with the entry listing. When the listen icon 410 is clicked, another user interface for the beat can be displayed. The user can comment on the beat on this page for example. The user can also add the beat as a favorite beat. Additional information regarding the beat, such as, tags, comments and/or ratings can be shown on this page, as illustrated with further reference to the example user interface of FIG. 5 ..."	[0093] "FIG. 5 illustrates an example user interface previewing a pre-recorded composition by playing the selected item. In one embodiment, each entry listing 501 of audio content is clickable by a user to request a preview of the composition associated with the entry listing. When the listing 501 is clicked, the entry expands and more information is revealed. The user interface 500 also includes selectable tabs for users to adjust the volume for the preview of the pre-recorded composition. Additional information regarding the composition such as approval, comments, and/or ratings can also be shown."

341. Because PO asserted the portions of the '687 Application cited above provide support for element [1l], the similar portions of *Cohen* must also teach element [1l], rendering it obvious.

342. Still further, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition:	***The Snapchat App displays a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition, as shown below:***
	In the example below, after recording, the Snapchat App presents the user with a preview of the recorded content. The Snapchat App allows the user to edit the timing of the recorded content such that the recorded content plays at a different point relative to the selected audio composition. 

EX1038 (*Infringement Contentions*) at 31-32.

343. Finally, as discussed above in §V.C, Snap and PO have served Preliminary Proposed Claim Constructions in the related District Court case. EXS 1051, 1052. It is my opinion that element [1l] is taught by the combination of

Cohen, *Chu*, *Sherman*, and *Joslin* regardless of which Party's construction(s) is utilized. For example, Snap has proposed that the meaning of "the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition" in [1l] is "the preview is provided by the server and enables the user to change the timing or latency of the recorded content on the server relative to the selected audio composition." EX1051, 3. This comports with my analysis in §V.A that a POSITA would have understood that the elements of the Challenged Claims are performed on the server side. Snap's construction is taught for at least the reasons above. For example, *Cohen* expressly teaches that its preview and latency analysis functionality is provided by preview module 216 and latency compensation module 213 on the server as described above. PO has proposed that the meaning of "the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition" in [1l] is "the preview includes a user interface which enables the user to change the timing or change the latency of the recorded content relative to the selected audio composition." EX1052, 13. This is also taught for at least the reasons above and in [1e], as each of *Cohen*, *Chu*, *Sherman*, and *Joslin* teach that their functionality is provided by user interfaces.

344. Therefore, it is my opinion that element [1l] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[1m] selecting a privacy attribute for the recorded content;

345. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1m], rendering it obvious.

346. Specifically, it is my opinion that element [1m] is rendered obvious by *Cohen* because *Cohen* teaches selecting a privacy attribute for the recorded content (*e.g.*, the user may select a privacy attribute for multimedia files recorded as described in element [1j] by way of sharing module 218 of FIG. 2). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0043], [0064], [0098], [0109], [0110], [0169], and [0187].

347. Specifically, *Cohen* (EX1004) teaches a sharing module 218 at the server that permits users to select a privacy attribute for recorded multimedia content. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0109] ("The sharing module 218 may receive commands related to privacy attributes of user content. The audio content owner (e.g., recording user of an audio track, uploading user of an audio track, etc.) typically has the ability to set the privacy attributes of owned content. In some instances, other select users may have the ability to set and/or modify privacy attributes of audio content. A track may be private, public, private, shared, etc"),

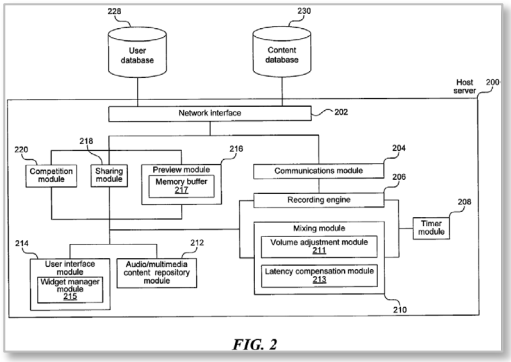


FIG. 2

¶[0110] ("The sharing module 218 provides the recording user with privacy attribute settings for the recording user to configure access to the mixed track by other users such that the audio content owner (e.g., the recorder) can determine if a particular track is visible to other users, and if so, who it is visible to and/or the group of users that it is visible to. Specific conditions under which a particular track is visible to other users can be specifiable by the content owner."). *See also* EX1004 (*Cohen*) at ¶[0043] ("When a recorded audio track or video content is permanently saved upon user request, the user can determine whether the track is accessible by other users. The user can set the privacy attribute associated with the recorded track and/or video content. For example, the recording user can make the recorded content publicly accessible (e.g., can be aurally played by other users), accessible to a select group of people, or private (e.g., is only visible to the recording user and/or can only be played by the recording user)"), ¶[0064] ("In the example of FIG. 2, the host server 200 includes … a sharing module 218"), ¶[0098] ("The user interface module 214 can further provide … a selectable button in the audio player/recorder widget for setting the privacy attribute of the audio track"), ¶[0162] ("In one embodiment, when a track is uploaded, the owner can set the accessibility (e.g., privacy settings) of the track. For example, the track may be visible to the public or only visible to the owner and/or other select users"), ¶[0169] ("In addition, the user can optionally share saved content with other users,

for example, in process 714. Each saved content can have its own privacy settings governing visibility, accessibility, rights to edit the track, and/or rights to record over the content, etc"), and ¶[0187] ("In process 926, a selectable button is provided in the user interface to indicate an accessibility option. For example, the button associated with multimedia content can be selected to indicate the privacy attribute (e.g., public, shared, protected, and/or private).").

348. Further, selecting privacy attributes for recorded content was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.F). Thus, to the extent this feature was somehow found not to be taught by *Cohen* (and/or *Chu*, *Sherman*, and *Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

349. Further, during prosecution of the '911 patent, PO identified the following parts of the underlying '687 Application as supporting element [1m]:

> [0072], [0073], [0093], Fig. 5). A privacy attribute is selected for the recorded content, and the recorded content is sent to the host server, which is configured to store multimedia content according to the selected privacy attribute (e.g., [0058], [0088]).

350. EX1002 (*'911 Patent File History*), 53. The portions of the '687 Application cited by PO are as follows:

[0058] The host server **121** is, in some embodiments, able to communicate with client devices **101-103** via the network **110.** In addition, the host server **121** is able to retrieve data from the user database **122** and the content database **125.** In some embodiments, the host server **121** is able to facilitate the generation of audio and video content, multimedia-content sharing over a network (e.g., the network **110)** among various users of the client devices **101-103.** The host server **121** can store multimedia content to be provided to other users, for example, for on-demand audio and/or video playback and recording. For example, users can listen to audio content or view video content shared by other users. Users can also, in some embodiments, record voice or audio recordings over pre-recorded compositions comprising of beats or melodies- otherwise known as generating audio content. These compositions may be provided by other users stored on the host system over a network. These recording sessions can be conducted in real-time or near real-time as the user is generating the audio or video content, for example.

[0088] One embodiment of the present disclosure includes a sharing module **224.** The sharing module **224** can be any combination of hardware components and/or software agents able to manage, track, modify, and/or enforce the privacy attributes of audio content. The sharing module **218** may receive commands related to privacy attributes of user content. The multimedia content owner (e.g., recording user of an audio or video content, etc.) typically has the ability to set the privacy attributes of owned content. The multimedia content may be shown on the user's public profile or kept as a private draft, etc., with further reference to **FIG. 15.**

EX1002 (*'911 Patent File History*), 153, 161.

351. It appears that the portions of the '687 Application identified by PO above as providing written description for element [1m] were substantially copied from *Cohen* (EX1004) into the '687 Application as discussed above in §II.D. *See*, *e.g.*, the following paragraphs of *Cohen*:

[0062] The host server **100** is, in some embodiments, able to communicate with client devices **102**A-N via the network **106**. In addition, the host server **100** is able to retrieve data from the user database **128** and the content database **130**. In some embodiments, the host server **100** is able to facilitate

web-based performance collaborations, multimedia-content sharing, exchange, and competition over a network (e.g., the network **106**) among various users of the client devices **102**A-N. Performance collaborations are typically conducted using user generated and/or user provided audio or multimedia content. The host server **100** can store the user multimedia content to be provided to other users, for example, for on-demand audio and/or video playback/recording. For example, users can listen to audio content or view video content shared by other users. Users can also, in some embodiments, record audio tracks over tracks such as tracks comprising beats provided by other users stored on the host system of the web-portal, or, in other words, create mixed tracks. These recording sessions can be conducted in real-time or near real-time as the user is generating the audio or video content, for example.

[0109] One embodiment of the present disclosure includes a sharing module **218**. The sharing module **218** can be any combination of hardware components and/or software agents able to manage, track, modify, and/or enforce the privacy attributes of audio content added to the service site in the host platform. The sharing module **218** may receive commands related to privacy attributes of user content. The audio content

owner (e.g., recording user of an audio track, uploading user of an audio track, etc.) typically has the ability to set the privacy attributes of owned content. In some instances, other select users may have the ability to set and/or modify privacy attributes of audio content. A track may be private, public, private, shared, etc.

EX1004 (*Cohen*), ¶¶[0062], [0109].

352. More particularly, the following table compares *Cohen's* ¶¶[0062] and [0109] with the '687 Application's ¶¶[0058] and [0088]. The text in red is the same between the two documents. The text in blue indicates the concepts are the same between the two documents.

Cohen ¶[0062]	**'687 Application ¶[0058]**
[0062] "The host server 100 is, in some embodiments, able to communicate with client devices 102A-N via the network 106. In addition, the host server 100 is able to retrieve data from	[0058] "The host server 121 is, in some embodiments, able to communicate with client devices 101-103 via the network 110. In addition, the host server 121 is able to retrieve data from

Cohen ¶[0062]	'687 Application ¶[0058]
the user database 128 and the content database 130. In some embodiments, the host server 100 is able to facilitate web-based performance collaborations, multimedia-content sharing, exchange, and competition over a network (e.g., the network 106) among various users of the client devices 102A-N. Performance collaborations are typically conducted using user generated and/or user provided audio or multimedia content. The host server 100 can store the user multimedia content to be provided to other users, for example, for on demand audio and/or video playback/recording. For example, users can listen to audio content or view video content shared by other users. Users can also, in some embodiments, record audio tracks over tracks such as tracks comprising beats provided by other users stored on the host system of the web-portal, or, in other words, create mixed tracks. These recording sessions can be conducted in real time or near real-time as the user is generating the audio or video content, for example."	the user database 122 and the content database 125. In some embodiments, the host server 121 is able to facilitate the generation of audio and video content, multimedia-content sharing over a network (e.g., the network 110) among various users of the client devices 101-103. The host server 121 can store multimedia content to be provided to other users, for example, for on-demand audio and/or video playback and recording. For example, users can listen to audio content or view video content shared by other users. Users can also, in some embodiments, record voice or audio recordings over pre-recorded compositions comprising of beats or melodies—otherwise known as generating audio content. These compositions may be provided by other users stored on the host system over a network. These recording sessions can be conducted in real-time or near real-time as the user is generating the audio or video content, for example."
[0109] "One embodiment of the present disclosure includes a sharing module 218. The sharing module 218 can be any combination of hardware components and/or software agents able to manage, track, modify, and/or enforce the privacy attributes of audio content added to the service site in the host platform. The sharing module 218 may receive commands related to	[0088] "One embodiment of the present disclosure includes a sharing module 224. The sharing module 224 can be any combination of hardware components and/or software agents able to manage, track, modify, and/or enforce the privacy attributes of audio content. The sharing module 218 may receive commands related to privacy attributes of user content. The

Cohen ¶[0062]	'687 Application ¶[0058]
privacy attributes of user content. The audio content owner (e.g., recording user of an audio track, uploading user of an audio track, etc.) typically has the ability to set the privacy attributes of owned content. In some instances, other select users may have the ability to set and/or modify privacy attributes of audio content. A track may be private, public, private, shared, etc."	multimedia content owner (e.g., recording user of an audio or video content, etc.) typically has the ability to set the privacy attributes of owned content. The multimedia content may be shown on the user's public profile or kept as a private draft, etc., with further reference to FIG. 15."

353. Because PO asserted the portions of the '687 Application cited above provide support for element [1m], the similar portions of *Cohen* must also teach element [1m], rendering it obvious.

354. Finally, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

selecting a privacy attribute for the recorded content:	***The Snapchat App selects a privacy attribute for the recorded content, as shown below:***
	The Snapchat App selects a default privacy attribute for the recorded content based on the user's "friends list". *See* https://support.snapchat.com/en-US/a/my-story (last visited January 9, 2023). Change Who Can View My Story The default privacy setting is that only Snapchatters you've added can view your Story 👀 To change who can see My Story... 1. Tap ⚙ in My Profile to open **Settings** 2. Scroll down to '**Who Can...**' and tap '**View My Story**' 3. Select either '**Everyone**,' '**My Friends**,' or '**Custom**' The privacy settings you have when you send a Snap to your Story will remain for that Snap, even if you change the settings later. For example, if your privacy was set to '**My Friends**' at the time the Snaps were sent to My Story, then only Snapchatters on your friends list will be able to see those Snaps.

EX1038 (*Infringement Contentions*) at 33-34.

355. Therefore, it is my opinion that element [1m] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[1n]	**sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute;**

356. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1n], rendering it obvious.

357. Specifically, it is my opinion that limitation [1n] is rendered obvious by *Cohen* because *Cohen* teaches sending the recorded content to the host server (*e.g.*, in *Cohen's* system, after a preview is provided, the multimedia recordings can be permanently saved by a user, such as in content database 130/230 or repository module 212, implemented as a distinct host server), wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute (*e.g.*, *Cohen's* content database 130/230 stores the recorded multimedia content and provides access thereto, such as in accordance with element [1d] according to the privacy attributes selected as described in element [1m]). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0042], [0043], [0047], [0049], [0078], [0090], [0109], [0110], [0116], [0117], [0121]-[0126], [0169], and [0179], and FIGS. 1 and 2.

358. Specifically, *Cohen* (EX1004) teaches that a user's recordings are first stored for preview in a buffer, such as memory buffer 217 in preview module 216 in FIG. 2, and then may be saved by the user into permanent storage, such as in content database 230 and/or repository module 212 at the server in FIG. 2. As discussed above in element [1d], *Cohen* teaches that each of the modules shown in FIG. 2 may be implemented as separate servers. EX1004 (*Cohen*) at ¶¶[0116]-[0117]. Thus, it would have been obvious to implement preview module 216, content database 230, and repository module 212 as separate servers, and permanently saving the user's recording would therefore send the recording from one server (*e.g.*, preview module 216) to another (*e.g.*, content database 230 or repository module 212). *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0042] ("Typically, the recorded content is stored in the buffer (e.g., memory buffer) after recording when being played for preview. ... If and when the recorded audio track or recorded video is satisfactory to the user, the track can be permanently saved"), ¶[0043] ("When a recorded audio track or video content is permanently saved upon user request)"), ¶[0047] ("Since audio tracks and video content provided by users are stored on a server, the physical presence of

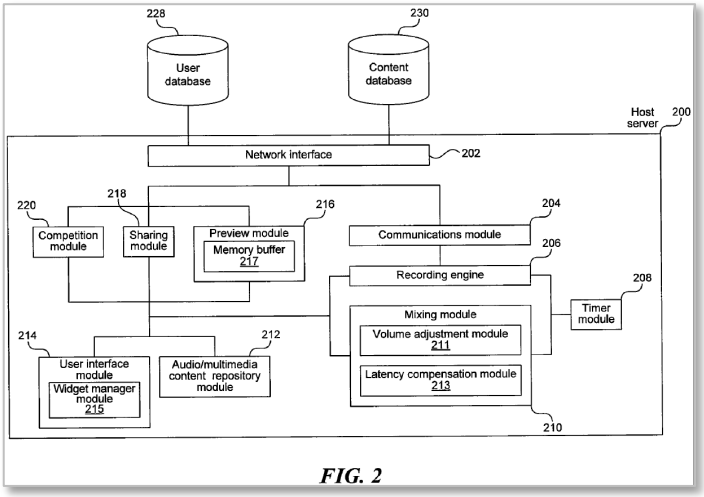


FIG. 2

each participant of the collaborative recording session is not necessary"), ¶[0049] ("The recording (e.g., mixed audio track, acappela track, video content) can be saved upon user request, for example, when the user determines that the recording is satisfactory."), ¶[0078] ("In one embodiment, the preview module 216 includes a memory buffer 217. Multimedia content stored in the preview module 216 may be stored temporarily (e.g., in the memory buffer 217) during preview and/or further until the user decides to save or discard the stored content. The stored content can include recorded or uploaded audio, image, and/or video content, for example"), ¶[0090] ("The host server 200 in the example of FIG. 2, in accordance with one embodiment, further includes the audio/multimedia repository module 212" that can store video content "after a video is recorded by the recording engine 206 or after mixed multimedia content is generated by the mixing module 210"), ¶¶[0121]-[0126] (teaching provisions of content database 328 that can store user content submitted by users), and ¶[0169] ("In process 712, the user selects to save the audio track and/or video content. The audio track and/or video content can be saved on a system database affiliated with and/or managed by the service site. The user can [access] the saved content via the service site. Additionally, the user can manage multiple listings of multimedia content saved through the service site and access the listing via the web interface. In addition, the user can optionally share saved content with other users, for example, in process 714. Each saved content

can have its own privacy settings governing visibility, accessibility, rights to edit the track, and/or rights to record over the content, etc").

359. Further, *Cohen* teaches that the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute. Specifically, *Cohen* teaches that the user's recording is stored in content database 230 and/or repository module 212 at the server with its privacy attribute dictating its availability to other users of the system (*see also* the discussion above in element [1d]/[1m], explaining that content stored in content database 230 and/or repository module 212 is available to other users of *Cohen's* system based on the privacy attribute). *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0043] ("When a recorded audio track or video content is permanently saved upon user request, the user can determine whether the track is accessible by other users. The user can set the privacy attribute associated with the recorded track and/or video content. For example, the recording user can make the recorded content publicly accessible (e.g., can be aurally played by other users), accessible to a select group of people, or private (e.g., is only visible to the recording user and/or can only be played by the recording user)"), ¶[0049] ("In most instances, the recording user can optionally make the recording or the performance art piece generated from the recording accessible to other users. For example, other users can listen to the recorded track or view the video content/performance art piece via the web

interface and provide comments and/or ratings"), ¶[0109] ("One embodiment of the present disclosure includes a sharing module 218. The sharing module 218 can be any combination of hardware components and/or software agents able to manage, track, modify, and/or enforce the privacy attributes of audio content added to the service site in the host platform. The sharing module 218 may receive commands related to privacy attributes of user content. The audio content owner (e.g., recording user of an audio track, uploading user of an audio track, etc.) typically has the ability to set the privacy attributes of owned content. In some instances, other select users may have the ability to set and/or modify privacy attributes of audio content. A track may be private, public, private, shared, etc"), ¶[0110] ("The sharing module 218 provides the recording user with privacy attribute settings for the recording user to configure access to the mixed track by other users such that the audio content owner (e.g., the recorder) can determine if a particular track is visible to other users, and if so, who it is visible to and/or the group of users that it is visible to"), ¶[0169] ("In addition, the user can optionally share saved content with other users, for example, in process 714. Each saved content can have its own privacy settings governing visibility, accessibility, rights to edit the track, and/or rights to record over the content, etc"), and ¶[0179] ("The owner can save the track but keep it private such that the saved content is only visible and/or accessible to the owner, and/or select users. In process 822, the user

selects to share the performance art piece with other users. The performance art piece may thus be visible to other users and accessible by other users, for example, for playback purposes.”). Based on the above, to provide the functionality taught by *Cohen*, a POSITA would have understood that the host server was configured to facilitate privacy-based access to the user recordings by other users.

360. In addition to the express teachings above, it would have been obvious to a POSITA to implement *Cohen* with the preview module 216 existing on a different server from that of the content database 130/230 or repository module 212 for reasons of storage capacity and performance, *e.g.*, to optimize for lower-latency memory access from a smaller capacity storage unit, as relevant for transient storage (preview purposes) relative to the longer-term storage demands of large collections of media content (repository) that will be accessed less frequently. In this scenario, the process of storing the previewed contents would include sending the recorded data from the preview module to the content database or repository module.

361. Further, sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.F). Thus, to the extent this feature was somehow found not to be taught by *Cohen* (and/or *Chu*, *Sherman*, and *Joslin*), it would have been

obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above

362. Further, during prosecution of the '911 patent, PO identified the following parts of the underlying '687 Application as supporting element [1n]:

> [0072], [0073], [0093], Fig. 5). A privacy attribute is selected for the recorded content, and the recorded content is sent to the host server, which is configured to store multimedia content according to the selected privacy attribute (e.g., [0058], [0088]).

EX1002 (*'911 Patent File History*), 53. The cited portions are as follows:

> **[0058]** The host server **121** is, in some embodiments, able to communicate with client devices **101-103** via the network **110.** In addition, the host server **121** is able to retrieve data from the user database **122** and the content database **125.** In some embodiments, the host server **121** is able to facilitate the generation of audio and video content, multimedia-content sharing over a network (e.g., the network **110)** among various users of the client devices **101-103.** The host server **121** can store multimedia content to be provided to other users, for example, for on-demand audio and/or video playback and recording. For example, users can listen to audio content or view video content shared by other users. Users can also, in some embodiments, record voice or audio recordings over pre-recorded compositions comprising of beats or melodies- otherwise known as generating audio content. These compositions may be provided by other users stored on the host system over a network. These recording sessions can be conducted in real-time or near real-time as the user is generating the audio or video content, for example.

> **[0088]** One embodiment of the present disclosure includes a sharing module **224.** The sharing module **224** can be any combination of hardware components and/or software agents able to manage, track, modify, and/or enforce the privacy attributes of audio content. The sharing module **218** may receive commands related to privacy attributes of user content. The multimedia content owner (e.g., recording user of an audio or video content, etc.) typically has the ability to set the privacy attributes of owned content. The multimedia content may be shown on the user's public profile or kept as a private draft, etc., with further reference to **FIG. 15.**

EX1002 (*'911 Patent File History*), 153, 161.

363. It appears that the portions of the '687 Application identified by PO above as providing written description for element [1n] were substantially copied from *Cohen* (EX1004) into the '687 Application as discussed above in §II.D. *See*, *e.g.*, the following paragraphs of *Cohen*:

[0062] The host server **100** is, in some embodiments, able to communicate with client devices **102**A-N via the network **106**. In addition, the host server **100** is able to retrieve data from the user database **128** and the content database **130**. In some embodiments, the host server **100** is able to facilitate web-based performance collaborations, multimedia-content sharing, exchange, and competition over a network (e.g., the network **106**) among various users of the client devices **102**A-N. Performance collaborations are typically conducted using user generated and/or user provided audio or multimedia content. The host server **100** can store the user multimedia content to be provided to other users, for example, for on-demand audio and/or video playback/recording. For example, users can listen to audio content or view video content shared by other users. Users can also, in some embodiments, record audio tracks over tracks such as tracks comprising beats provided by other users stored on the host system of the web-portal, or, in other words, create mixed tracks. These recording sessions can be conducted in real-time or near real-time as the user is generating the audio or video content, for example.

[0109] One embodiment of the present disclosure includes a sharing module **218**. The sharing module **218** can be any combination of hardware components and/or software agents able to manage, track, modify, and/or enforce the privacy attributes of audio content added to the service site in the host platform. The sharing module **218** may receive commands related to privacy attributes of user content. The audio content

owner (e.g., recording user of an audio track, uploading user of an audio track, etc.) typically has the ability to set the privacy attributes of owned content. In some instances, other select users may have the ability to set and/or modify privacy attributes of audio content. A track may be private, public, private, shared, etc.

EX1004 (*Cohen*), ¶¶[0062], [0109].

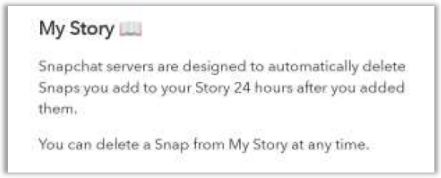
364. More particularly, the following table compares *Cohen's* ¶¶[0062] and [0109] with the '687 Application's ¶¶[0058] and [0088]. The text in red is the same between the two documents. The text in blue indicates the concepts are the same between the two documents.

EX1004 (*Cohen*), ¶[0062], ¶[0109]	**EX1002 (*'911 Patent File History*), 153 (¶[0058]), 161 ([0088])**
[0062] "The host server 100 is, in some embodiments, able to communicate with client devices 102A-N via the network 106. In addition, the host server 100 is able to retrieve data from the user database 128 and the content database 130. In some embodiments, the host server 100 is able to facilitate web-based performance collaborations, multimedia-content sharing, exchange, and competition over a network (e.g., the network 106) among various users of the client devices 102A-N. Performance collaborations are typically conducted using user generated and/or user provided audio or multimedia content. The host server 100 can store the user multimedia content to be provided to other users, for example, for on demand audio and/or video playback/recording. For	[0058] "The host server 121 is, in some embodiments, able to communicate with client devices 101-103 via the network 110. In addition, the host server 121 is able to retrieve data from the user database 122 and the content database 125. In some embodiments, the host server 121 is able to facilitate the generation of audio and video content, multimedia-content sharing over a network (e.g., the network 110) among various users of the client devices 101-103. The host server 121 can store multimedia content to be provided to other users, for example, for on-demand audio and/or video playback and recording. For example, users can listen to audio content or view video content shared by other users. Users can also, in some embodiments, record voice or audio

EX1004 (*Cohen*), ¶[0062], ¶[0109]	EX1002 (*'911 Patent File History*), 153 (¶[0058]), 161 ([0088])
example, users can listen to audio content or view video content shared by other users. Users can also, in some embodiments, record audio tracks over tracks such as tracks comprising beats provided by other users stored on the host system of the web-portal, or, in other words, create mixed tracks. These recording sessions can be conducted in real time or near real-time as the user is generating the audio or video content, for example.	recordings over pre-recorded compositions comprising of beats or melodies—otherwise known as generating audio content. These compositions may be provided by other users stored on the host system over a network. These recording sessions can be conducted in real-time or near real-time as the user is generating the audio or video content, for example."
[0109] "One embodiment of the present disclosure includes a sharing module 218. The sharing module 218 can be any combination of hardware components and/or software agents able to manage, track, modify, and/or enforce the privacy attributes of audio content added to the service site in the host platform. The sharing module 218 may receive commands related to privacy attributes of user content. The audio content owner (e.g., recording user of an audio track, uploading user of an audio track, etc.) typically has the ability to set the privacy attributes of owned content. In some instances, other select users may have the ability to set and/or modify privacy attributes of audio content. A track may be private, public, private, shared, etc."	[0088] "One embodiment of the present disclosure includes a sharing module 224. The sharing module 224 can be any combination of hardware components and/or software agents able to manage, track, modify, and/or enforce the privacy attributes of audio content. The sharing module 218 may receive commands related to privacy attributes of user content. The multimedia content owner (e.g., recording user of an audio or video content, etc.) typically has the ability to set the privacy attributes of owned content. The multimedia content may be shown on the user's public profile or kept as a private draft, etc., with further reference to FIG. 15."

365. Because PO asserted the portions of the '687 Application cited above provide support for element [1n], the similar portions of *Cohen* must also teach element [1n], rendering it obvious.

366. Still further, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute;	***The Snapchat App sends the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute, as shown below:*** The Snapchat App publishes the user's recorded content to the user's "Story." A user's Story is saved on Snapchat servers. *See* https://support.snapchat.com/en-US/a/when-are-snaps-deleted (last visited January 9, 2023). 
	Once the user saves the recorded content to his or her Story, other users can view it, depending on the selected privacy attribute. *See* https://support.snapchat.com/en-US/a/my-story (last visited January 9, 2023). 

EX1038 (*Infringement Contentions*) at 35-36.

367. Finally, as discussed above in §V.C, Snap and PO have served Preliminary Proposed Claim Constructions in the related District Court case. EXS 1051, 1052. It is my opinion that element [1n] is taught by the combination of

Cohen, *Chu*, *Sherman*, and *Joslin* regardless of which Party's construction(s) is utilized. For example, Snap has proposed that the meaning of "facilitate access to other users" in [1n] is "plain and ordinary meaning." EX1051, 3. This is taught for at least the reasons above. PO has proposed that the meaning of "access to other users" in [1n] is "access by other users" EX1052, 4-5. This is also taught for at least the reasons above.

368. Therefore, it is my opinion that element [1n] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[1o] receiving a request to publish the recorded content;

369. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1o], rendering it obvious.

370. Specifically, it is my opinion that limitation [1o] is rendered obvious by *Cohen* because *Cohen* teaches receiving a request to publish the recorded content (*e.g.*, *Cohen's* user interface widget 520 / widget interface manager 215 receives a user request by clicking on, for example, a Facebook post button, to publish the recorded multimedia content (created as described in element [1j] and provided as part of multimedia player widget 502) to social media websites). *See*, *e.g.*,

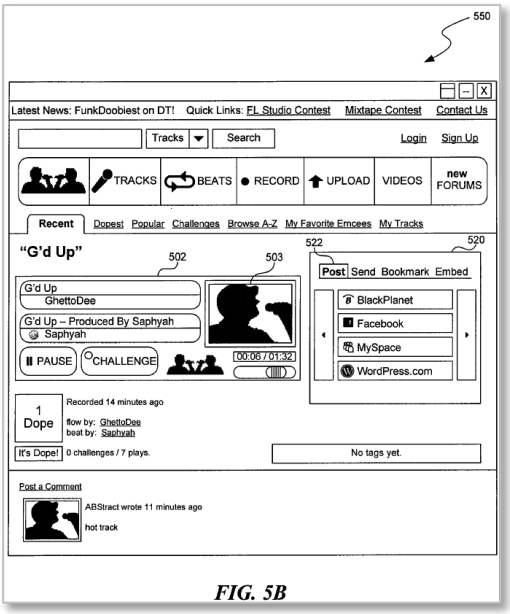


FIG. 5B

EX1004 (*Cohen*) at ¶¶[0064], [0092]-[0094], [0103]-[0105], [0142]-[0149], [0145], and [0208], and FIGS. 1, 2, 5B-5E.

371. In more detail, *Cohen* (EX1004) teaches its user interface includes a user interface widget 520 / widget interface manager 215 that receives user requests (*e.g.*, user clicks on a Facebook post button) from user interface widget 520 to publish content (*e.g.,* the multimedia content recorded in *Cohen's* system) to social media websites (*e.g.*, by "migrating" the player widget 502 that can play the specified content to "an external platform (target platform)." *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0103] ("The graphical user interface widget (e.g., the widget 520 of FIG. 5B) includes multiple options related to actions for migration of an instance of the audio player widget 502 (or multi-media player widget) to an external platform (target platform). The selected action related to migration of an instance of the audio player widget (or multi-media player widget) to a target platform can be performed by the widget manager module 215"), ¶[0104] ("a user in the host platform can post an instance of the audio player widget (or multi-media player widget) on his/her profile in an online social network. The online social network can be, by way of example but not limitation, Facebook, MySpace, BlackPlanet, and WordPress.com"), ¶[0145] ("The graphical user interface widget 520 includes many selectable options related to migration of an instance of the audio player widget in the graphical user interface widget in the source platform to a target

(external) platform. In the example of FIG. 5B, the "post" option 522 is illustrated. The post option 522 may allow users to post the instance of the audio player widget 502 to a profile page of the user or another user in the target platform (e.g., BlackPlanet, Facebook, MySpace, etc.). The instance of the audio player/recorder widget 502 may then be accessed in the target platform for multimedia content playback or recording purposes"), ¶[0142] (teaching adding the audio player/recorder widget 502 to a user's personalized space in a social networking site (e.g., Friendster, Facebook, Linkedin, etc.)), and ¶[0144] ("The graphical user interface widget 520 is provided in the user interface 550 interface in a source (host) platform where a first set of users share audio and multimedia content and collaborate in musical or performance creations using the audio player widget 502 (or multimedia player/recorder widget). The graphical user interface widget 520 is typically linked to the audio player widget 502 (or multimedia player/recorder widget) in the user interface 550 in such a manner that, for example, the instance of the audio player widget 502 that has been migrated to

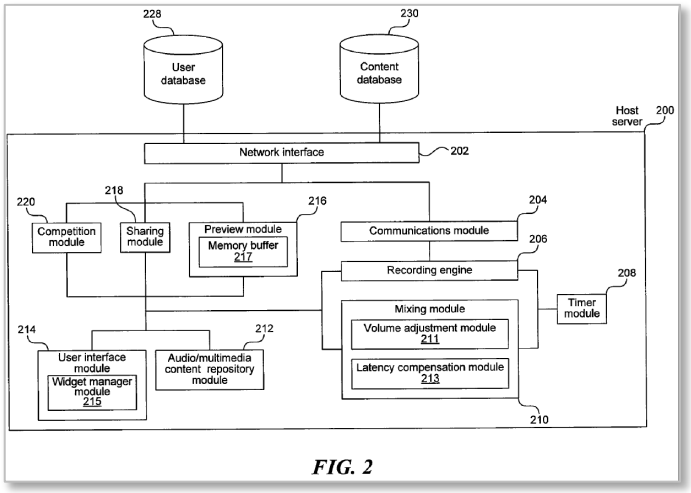


FIG. 2

an external platform can be used to access the multimedia content being played back in the widget 502 in the source platform."). *See also* EX1004 (*Cohen*) at ¶[0064] (teaching user interface module 214 can include a widget manager module 215), ¶¶[0092]-[0094] (teaching user interface module 214 provides user interfaces and widgets), ¶[0105] (teaching bookmarking an instance of the audio player widget), ¶¶[0143]-[0149] (teaching various embodiments of example user interface 550 with audio player/recorder widget 502 and graphical user interface widget 520, including the sending of the widget by email in FIGS. 5C/5F, bookmarking the widget in FIG. 5D, and embedding the widget on a social media website in FIG. 5E), and ¶[0208] and FIGS. 1, 2, 5B-5E.

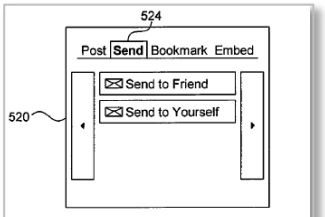


FIG. 5C

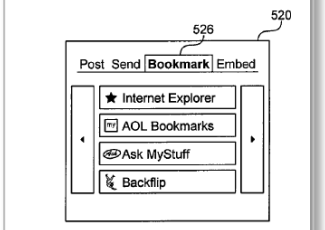


FIG. 5D

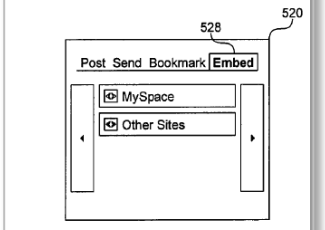


FIG. 5E

372. Nevertheless, PO argued during prosecution that the Examiner had not shown that *Cohen* teaches element [1o] as follows:

> The Examiner asserts that Cohen discloses "receiving a request to publish the recorded content; in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video; publishing the streamable video by copying the streamable video to a media server," citing paragraphs [0169] and [0170] and Figure 7, steps 714–718. Despite the Examiner's qualification that "*arguably*, these cited sections *can* reasonably read on the particular claimed features," (emphasis added), they in fact do *not* reasonably "read on" the particular claimed features because they do not disclose them.

> Cohen Paragraphs [0169] and [0170] discuss generally the concept of saving content to a "service site" and disclose "[i]n response to the user request to share the track with others, a listing entry of the content is published on the service site." This does not disclose "in response to the request to publish, *processing and encoding individual components of the recorded content to create a streamable video*." Figure 7 offers no such disclosure either—whether 'arguably' or otherwise.

EX1002 (*'911 Patent File History*), 56-57.

373. Although PO's arguments reference each of elements [1o]-[1s], they appear to be focused on element [1r]. In any event, to the extent PO's argument is addressing element [1o], it misrepresents *Cohen's* teachings. *Cohen* specifically teaches "receiving a request to publish the recorded content" for at least the reasons above.

374. Moreover, even if *Cohen* was deficient with respect to element [1o] in any regard (it is not), *Sherman and Joslin* both teach "receiving a request to publish the recorded content." For example, *Sherman* (EX1006) teaches functionality where "the system software may be used to prepare video clips for electronic distribution as announcements, invitations, greetings, etc." *Sherman* (EX1006), ¶[0038]. In this embodiment, an invitee will be directed to a website for the invitation where "a highly individualized video clip [with] their favorite actors or singers deliver[ing] their particular message" is provided. *Sherman* (EX1006), ¶[0038]. *Sherman* also notes that on-line distribution is viable as video compression technology has advanced. *Sherman* (EX1006), ¶[0041].

375. A POSITA would have understood that placing the video clip on the invitation website for an invitee to view is "publishing" the video clip, as it makes the video clip accessible on the web. And in the context of a web-based distribution mechanism for publishing video clips, a POSITA would have understood that creating the greeting and setting up the invitation is a "request" by the user to publish the video clip on the web-based invitation site.

376. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Chu* and/or *Joslin*) in view of *Sherman*. For example, a POSITA would have been motivated to modify *Cohen* (as shown in FIG. 5B) and *Chu's* teachings of sharing their user-recorded videos with *Sherman's* teachings of processing and encoding such videos and electronically distributing them, such as by using them on an invitation website. A POSITA would have understood that the addition of more distribution methods to share content would have been recognized as highly desirable by 2009-2010. In particular, a POSITA would have understood that *Sherman's* invitation creation option could have been directly incorporated into (or otherwise used in) *Cohen's* system as an additional option in FIG. 5B to provide added functionality. For example, a POSITA would have understood that adding another alternative to the "post" to Facebook, MySpace, *etc*. option taught by *Cohen*, such as "create invitation" would have been desirable. Moreover, a POSITA would have

considered it obvious to utilize the processing and encoding functionality taught by *Sherman* instead of *Cohen's* widget functionality to create the invitation, or to otherwise implement the other "posting" options of *Cohen*.

377. Additionally and alternatively, *Joslin* (EX1007) teaches that the participant's performance may be stored in a digital storage device for viewing and may be "uploaded to a server for subsequent download by the participant via the Internet." *Joslin* (EX1007), 2:39-44. *Joslin* further teaches that it includes "means for retrieving a participant's performance video" from the performance media library where it has been stored as an MPEG-2 video, "and modifying the format and resolution to compressed digital video for internet video streaming, and uploading to a server for later download by the participant via the internet." *Joslin* (EX1007), 3:36-44, 10:33-39. *See also Joslin* (EX1007), 11:61-67.

378. A POSITA would have understood that "internet video streaming" refers to the transmission of video data from a server (*e.g.*, *Joslin's* server) to one or more clients (*e.g.*, *Joslin's* participants' devices). As a precursor, the performance must be placed on a server from where it will later be streamed to clients. A POSITA would have understood that such placement of the performance on a server constitutes "publishing." A POSITA would also have understood that *Joslin's* teaching that the participant's performance video can be: (i) retrieved from storage; and (ii) formatted for "internet video streaming" would have been

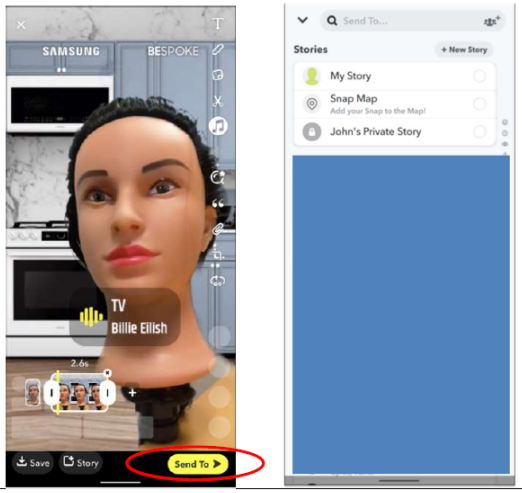
performed according to a user request, and therefore that the process is a receipt of a request (of the user's request by the system) to publish the recorded content.

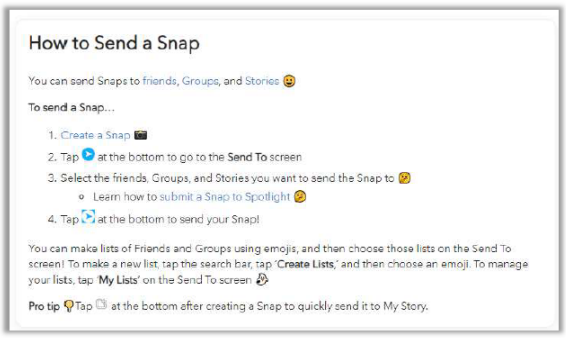
379. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Chu* and/or *Sherman*) in view of *Joslin*. For example, a POSITA would have been motivated to modify *Cohen*, *Chu*, and *Sherman's* teachings of creating and sharing multimedia content with the processing, encoding, and publishing functionality of *Joslin* at least because *Joslin* teaches a particular methodology for implementing the sharing teachings of *Cohen*, *Chu*, and *Sherman* (*e.g.*, processing and encoding the file and sending it to a site for streaming) that a POSITA would have understood could have been directly incorporated into (or otherwise used in) the systems of *Cohen*, *Chu*, and *Sherman*, either as a methodology for implementing one of the existing options (*e.g.*, one of the options of FIG. 5B and as an alternative or addition to the widget migration functionality) or as another option that could be listed in FIG. 5B to provide added functionality for *Cohen's* (and/or *Chu* and/or *Sherman's*) system (again, as an alternative or addition to the widget migration functionality). A POSITA would have recognized such functionality as highly desirable by 2009-2010.

380. Further, receiving a request to publish the recorded content was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.G). For example, it is no different from the exceedingly well-known process for sharing a video on

YouTube by uploading the video file through the YouTube user interface. A user uploading a video file to YouTube is a request to publish the file on the YouTube website. EX1015 (*YouTube*), 7, 15, 22, 45, 59, 72. Thus, to the extent this feature was somehow found not to be taught by *Cohen*, *Sherman*, and *Joslin* (and/or *Chu*), it would have been obvious to a POSITA to configure *Cohen's* process, which specifically references posting to social media sites similar to YouTube, to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

381. Finally, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

receiving a request to publish the recorded content:	***The Snapchat App receives requests to publish the recorded content, as shown below:*** After recording content, the Snapchat App presents the user with a "Send To" button. The Snapchat App will then publish the content to the user's Story after receiving the user's request via the "Send To" button.
	



(https://support.snapchat.com/en-US/article/send-snap) (last visited January 9, 2023).

EX1038 (*Infringement Contentions*) at 36-38.

382. Therefore, it is my opinion that element [1o] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[1r]	**in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video; and**

383. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1r], rendering it obvious.

384. Specifically, it is my opinion that element [1r] is rendered obvious by *Cohen*, *Chu*, *Sherman*, and *Joslin*. *First*, *Cohen* teaches, in response to the request to publish (*see* element [1o]), processing and encoding individual components of the recorded content to create a streamable video (*e.g.*, *Cohen's* system, in response to the publishing request of element [1o], processes and encodes (*e.g.*, converts) the individual components (*e.g.*, audio and video components) of a recorded video to create a streamable video as part of its process of migration of a widget to a target platform, such as a social media website). *See*, *e.g.*, EX1004

(*Cohen*) at ¶¶[0103], [0104], [0142], [0144], [0145], and [0208], and FIGS. 1, 2, and 5B-5E. As described in detail below, a POSITA would have considered it obvious as common knowledge in the art that individual components of *Cohen's* recorded content (*e.g.*, its audio and video components) would have been processed and encoded to create a streamable video compatible with and playable by the player widget. Indeed, *Cohen* teaches saving files in streamable formats to enable this functionality. *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0090] and [0091]. *Second*, *Chu* teaches processing and encoding (*e.g.*, converting) its audio and video components as an MPEG, which a POSITA would have understood to be a streamable file type and usable with the widget teachings of *Cohen*. *See, e.g.,* EX1005 (*Chu*), 16:25-39. *Third*, both *Sherman* and *Joslin* teach processing and encoding individual components of recorded content to create streamable videos in response to a user request (*e.g.*, *Sherman* teaches processing and encoding (*e.g.*, converting) the individual components (*e.g.*, audio and video components) of its video clips into streamable files that can be stored on an invitation website and *Joslin* teaches processing and encoding (*e.g.*, converting) the individual components (*e.g.*, audio and video components) of its video clips into streamable

files and uploading them to a server). *See*, *e.g.*, *Sherman* (EX1006), at ¶¶[0023], [0038], and [0041] and *Joslin* (EX1007), 3:36-44, 10:33-39.

385. In more detail, *Cohen* (EX1004) teaches, in response to a user's interaction with *Cohen's* user interface widget 520 / widget interface manager 215, such as clicking the "post" request discussed in element [1o] (the "request to publish"), migrating an audio player/recorder widget 502 (via operation of widget manager module 215) that can play the specified content to a target platform, such as a social media service like Facebook. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0103] ("The selected action related to migration of an instance of the audio player widget (or multi-media player widget) to a target platform can be performed by the widget manager module 215. The instance of the audio player widget (or multi-media player widget) in the external platform is typically available for access by the user via the target platform or users of the external platform"), ¶[0104] ("The action related to migration of the instance of the audio player widget (or multi-media player widget) can include, posting the instance of the audio player widget (or multi-media player widget) to a profile page of the user or another user in the target platform. For example, a user in the host platform can post an instance of the audio player widget (or multi-media player

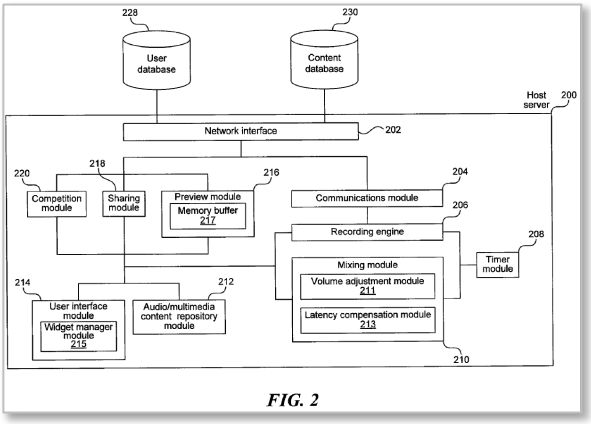


FIG. 2

widget) on his/her profile in an online social network. The online social network can be, by way of example but not limitation, Facebook, MySpace, BlackPlanet, and WordPress.com. The audio player widget (or multi-media player widget) may be available for access by the user's friends or connections in the online social network and/or additional select users"), ¶[0142] (teaching adding the audio player/recorder widget 502 to a user's personalized space in a social networking site (e.g., Friendster, Facebook, Linkedin, etc.)), ¶[0144] ("The graphical user interface widget 520 is typically linked to the audio player widget 502 (or multimedia player/recorder widget) in the user interface 550 in such a manner that, for example, the instance of the audio player widget 502 that has been migrated to an external platform can be used to access the multimedia content being played back in the widget 502 in the source platform"), ¶[0145] ("In the example of FIG. 5B, the "post" option 522 is illustrated. The post option 522 may allow users to post the instance of the audio player widget 502 to a profile page of the user or another user in the target platform (e.g., BlackPlanet, Facebook, MySpace, etc.). The instance of the audio player/recorder widget 502 may then be accessed in the target platform for multimedia content playback or recording

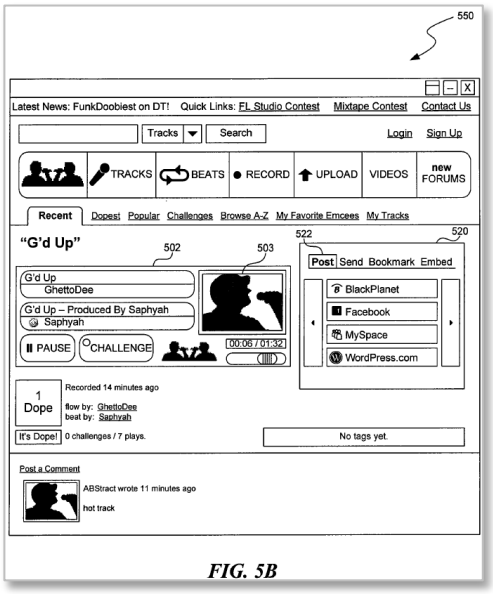


FIG. 5B

purposes"), ¶[0208] ("In process 1306, the selected action related to migration of an instance of the audio/multimedia player widget to a target platform is performed. In process 1308, the instance of the audio/multimedia player widget is provided for access by the user via the target platform or a second set of users of the target platform"), and FIGS. 1, 2, 5B-5E.

386. To support the migration functionality described above (and in response to the user request), a POSITA would have considered it obvious based on common knowledge in the art that individual components of *Cohen's* recorded content (*e.g.*, its audio and video components) would have been processed and encoded to create a streamable video (*e.g.*, in mp4 format as taught by *Cohen* at ¶[0090]) compatible with and playable by the player widget, for at least three reasons.

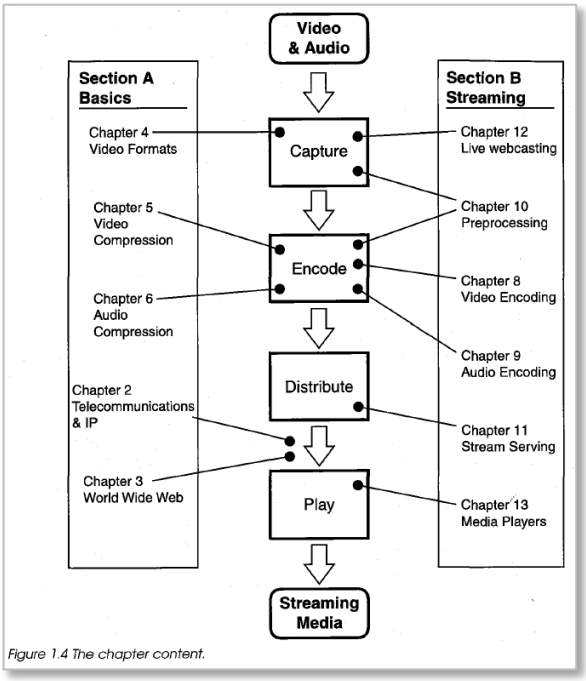


Figure 1.4 The chapter content.

387. *First*, it was exceedingly well known by 2009-2010 that video placed on the web for viewing, including on social media sites as taught by *Cohen*, would have been streamable. *See*, *e.g.*, EX1015 (*Austerberry)*, *passim* and FIGS. 1.4, 7.3, 7.4, 7.6; EX1015 (*YouTube*), 1-2, 4, 17, 23, 25, 30, 72, 80, 82-83.

388. *Second*, it was well known by 2009-2010 that streamable files were created by "processing and encoding" audio and video components, which a POSITA would have understood to mean the overall conversion process from audio and video components to a streamable format, such as MPEG or Flash, as shown in FIG. 1.4 of *Austerberry*, reproduced above, that includes numerous individual processing and encoding steps. *See*, *e.g.*, EX1014 (*Austerberry*), 133-172. Processing[14] and encoding[15] have broad meanings, and the '911 Patent does

[14] The ordinary meaning of process is, for example: (i) "computing to perform mathematical and logical operations on (data) according to programmed instructions in order to obtain the required information" (EX1039; *Collins*); (ii) "a systematic series of actions directed to some end" (EX1040; *Webster's*); (iii) "*Computing* operate on (data) by means of a program" (EX1041; *Oxford*); (iv) "4. *Computer Science* to perform operations on (data)" (EX1042; *American Heritage*); (v) "to manipulate data with a program" (EX1043; *Microsoft*); (vi) "1. A sequence of steps, events, operations, functions, or the like, which leads to a given result. Also, the following of such a sequence. 2. In computers, handling, manipulating, or otherwise operating on data, as occurs, for instance, when compiling, calculating, converting, generating, displaying, or transmitting. Also, the steps involved in such operations" (EX1044; *Wiley*); and (vii) "a number of tasks that must be carried out to achieve a goal" (EX1045; *Collins*).

[15] The ordinary meaning of encode is, for example: (i) "to convert (characters and symbols) into a digital form as a series of impulses" (EX1039; *Collins*); (ii) "to convert into code" (EX1040; *Webster's*); (iii) "convert (information or an instruction) into a digital form" (EX1041; *Oxford*); (iv) "to format (electronic data) according to a standard format" (EX1042; *American Heritage*); (v) "in programming, to put something into code, which frequently involves changing the form-for example, changing a decimal number to binary-coded form" (EX1043; *Microsoft*); (vi) "to express information utilizing a code" (EX1044; *Wiley*); and (vii) "to apply the rules of a code to a program or data" (EX1045; *Collins*). *See also* the definitions of encoder: (v) "1. In general, any hardware or software that encodes information-that is, converts the information to a particular form or

not describe any particular "processing" or "encoding" actions that must be performed, stating simply that "[t]he individual components that comprise audio/video content are then processed, encoded, and made streamable over a network for publication" (EX1001 (*'911 Patent*), 17:2-5). This would have led a POSITA to understand that the "processing and encoding" was nothing different from the well-known process of converting audio and video components into a streamable file.

389. *Third*, *Cohen* expressly teaches such a conversion process where individual components (e.g., audio, videos) of the recorded content are converted into an MPEG format. *See*, *e.g.*, EX1004 (*Cohen*) ¶[0090] (teaching system is capable of storing, playing, and reading "audio-based and other multimedia data and content, in a variety of formats, including, but not limited to, mp3, mp4, m4a, m4p, aac, wma, ra, wav, ogg, flac, aiff, raw, aw, DVD, CD, Blu-Ray, HD-DVD, DTS-CD, SACD, etc."). *See also* ¶[0091] (teaching system includes "digital signal processors (DSPs) that support generation of digital audio/video content

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format. For example, the Windows Media Encoder converts audio and video to a form that can be streamed to clients over a network. 2. In reference to MP3 digital audio in particular, technology that converts a WAV audio file into an MP3 file. An MP3 encoder compresses a sound file to a much smaller size, about one-twelfth as large as the original, without a perceptible drop in quality" (EX1043; *Microsoft*); (vi) "a device which converts an analog quantity into a digital signal" (EX1044; *Wiley*); and (iii) "a device that can translate data from one format to another" (EX1045; *Collins*).

modification and/or implementation of audio/video effects/mixing.") and ¶¶[0083]-[0088] (teaching various combinations of audio and video components to create multimedia files). A POSITA would have understood that converting the user recordings to mp4/MPEG-4 formats would have utilized an MPEG encoder that would have performed the required processing and encoding steps well-known to a POSITA as described above. *YouTube* teaches a similar process whereby files are processed and encoded into a streamable Adobe Flash file. EX1015 (*YouTube*), 1-2, 4, 7, 15, 17, 22, 23, 45, 59, 72, 80, 82-83. The definition of "encoder" in *Collins* also explains this process. EX1045 (*Collins*).

390. To the extent "processing and encoding" is construed to require two separate and identifiable steps, a POSITA would also have considered it well-known that the overall conversion process from audio and video components to a streamable file (*e.g.*, MPEG or Flash) includes, among other things, separate pre-processing and encoding steps, as shown in FIG. 1.4 of *Austerberry*, reproduced above. The pre-processing steps may include, among other things, adjusting video levels, de-interlacing, cropping, and noise reduction prior to encoding to provide a higher quality result. EX1014 (*Austerberry*), 170-178. A POSITA would have understood that such pre-processing steps are "processing" steps and would have been used in the MPEG conversion process taught by *Cohen*.

391. As discussed above, PO argued during prosecution that the Examiner had not shown that *Cohen* teaches element [1r] as follows:

> The Examiner asserts that Cohen discloses "receiving a request to publish the recorded content; in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video; publishing the streamable video by copying the streamable video to a media server," citing paragraphs [0169] and [0170] and Figure 7, steps 714–718. Despite the Examiner's qualification that "*arguably*, these cited sections *can* reasonably read on the particular claimed features," (emphasis added), they in fact do *not* reasonably "read on" the particular claimed features because they do not disclose them.
>
> Cohen Paragraphs [0169] and [0170] discuss generally the concept of saving content to a "service site" and disclose "[i]n response to the user request to share the track with others, a listing entry of the content is published on the service site." This does not disclose "in response to the request to publish, *processing and encoding individual components of the recorded content to create a streamable video*." Figure 7 offers no such disclosure either—whether 'arguably' or otherwise.

EX1002 (*'911 Patent File History*), 56-57.

392. PO's appeal brief argument is wrong. For at least the reasons above, a POSITA would have understood *Cohen* to teach "in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video," or would have considered such functionality obvious.

393. Moreover, even if *Cohen* was deficient with respect to teaching the processing and encoding of individual components of the recorded video to create a streamable video" (it is not), *Chu* also teaches those features of element [1r]. *See*, *e.g.*, EX1005 (*Chu*), 16:25-39 ("At the conclusion of the recordation of the karaoke performance and title selection, the central processing unit 76 takes all data from

temporary storage on the hard disk 72 and directs it to a [MPEG] converter 137. MPEG (Moving Pictures Exports Group) is a standard for compressing full motion video. In the [MPEG] converter 137 the audio/video data is converted to a [MPEG] format which is a compressed version of the audio and video data that was stored on the hard disk 72.").

394. A POSITA would have considered it obvious that *Chu's* MPEG converter was processing and encoding (by converting into the MPEG file format) individual components (*e.g.*, the audio and video components) of the recorded content to create a streamable video because that is, and was at the time, at least one purpose of an MPEG converter (*e.g.*, to create MPEG files that are a combination of component audio and video components). And to the extent "processing and encoding" is construed to require two separate and identifiable steps, a POSITA would also have considered it well-known that the overall MPEG conversion process would have utilized separate pre-processing and encoding steps, as shown in FIG. 1.4 of *Austerberry*, reproduced above. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Sherman* and *Joslin*) in view of *Chu* least because *Cohen* teaches posting its user performance to social media websites in response to a user request, and *Chu* (which is directed to a multimedia creation and sharing system similar to *Cohen*) teaches a methodology for enabling that posting by processing and encoding the

audio and video components of the performance such that the performance would be in a streamable format usable for *Cohen's* player widget that a POSITA would have understood could have been directly incorporated into (or otherwise used in) *Cohen's* system.

395. Moreover, even if *Cohen* and *Chu* were deficient as to teaching all of the features of element [1r] (they are not), *Sherman* and *Joslin* also teach "in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video." For example, as discussed above, *Sherman* (EX1006) teaches functionality where "the system software may be used to prepare video clips for electronic distribution as announcements, invitations, greetings, etc." *Sherman* (EX1006), ¶[0038]. One way of distribution in *Sherman* is as an "MPEG, AVI, Windows Media, QuickTime, or Real Video" formatted file, which a "user may distribute … to friends and others via any available distribution medium." *Sherman* (EX1006), ¶[0023]. In one embodiment, an invitee may be directed to a website for the invitation where "a highly individualized video clip [with] their favorite actors or singers deliver[ing] their particular message" is provided. *Sherman* (EX1006), ¶[0038]. *Sherman* also notes that on-line distribution is viable as video compression technology has advanced. *Sherman* (EX1006), ¶[0041].

396. Based on *Sherman's* teachings and the general knowledge in the art, a POSITA would have found it obvious to provide video clips on an invitation website in a streamable format, as streaming was exceedingly well-known by 2009-2010 as discussed above (*e.g.*, multimedia was known by 2009-2010 to stream from websites to avoid the need for a user to download an entire multimedia file to view it). EX1015 (*YouTube*), 1-2, 4, 7, 15, 17, 22, 23, 45, 59, 72, 80, 82-83. *See also* EX1014 (*Austerberry*), *passim* and FIGS. 1.4, 7.3, 7.4, 7.6. Further, a POSITA would have understood that, to place the video clip on the invitation website for an invitee to view, the individual audio and video components of the video must have been processed and encoded (*e.g.*, by, for example, creating an MPEG file from those components as taught by *Sherman* and *Chu*) to make the file streamable. And to the extent "processing and encoding" is construed to require two separate and identifiable steps, a POSITA would also have considered it obvious that the overall MPEG conversion process taught by *Sherman* would have utilized separate pre-processing and encoding steps, as shown in FIG. 1.4 of *Austerberry*, reproduced above.

397. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Chu* and/or *Joslin*) in view of *Sherman*. For example a POSITA would have been motivated to modify *Cohen* (as shown in FIG.5B) and *Chu's* teachings of sharing their user-recorded videos with *Sherman's*

teachings of processing and encoding such videos and electronically distributing them, such as by using them on an invitation website. A POSITA would have understood that the addition of more distribution methods to share content would have been recognized as highly desirable by 2009-2010. In particular, a POSITA would have understood that *Sherman's* invitation creation option could have been directly incorporated into (or otherwise used in) *Cohen's* system as an additional option in FIG. 5B to provide added functionality.

398. Additionally or alternatively, *Joslin* (EX1007) teaches, as discussed above, a "means for retrieving a participant's performance video" from the performance media library where it has been stored as an MPEG-2 video, "and modifying the format and resolution to compressed digital video for internet video streaming, and uploading to a server for later download by the participant via the internet." *Joslin* (EX1007), 3:36-44, 10:33-39.

399. A POSITA would have understood, as discussed above, that *Joslin's* teaching that the participant's performance video can be formatted for "internet video streaming" would have been performed according to a user request (or that it would have been obvious to do so to control distribution of the performance), and that "internet video streaming" is functionality whereby a recording is placed on a webpage for others to view. EX1015 (*YouTube*), 1-2, 4, 7, 15, 17, 22, 23, 45, 59, 72, 80, 82-83. *See also* EX1014 (*Austerberry*), *passim* and FIGS. 1.4, 7.3, 7.4, 7.6.

A POSITA would also have understood (or considered it obvious) that the process of creating an MPEG-2 video, or "modifying the format and resolution to compressed digital video for internet video streaming" (*Joslin* (EX1007), 3:36-44, 10:33-39) includes processing and encoding (*e.g.*, creating an MPEG-2 file from those components as taught by *Joslin*) individual components of the user's recording to make the file streamable. And to the extent "processing and encoding" is construed to require two separate and identifiable steps, a POSITA would also have considered it obvious that the overall MPEG conversion process taught by *Joslin* would have utilized separate pre-processing and encoding steps, as shown in FIG. 1.4 of *Austerberry*, reproduced above.

400. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Chu* and/or *Sherman*) in view of *Joslin*. For example, a POSITA would have been motivated to modify *Cohen*, *Chu*, and *Sherman's* teachings of creating and sharing multimedia content creation with the processing, encoding, and publishing functionality of *Joslin* at least because *Joslin* teaches a particular methodology for implementing the sharing teachings of *Cohen*, *Chu*, and *Sherman* (e.g., processing and encoding the file and sending it to a site for streaming) that a POSITA would have understood could have been directly incorporated (or otherwise used) into *Cohen*, *Chu*, and *Sherman*, either as a methodology for implementing one of the existing options (*e.g.*, one of the options

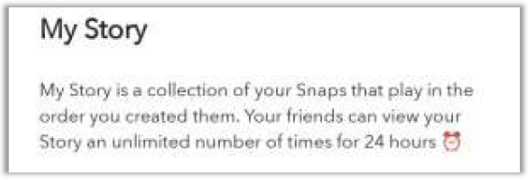
of FIG. 5B) or as another option that could be listed in FIG. 5B to provide added functionality for *Cohen's* system. A POSITA would have recognized such functionality as highly desirable by 2009-2010.

401. Further, in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.G). For example, it is no different from the exceedingly well-known process of streaming media creation of *Austerberry* (EX1014) or for responding to a user's upload of a video to YouTube by converting (*e.g.*, processing and encoding) the uploaded file to a streamable flash video file. EX1015 (*YouTube*), 1-2, 4, 17, 22, 45, 55, 82-83. Thus, to the extent this feature was somehow found not to be taught by *Cohen*, *Chu*, *Sherman*, and *Joslin*, it would have been obvious to a POSITA to configure *Cohen's* process, which specifically references posting to social media websites like YouTube, to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

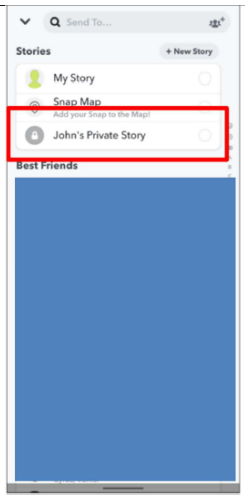
402. Finally, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

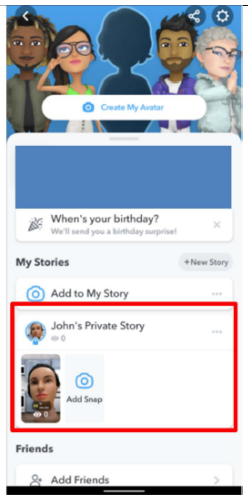
in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video:	***The Snapchat App, in response to the request to publish, processes and encodes individual components of the recorded content to create a streamable video, as shown below:*** Once the user has requested to publish his or her recorded content as a Story, the Snapchat App processes and encodes the individual components of the recorded content and then publishes the recorded content and makes it streamable by a

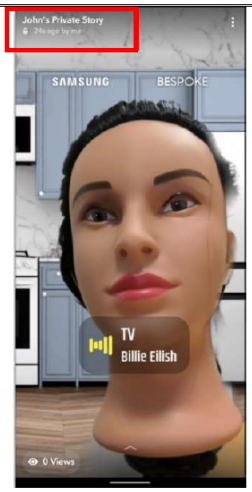
subset of users based on the recorded content's privacy attribute. *See* https://support.snapchat.com/en-US/a/my-story (last visited January 9, 2023)

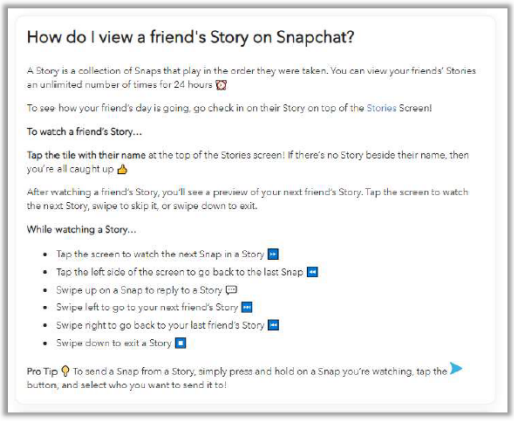


In the example below, the Snapchat App publishes the recorded content to the user's "Private Story."









(https://support.snapchat.com/en-US/article/about-stories) (last visited January 9, 2023)

EX1038 (*Infringement Contentions*) at 38-42.

403. Therefore, it is my opinion that element [1r] is taught by the combination of *Cohen*, *Chu*, *Sherman, and Joslin*.

[1s]	**publishing the streamable video by copying the streamable video to a media server.**

404. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [1s], rendering it obvious.

405. Specifically, it is my opinion that element [1s] is rendered obvious by *Cohen*, *Chu*, *Sherman*, and *Joslin*. First, *Cohen* teaches publishing the streamable video by copying the streamable video to a media server (*e.g.*, for the reasons discussed in element [1r], *Cohen's* system migrates a widget, which provides streamable video, to a media server). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0064], [0090], [0091], [0102]-[0104], [0142], [0144], [0145], and [0208] and FIGS. 1, 2, 5B-5E. A POSITA would have understood that the migration process taught by *Cohen* would have included copying the streamable video as discussed in element

[1r] to, for example, the social media system's server, or would have otherwise considered it obvious to do so. Second, both *Sherman* and *Joslin* teach publishing the streamable video by copying the streamable video to a media server (*e.g.*, *Sherman's* placing of the video clip on an invitation website for an invitee to view is "publishing" the video clip, as it makes the video clip accessible on the web, and the video clip would have been streamable, and *Joslin's* storing of performance videos on a server in a format "for internet video streaming" is placing its streamable video on a server by copying it). *See*, *e.g.*, *Sherman* (EX1006) at ¶¶[0023] and [0038] and *Joslin* (EX1007), 2:39-44, 3:36-44, 10:33-39, and 11:61-67.

406. In more detail, *Cohen* (EX1004) teaches publishing the streamable video by copying the streamable video (created as discussed in element [1r]) to a media server at least because, in response to a user's interaction with *Cohen's* user interface widget 520 / widget interface manager 215 requesting the "posting" of a user's recording, *Cohen* teaches migrating audio player/recorder widget 502 to a social media service, such as Facebook, which a POSITA would have understood to be copying (by migrating) the user's recorded content to a social media server (e.g., Facebook.com), which is a media server. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0103] ("The selected action related to migration of an instance of the audio player widget (or multi-media player widget) to a target platform can be performed

by the widget manager module 215. The instance of the audio player widget (or multi-media player widget) in the external platform is typically available for access by the user via the target platform or users of the external platform"), ¶[0104] ("The action related to migration of the instance of the audio player widget (or multi-media player widget) can include, posting the instance of the audio player widget (or multi-media player widget) to a profile page of the user or another user in the target platform. For example, a user in the host platform can post an instance of the audio player widget (or multi-media player widget) on his/her profile in an online social network. The online social network can be, by way of example but not limitation, Facebook, MySpace, BlackPlanet, and WordPress.com. The audio player widget (or multi-media player widget) may be available for access by the user's friends or connections in the online social network and/or additional select users"), ¶[0142] (teaching adding the audio player/recorder widget 502 to a user's personalized space in a social networking site (e.g., Friendster, Facebook, Linkedin, etc.)), ¶[0144] ("The graphical user interface widget 520 is typically linked to the audio

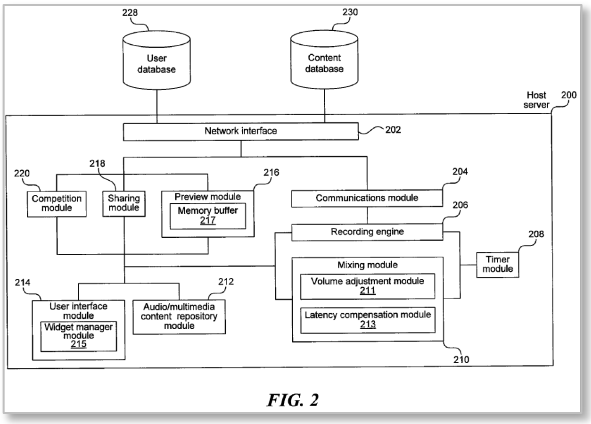


FIG. 2

player widget 502 (or multimedia player/recorder widget) in the user interface 550 in such a manner that, for example, the instance of the audio player widget 502 that has been migrated to an external platform can be used to access the multimedia content being played back in the widget 502 in the source platform"), and ¶[0145] ("The post option 522 may allow users to post the instance of the audio player widget 502 to a profile page of the user or another user in the target platform (e.g., BlackPlanet, Facebook, MySpace, etc.). The instance of the audio player/recorder widget 502 may then be accessed in the target platform for multimedia content playback or recording purposes"), ¶[0208] ("In process 1306, the selected action related to migration of an instance of the audio/multimedia player widget to a target platform is performed. In process 1308, the instance of the audio/multimedia player widget is provided for access by the user via the target platform or a second set of users of the target platform."). *See also e.g.*, EX1004 (*Cohen*), at ¶[0064] (teaching user interface module 214 can include a widget manager module 215), ¶[0090] (teaching file types of recordings"), ¶[0091], and ¶[0102] and FIGS. 1, 2, 5B-5E.

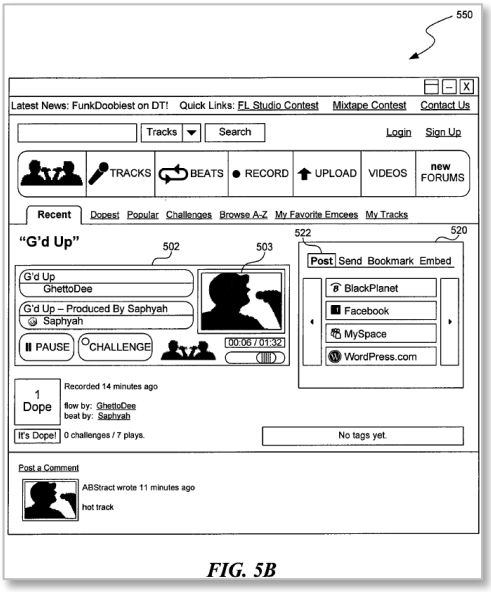


FIG. 5B

407. To the extent PO argues (with respect to this element or any previous element) that *Cohen* teaches only migrating a widget and not a streamable video, a POSITA would have considered it obvious in view of *Cohen* to migrate/publish the streamable video by copying it to a media server. In particular, a POSITA would have considered it to be obvious to migrate the streamable video itself (as explicitly taught by *Sherman* and *Joslin*) rather than migrate the widget that plays a video (as taught by *Cohen*), as moving video files between servers was well-known and would achieve the same functionality. *See* EX1014 (*Austerberry*), 112-132, and FIG. 7.6 reproduced here (illustrating content being published to a streaming server). These were each well-known alternatives as of 2009-2010 and would have provided equivalent functionality to the end user.

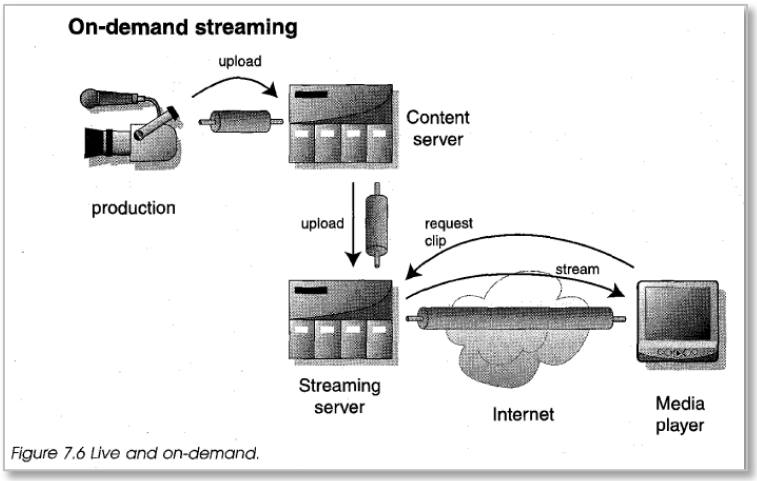


Figure 7.6 Live and on-demand.

408. Nevertheless, as discussed above, PO argued during prosecution that the Examiner had not shown that *Cohen* teaches element [1s] as follows:

> The Examiner asserts that Cohen discloses "receiving a request to publish the recorded content; in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video; publishing the streamable video by copying the streamable video to a media server," citing paragraphs [0169] and [0170] and Figure 7, steps 714–718. Despite the Examiner's qualification that "*arguably*, these cited sections *can* reasonably read on the particular claimed features," (emphasis added), they in fact do *not* reasonably "read on" the particular claimed features because they do not disclose them.
>
> Cohen Paragraphs [0169] and [0170] discuss generally the concept of saving content to a "service site" and disclose "[i]n response to the user request to share the track with others, a listing entry of the content is published on the service site." This does not disclose "in response to the request to publish, *processing and encoding individual components of the recorded content to create a streamable video*." Figure 7 offers no such disclosure either—whether 'arguably' or otherwise.

EX1002 (*'911 Patent File History*), 56-57.

409. Although, as discussed above, PO's arguments reference each of elements [1o]-[1s], they appear to be focused on element [1r]. In any event, to the extent PO's argument is addressing element [1s], it misrepresents *Cohen's* teachings. *Cohen* specifically teaches "publishing the streamable video by copying the streamable video to a media server" for at least the reasons above.

410. Moreover, even if *Cohen* was deficient in any regard (it is not), *Sherman* and *Joslin* both teach publishing the streamable video by copying the streamable video to a media server. For example, *Sherman* (EX1006) teaches functionality where "the system software may be used to prepare video clips for electronic distribution as announcements, invitations, greetings, etc." *Sherman* (EX1006), ¶[0038]. One way of distribution in *Sherman* is as an "MPEG, AVI,

Windows Media, QuickTime, or Real Video" formatted file, which a "user may distribute … to friends and others via any available distribution medium." *Sherman* (EX1006), ¶[0023]. In one embodiment, an invitee will be directed to a website for the invitation where "a highly individualized video clip [with] their favorite actors or singers deliver[ing] their particular message" is provided. *Sherman* (EX1006), ¶[0038].

411. As discussed above, a POSITA would have: (i) understood that placing the video clip on the invitation website for an invitee to view is "publishing" the video clip, as it makes the video clip accessible on the web; and (ii) found it obvious to provide the invitation video clips as streamable video, as that was one option for video provision from websites at the time (*e.g.*, multimedia was known by 2009-2010 to stream from websites to avoid the need for a user to download an entire multimedia file to view it). Further, a POSITA would have understood that placing the performance clip on an invitation website involves copying the streamable media to the invitation website server, or would have considered it obvious to do so. *See, e.g.*, EX1014 (*Austerberry*), 112-132.

412. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Chu* and/or *Joslin*) in view of *Sherman*. For example a POSITA would have been motivated to modify *Cohen* (as shown in FIG. 5B) and *Chu's* teachings of sharing their user-recorded videos with

Sherman's teachings of processing and encoding such videos and electronically distributing them, such as by using them on an invitation website. A POSITA would have understood that the addition of more distribution methods to share content would have been recognized as highly desirable by 2009-2010. In particular, a POSITA would have understood that *Sherman's* invitation creation option could have been directly incorporated into (or otherwise used in) *Cohen's* system as an additional option in FIG. 5B to provide added functionality.

413. Additionally and alternatively, *Joslin* (EX1007) teaches, as discussed above, that the participant's performance may be stored in a digital storage device for viewing and may be "uploaded to a server for subsequent download by the participant via the Internet." *Joslin* (EX1007), 2:39-44. In particular, *Joslin* teaches that it includes "means for retrieving a participant's performance video" from the performance media library where it has been stored as an MPEG-2 video, "and modifying the format and resolution to compressed digital video for internet video streaming, and uploading to a server for later download by the participant via the internet." *Joslin* (EX1007), 3:36-44, 10:33-39. Similarly, *Joslin* teaches that "[t]he participant may further choose to have the digital video file uploaded to a server for later retrieval via the internet for which the operator selects a function in the integrated media server to create a lower resolution version of the file, transfers the

file to another computer via hard drive, disk or [TCP/IP], from any of which the file is later uploaded to a server for later retrieval." *Joslin* (EX1007), 11:61-67.

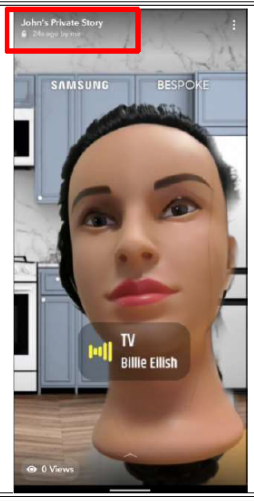
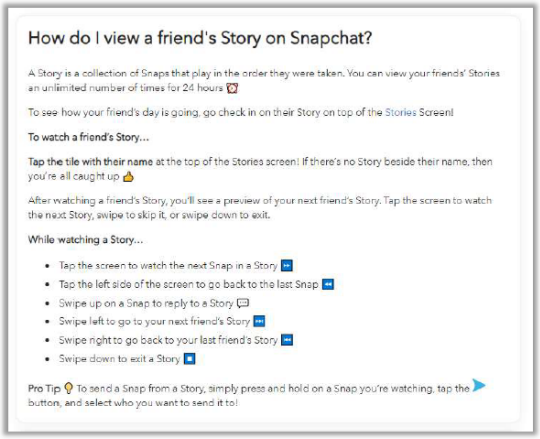
414. As discussed above, a POSITA would have understood *Joslin's* teaching that: (i) the participant's performance video can be formatted for internet video streaming; and (ii) the video can be uploaded to a server for later retrieval to teach "publishing the streamable video by copying the streamable video to a media server," as the created streamable video is copied (uploaded) to a server (a media server). *See also* EX1014 (*Austerberry*), 112-132.

415. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Chu* and/or *Sherman*) in view of *Joslin*. For example, a POSITA would have been motivated to modify *Cohen*, *Chu*, and *Sherman's* teachings of creating and sharing multimedia content creation with the processing, encoding, and publishing functionality of *Joslin* at least because *Joslin* teaches a particular methodology for implementing the sharing teachings of *Cohen*, *Chu*, and *Sherman* (e.g., processing and encoding the file and sending it to a site for streaming) that a POSITA would have understood could have been directly incorporated into (or otherwise used in) *Cohen*, *Chu*, and *Sherman's* systems, either as a methodology for implementing one of the existing options (*e.g.*, one of the options of FIG. 5B) or as another option that could be listed in FIG. 5B to

provide added functionality. A POSITA would have recognized such functionality as highly desirable by 2009-2010.

416. Further, publishing the streamable video by copying the streamable video to a media server was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.G). For example, it is no different from the exceedingly well-known process for sharing a video on YouTube, which receives an uploaded media file, converts (*e.g.*, processes and encodes) it to a streamable flash video file, and adds the streamable flash video file to its site (*e.g.*, copies it from the conversion server to a web server). EX1015 (*YouTube*), 1-2, 4, 17, 22, 45, 55, 82-83. *See also* EX1014 (*Austerberry*), 112-132. Thus, to the extent this feature was somehow found not to be taught by *Cohen*, *Chu*, *Sherman*, and *Joslin*, it would have been obvious to a POSITA to configure *Cohen's* process, which specifically references posting to social media services like YouTube, to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

417. Finally, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

and publishing the streamable video by copying the streamable video to a media server	***The Snapchat App publishes the streamable video by copying the streamable video to a media server. See, e.g., as shown below:*** The Snapchat App publishes the streamable video by copying the video to a media server. *See* https://support.snapchat.com/en-US/a/when-are-snaps-deleted (last visited January 9, 2023). 
	
	 (https://support.snapchat.com/en-US/article/about-stories) (last visited January 9, 2023).

EX1038 (*Infringement Contentions*) at 43-45.

418. Therefore, it is my opinion that element [1s] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

3. Dependent Claim 2

[2]	**The method of claim 1, further comprising the step of terminating the recording session after a duration of time has elapsed.**

419. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches claim 2, rendering it obvious.

420. Specifically, it is my opinion that claim 2 is rendered obvious by *Cohen* because *Cohen* teaches[16] terminating the recording session either by a user clicking on a "stop" button or automatically after a duration of time has elapsed. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0076] ("The recording engine 206 can also terminate the recording session. Recording session can be terminated after audio has been recorded for a predetermined amount of time. For example, the recording engine 206 is, in some embodiments, coupled to a timer module 208 to keep track of recording time, countdown time, and/or playing time, etc. The timer module 208 may be internal to the recording engine 206. In addition, the recording session can be terminated in response to receiving a user request (e.g., by the click of a button on the user interface) or in response to a terminating indication of the recording session. The termination indication may be, one or more of, duration of elapsed time and a user-generated termination request"), ¶[0077] (describing timer module 208), ¶[0097] ("[t]he user interface can further include, for example, a record button for initiating a recording session and a stop button for terminating the recording session"),

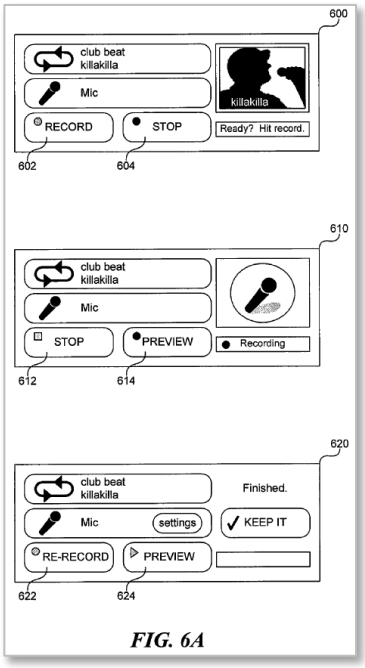


FIG. 6A

[16] For each dependent claim, the cited teachings are in addition to those cited for the claim from which it depends.

¶[0153] (describing the widget in FIG. 6A as having a stop button 612 that "is, in most instances, used to stop the recording session. For example, the stop button 612 can be used by the user to generate a termination request to terminate the recording session (e.g., by a click of a pointing device on the stop button)"), ¶[0161] (teaching that owners of tracks may specify the time other users may record over the track), Claim 11 ("cease recording the second track responsive to a terminating indication of the recording session; the termination indication comprises one or more of, duration of elapsed time and a user-generated termination request"), and Claim 28 ("cease recording the audio track responsive to a termination indication.") *See also e.g.*, EX1004 (*Cohen*) at ¶[0168], ¶[0175], and ¶[0185], FIGS. 1, 2, 6A.

421. Because claim 2 simply requires "terminating the recording session after a duration of time has elapsed," it is my opinion that either the manual or automatic termination processes of *Cohen* identified above teach all the features of claim 2. There is no "automatic" requirement in claim 2, so it would include manual termination of a recording session that has lasted a certain amount of time. And even if "automatic" termination was found to be a requirement of claim 2, *Cohen's* automatic termination process teaches this.

422. In addition to the above, *Chu* also teaches the features of claim 2. *See*, *e.g.*, EX1005 (*Chu*) at 16:12-24 (teaching that the end of the recording is defined

by the end of the music of the selected karaoke composition). *See also* EX1011 (*Chu*), Abstract, 1:6-21, 2:36-48, and 5:1-16 (teaching that *Chu's* system is a karaoke-based system). A POSITA would have understood karaoke systems like *Chu's* to end recording when the underlying karaoke selection is finished playing (*i.e.*, "after a duration of time has elapsed"). *Sherman* and *Joslin* also teach similar systems where recording ends with the end of recording over a particular clip.

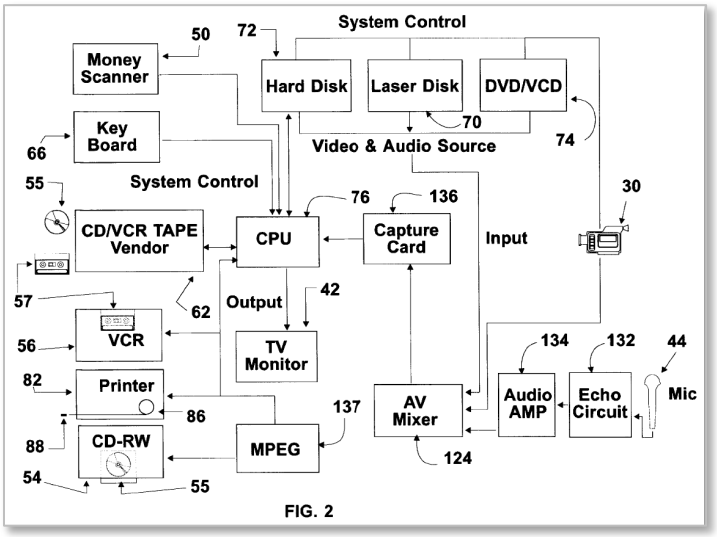


FIG. 2

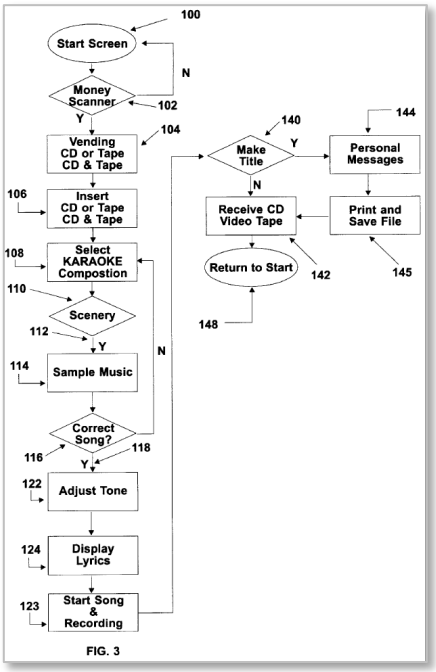
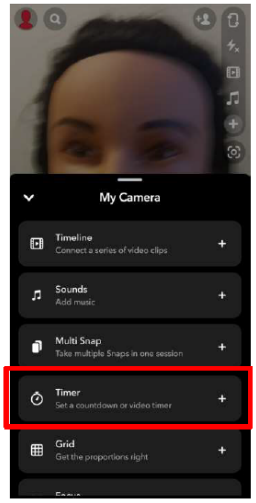


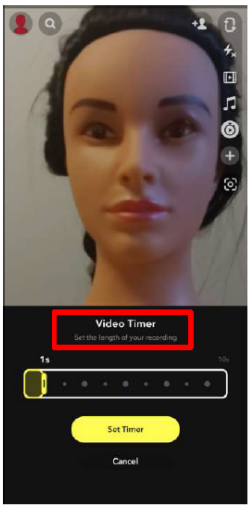
FIG. 3

423. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* with any of *Chu*, *Sherman*, and *Joslin*. With respect to claim 2, for example, this is at least because each reference is in the same technical field of multimedia content creation (the technical field of the '911 Patent) and each teaches similar known techniques for creating multimedia content using existing content and a user video, and sharing it with others.

424. Further, the termination of recording sessions after a duration of time has elapsed was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.B). Thus, to the extent this feature was somehow found not to be taught by *Cohen*, *Chu*, *Sherman*, and *Joslin*, it would have been obvious to a POSITA to configure *Cohen's* process to utilize such functionality in view of the basic understanding in the art for the same reasons identified above.

425. Finally, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

The method of claim 1, further comprising the step of terminating the recording session after a duration of time has elapsed.	***The Snapchat App terminates the recording session after a duration of time has elapsed, as shown below:*** The Snapchat App's "video timer" feature prompts the user to "Set the length of your recording." The user can then choose the length of the user's video recording, and the Snapchat App terminates the recording session after the selected amount of time has elapsed.
	

EX1038 (*Infringement Contentions*) at 46-48.

426. Therefore, it is my opinion that claim 2 is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

4. Dependent Claim 3

[3]	**The method of claim 1, wherein the interface to selectively edit the pre-recorded visual media content comprises an interface to selectively remove an element of the instance of pre-recorded visual media content.**

427. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches claim 3, rendering it obvious.

428. Specifically, it is my opinion that claim 3 is rendered obvious by the combination of *Cohen*, *Chu*, and *Sherman* because the combination teaches the interface to selectively edit the pre-recorded visual media content comprises an interface to selectively remove an element of the instance of pre-recorded visual media content for at least the reasons discussed in element [1f].

429. In particular, the combination of *Cohen*, *Chu*, and *Sherman* teaches the interface to selectively edit the instance of pre-recorded visual media content for at least the reasons discussed in element [1f]. Further, *Sherman* teaches the user may edit "the visual elements of the movie clip. Users can select photographs to be superimposed/inserted into the video, thus inserting themselves into the scene. Another possibility is to segment out the static background of a scene and replace it with another background or even video, thus completely altering the context of the video." *Sherman* (EX1006), ¶[024].

430. A POSITA would have understood that providing the user with the ability to replace segments of the static background of a scene, as taught by *Sherman*, removes "an element of the instance of pre-recorded visual media content," as recited in claim 3, rendering it obvious.

431. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Joslin*) in view of *Chu* and *Sherman* at least because *Cohen* teaches the ability to video record a user during the user's vocal performance over an audio track, and *Chu* and *Sherman* (which are directed to similar multimedia creation and sharing systems) teach that a video background can also be added to the recording process to make the resultant multimedia composition more interesting.

432. Further, selectively editing of pre-recorded visual media content used as a background by selectively removing elements of the pre-recorded visual media content was generally known by POSITAs by 2009-2010 (*see, e.g.*, §§I.C, I.D, I.E). Thus, to the extent this feature was somehow found not to be taught by *Cohen*, *Chu*, and *Sherman* (and *Joslin*), it would have been obvious to a POSITA to configure *Cohen*, *Chu*, and *Sherman's* process (with or without the teachings of *Joslin*) to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

433. Therefore, it is my opinion that claim 3 is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

5. Dependent Claim 4

[4]	**The method of claim 1, further comprising the step of locally saving the streamable video.**

434. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches claim 4, rendering it obvious.

435. Specifically, it is my opinion that claim 4 is rendered obvious by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* because the combination teaches locally saving the streamable video for at least the reasons discussed in elements [1o]-[1s]. In particular, because claim 4 does not specify where "locally" is, the scope of this claim includes saving the streamable file "locally" on the media server, which a POSITA would have understood is obvious for at least the reasons

described in elements [1o]-[1s] related to copying the streamable video file to a media server, as a POSITA would have understood that copying a streamable video file to a server includes locally saving the streamable video on the media server to provide the functionality described above.

436. Moreover, *Joslin* also teaches the participant's performance may be stored in a digital storage device for viewing and may be "uploaded to a server for subsequent download by the participant via the Internet." *Joslin* (EX1007), 2:39-44. In particular, *Joslin* teaches that it includes "means for retrieving a participant's performance video" from the performance media library where it has been stored as an MPEG-2 video, "and modifying the format and resolution to compressed digital video for internet video streaming, and uploading to a server for later download by the participant via the internet." *Joslin* (EX1007), 3:36-44, 10:33-39. Similarly, *Joslin* teaches that "[t]he participant may further choose to have the digital video file uploaded to a server for later retrieval via the internet for which the operator selects a function in the integrated media server to create a lower resolution version of the file, transfers the file to another computer via hard drive, disk or [TCP/IP], from any of which the file is later uploaded to a server for later retrieval." *Joslin* (EX1007), 11:61-67.

437. A POSITA would have understood these teachings to include the functionality of saving a streamable file on both a server and a client (after

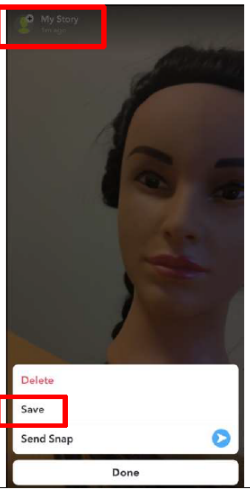
downloading by the participant to his/her device), either of which would satisfy the "locally saving" requirement of this claim. A POSITA would have been motivated to modify *Cohen* (and *Chu* and/or *Sherman*) in view of *Joslin* for at least the reasons discussed in elements [1o]-[1s] (and §VI.A.1) and to provide the additional functionality described herein where a user may download and locally save the streamable video file.

438. Further, locally saving streamable video was generally known by POSITAs by 2009-2010 (*see, e.g.*, §§I.F, I.G). Thus, to the extent this feature was somehow found not to be taught by Cohen, *Chu*, or *Joslin* (or *Sherman*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

439. Finally, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

The method of claim 1, further comprising the step of locally saving the streamable video.	***The Snapchat App saves the streamable video locally, as shown below:*** The Snapchat App prompts the user to "Save" the streamable video, after which the streamable video is locally saved to the user's mobile device. This can be done before or after the streamable video is published.







(https://support.snapchat.com/en-US/a/save-story) (last visited January 10, 2023).

EX1038 (*Infringement Contentions*) at 49-52.

440. Therefore, it is my opinion that claim 4 is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

6. Dependent Claim 5

[5]	**The method of claim 1, further comprising the step of wherein the step of generating the recorded content is executed by a client device controlled by the user.**

441. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches claim 5, rendering it obvious.

442. Specifically, it is my opinion that claim 5 is rendered obvious by *Cohen* because *Cohen* teaches generating the recorded content described with regard to claim 1 using a client device controlled by the user and in communication with recording engine 206 of *Cohen's* system. A POSITA would have understood this arrangement as generating the recorded content at the client because it uses the client's camera and microphone to create the content. *See, e.g.*, EX1004 (*Cohen*), at ¶[0072] (teaching recording engine 206 "record[s] multimedia (e.g., audio, text, image, and/or video) content for example, over a network connection (e.g., Internet). The audio-based content maybe user-generated (e.g., sang, spoken, rapped, etc.) content provided by the recording user. The recording engine 206, can, for example, establish a connection with a user device through the communications module 204. Upon detection of an audio input device or a video input device (e.g., microphone, camera, web-cam, video recorder, transducer,

sensor) coupled to the user device, the recording engine 206 can record audio or video input (e.g., voice, speech, sound, dialogue, music, instruments music, rhythms, song, rap, melody, theatrical performance, movie, play, an act, a skit, etc.) detected by the audio and/or video input device"), ¶¶[0054]-[0055] (teaching capabilities of client devices 102A-N), ¶¶[0056]-[0058], ¶[0062] (teaching "host server 100 is able to facilitate web-based performance collaborations, multimedia-content sharing, exchange, and competition over a network (e.g., the network 106) among various users of the client devices 102A-N" and that "[p]erformance collaborations are typically conducted using user generated and/or user provided audio or multimedia content"), ¶[0069] (teaching various networks usable with the system to provide connections between client devices 102A-N and servers), ¶[0070] (teaching communications module 204 maintains communications with user devices to facilitate generation of a performance art piece, and that "when a user wishes to record a track, the communications module 204 prompts the user for permission to access peripheral devices (e.g., microphone, camera, web-cam, etc.) connected to the user device"), ¶[0212] (teaching "video content may be recorded using an imaging device (e.g., camera, web-cam, etc.) connected to the user device. In one embodiment, the video recording occurs when the audio recording is occurring. For example, in process 1404, the user is video recorded over the

network while the user is recording the audio track."), and FIGS. 1 and 2 (reproduced below).

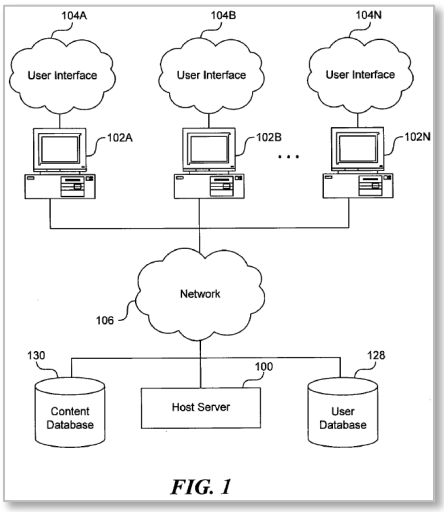


FIG. 1

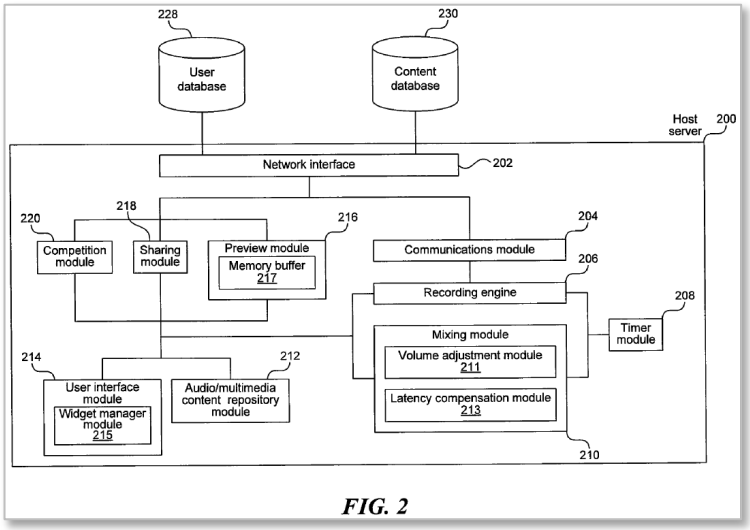


FIG. 2

443. Further, the generation of content on a user-controlled client device was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.B). Thus, to the extent this feature was somehow found not to be taught by *Cohen* (and/or *Chu*, *Sherman*, and *Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

444. Therefore, it is my opinion that claim 5 is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

7. Dependent Claim 6

[6]	**The method of claim 1, wherein the audio composition comprises pre-recorded audio.**

445. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches claim 6, rendering it obvious.

446. Specifically, it is my opinion that claim 6 is rendered obvious by *Cohen* because *Cohen* teaches the audio composition selected in element [1d] is pre-recorded audio for at least the reasons discussed in element [1d], including because the audio compositions must be pre-recorded to be selectable (i.e., they must exist to be selectable).

447. Further, *Cohen* explicitly teaches such pre-recording at least because the listed tracks are available on-demand and display information such as when the track was added, number of plays, rating, comments, tags, etc. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0047] ("Since audio tracks and video content provided by users are stored on a server, the physical presence of each participant of the collaborative recording session is not necessary. The requested track for a recording session can be provided on-demand. For example, a user can select to sing or record a video over a track (e.g., rhythm, beat, melody) listed on the website"), ¶[0132], and ¶[0134], and FIGS. 1, 2, 4A, 4B. A POSITA would have recognized that such on-demand availability and tracked information would have been provided when the audio composition was pre-recorded.

448. *Cohen* also teaches that multimedia content available for a user is stored in content databases, and thus pre-recorded. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0123] ("FIG. 3B depicts a block diagram illustrating a content database 330 to store audio content 330A, audio content metadata 330B and/or 330C, according to one embodiment"), EX1004 (*Cohen*) at ¶[0124] ("In the example of FIG. 3B, the database 330A stores audio content, including, but not limited to, recently added tracks/beats"), EX1004 (*Cohen*) at ¶[0125] ("The database of 330B stores beats (e.g., rhythms) and information related to the beats"), and EX1004 (*Cohen*) at ¶[0126] ("The database 330C stores tracks (e.g., voice expressions recorded over beats) and information related to each track"), and FIG. 3B.

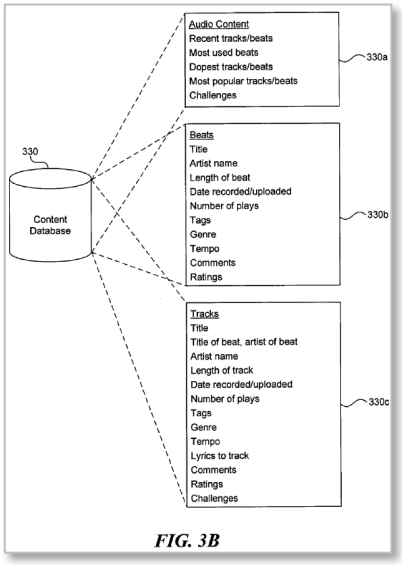


FIG. 3B

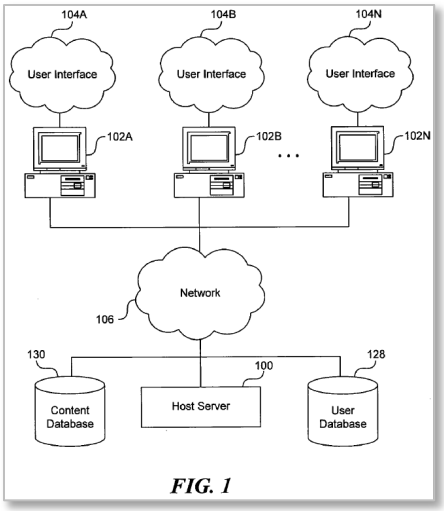


FIG. 1

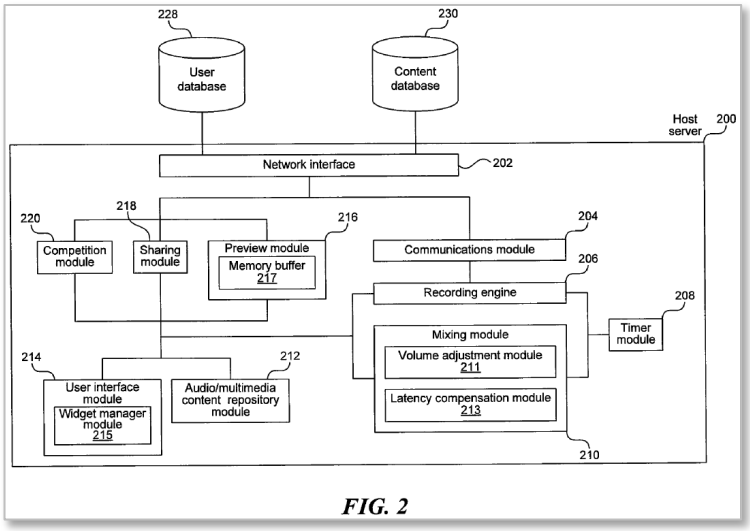


FIG. 2

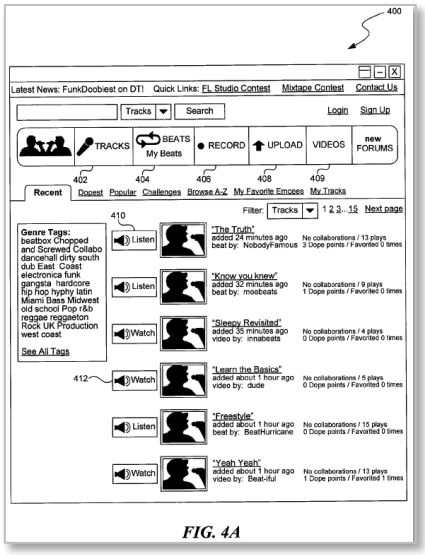


FIG. 4A

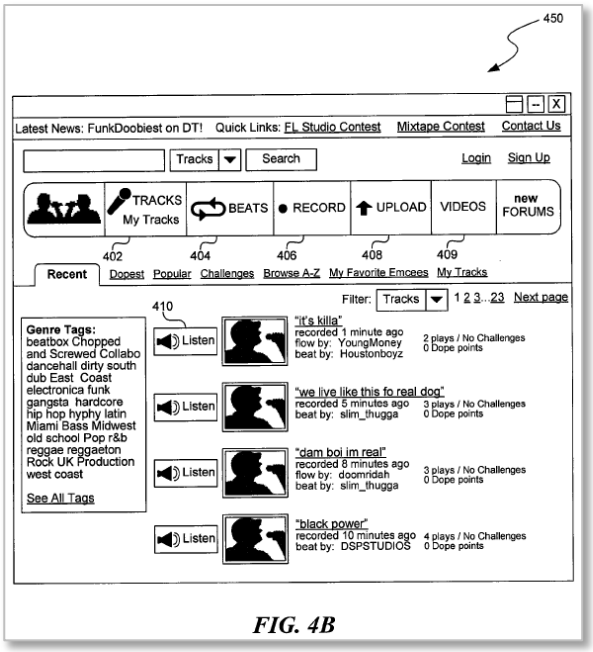


FIG. 4B

449. In addition to the above, *Chu* also teaches the features of claim 6. *See*, *e.g.*, EX1005 (*Chu*) at 9:26-45 and 12:34-48 (teaching that the selectable karaoke songs are stored on DVD and therefore pre-recorded). As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* with any of *Chu*, *Sherman*, and *Joslin*. With respect to claim 6, for example, this is at least because each reference is in the same technical field of multimedia content creation (the

technical field of the ’911 Patent) and each teaches similar known techniques for creating multimedia content using existing content and a user video, and sharing it with others.

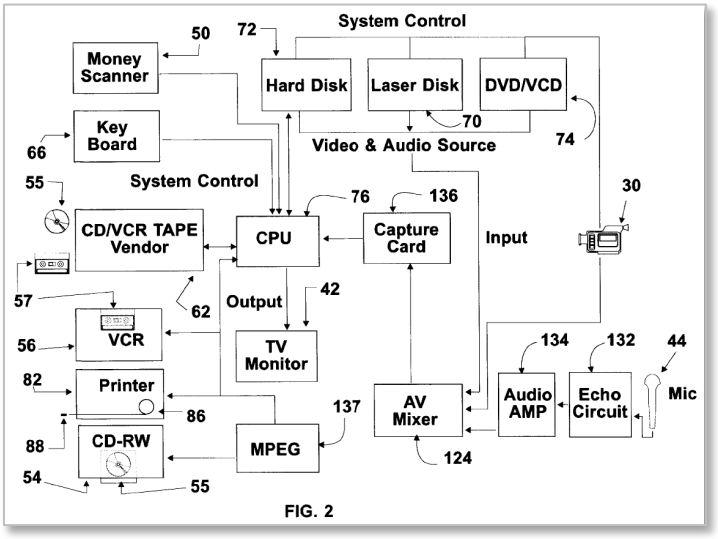


FIG. 2

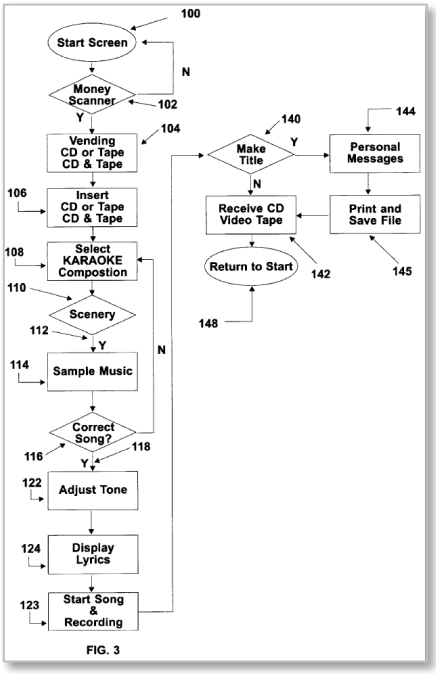
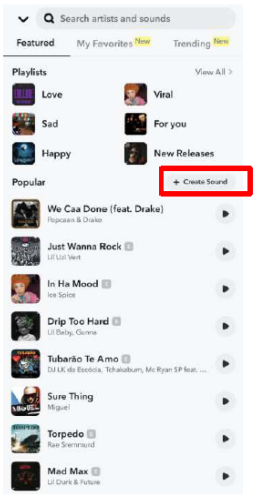
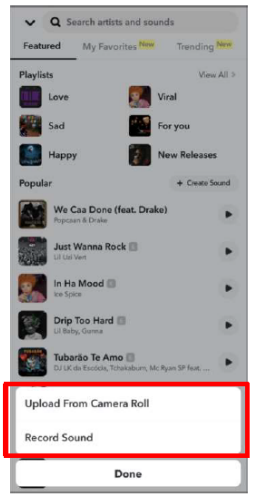


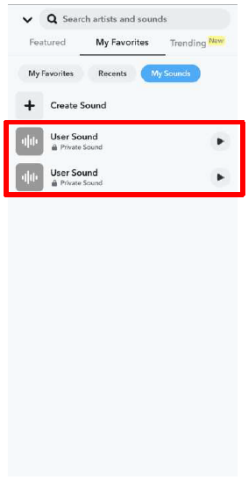
FIG. 3

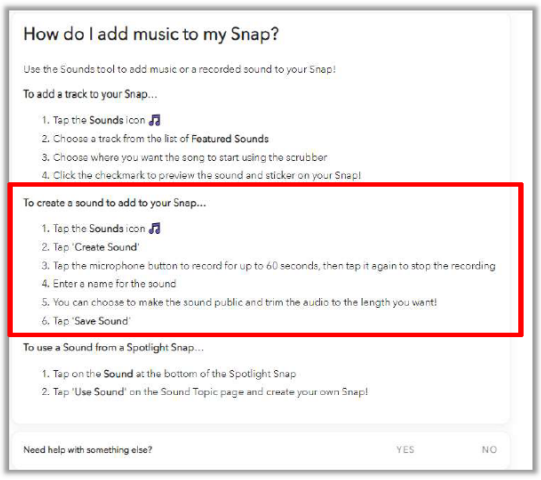
450. Further, combining pre-recorded multimedia with live multimedia was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.C). Thus, to the extent this feature was somehow found not to be taught by *Cohen* and *Chu* (and *Sherman* or *Joslin*), it would have been obvious to a POSITA to configure *Cohen’s* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

451. Finally, my above analysis is consistent with the assertion of infringement against Petitioner’s product, as shown in the following excerpt, advanced in the related litigation.

The method of claim 1, wherein the audio composition comprises pre-recorded audio.	***The Snapchat App prompts the user to select an audio composition from a list of compositions retrieved from a host server. This list includes audio compositions which comprise pre-recorded content, as shown below:*** The Snapchat App prompts the user to "Create Sound." The user can upload a pre-recorded audio composition, or record an audio composition in the Snapchat App. After either step is taken, the pre-recorded audio composition becomes part of the list of compositions from which the user is prompted to select.
	
	







(https://support.snapchat.com/en-US/article/add-music) (last visited January 9, 2023).

EX1038 (*Infringement Contentions*) at 53-58.

452. Therefore, it is my opinion that claim 6 is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

8. Dependent Claim 7

[7]	**The method of claim 1, wherein the preview is stored in temporary memory and re-written to non-transient memory upon receiving a save request from the user.**

453. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches claim 7, rendering it obvious.

454. Specifically, it is my opinion that claim 7 is rendered obvious by *Cohen* because *Cohen* teaches the preview of the recorded content (*see* element [1l]) is stored in temporary memory (*e.g.*, memory buffer 217) during user review and then is re-written to non-volatile memory (*e.g.*, content database 230) upon receiving a save request from the user (e.g., as part of the sending of the recorded content to content database 230 described in element [1n]. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0042] ("Once the user has completed the recording process, ***a preview*** of the recorded track can be aurally played over the network back to the recording user and the video can be visibly played over the network to the user. Typically, the recorded content is stored in the ***buffer (e.g., memory buffer***) after recording when being played for preview. … If and when the recorded audio track or recorded video is satisfactory to the user, the track can be ***permanently saved***") (emphasis added), and EX1004 (*Cohen*) at ¶[0049] ("The recording (e.g., mixed audio track, acappela track, video content) can be ***saved*** upon user request, for example, when the user determines that the recording is satisfactory"), ¶¶[0060]-[0064] (teaching host server 100/200 can store user multimedia content, such as in content database 130, which a POSITA would have understood would

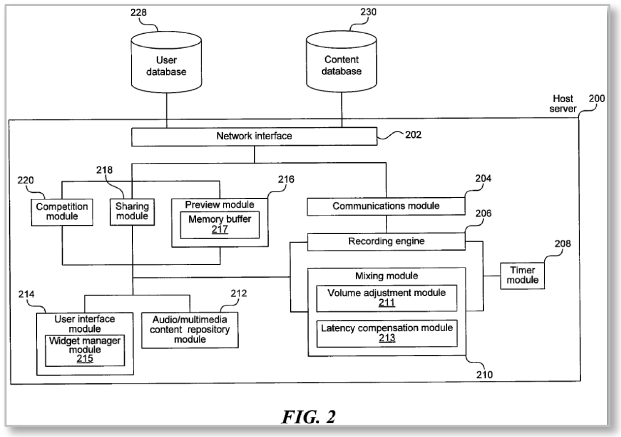


FIG. 2

have been implemented using non-volatile storage), ¶[0078] ("In some instances, the preview module 216 includes memory (e.g., volatile and/or non-volatile) and/or storage unit (e.g., magnetic disk drive, optical disk drive, etc.) for storing multimedia content (e.g., audio, video, image or the like). In one embodiment, the preview module 216 includes a memory buffer 217. Multimedia content stored in the preview module 216 may be stored temporarily (e.g., in the memory buffer 217) during preview and/or further until the user decides to save or discard the stored content"), ¶[0079] ("The preview module 216 is also, in some embodiments, coupled to the audio/multimedia content repository module 212 to access multimedia content stored in the repository. … After the preview, the preview module 216 can discard or save the file based on user request"),

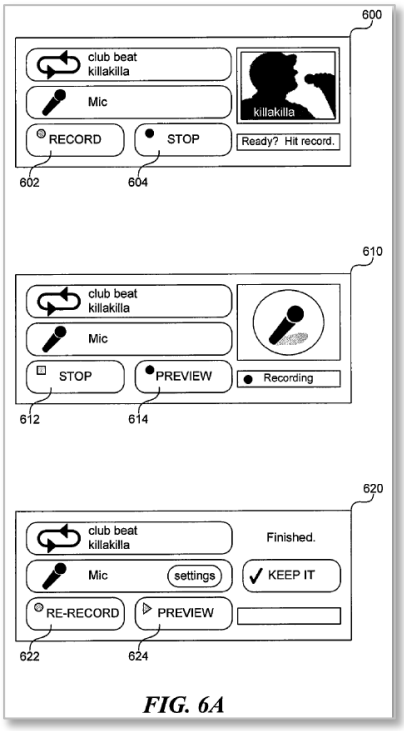


FIG. 6A

¶¶[0123]-[0126] (teaching content database 330 can store user multimedia content), ¶[0140] ("After the recording session, the recording user is presented with the options of previewing the recording mixed with the selected multimedia content (e.g., a selected beat), re-recording the audio or video content, and/or saving the mixed multimedia content"), ¶[0169] ("In process 712, the user selects to save the audio track and/or video content. The audio track and/or video content

can be saved on a system database affiliated with and/or managed by the service site. The user can [access] the saved content via the service site."). *See also* EX1004 (Cohen) at ¶[0080], ¶[0154], ¶[0168], ¶[0176], ¶[0178], ¶[0179], ¶[0185], ¶[0187], FIG. 6A, Claim 7 ("during the preview, the first and second audio tracks are stored in memory buffer"), Claim 14 ("preview enables the recording user to select to save or discard the second audio track"), Claim 19 ("a memory buffer within which the user-provided audio track is stored during the preview of the simultaneous aural playback"), and Claim 28 ("28. A method of web-based audio-content exchange and recording via a web-portal, comprising: … storing the audio track responsive to the user selecting to save the audio track.")

455. A POSITA would have understood permanent saving to be describing saving in non-volatile memory rather than in a buffer.

456. Further, the temporary storage of a preview of a created multimedia file and the subsequent moving of the file to permanent storage on user request was generally known by POSITAs by 2009-2010 (*see, e.g.*, §§ I.E, I.F). Thus, to the extent this feature was somehow found not to be taught by *Cohen* (and/or *Chu*, *Sherman*, and *Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

457. Still further, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

The method of claim 1, wherein the preview is stored in temporary memory and re-written to non-transient memory upon receiving a save request from the user.	***The Snapchat App stores the preiview of the recorded content in temporary memory and re-writes the recorded content to non-transient memory upon receiving a save request from the user, as shown below:***
	On information and belief, the Snapchat App stores the preview of the recorded content in temporary memory. The recorded content is re-writen to non-transient memory upon receiving a save request from the user, e.g., when the user clicks on the Save button displayed along side the preview. 

EX1038 (*Infringement Contentions*) at 59-60.

458. Finally, as discussed above in §V.C, Snap and PO have served Preliminary Proposed Claim Constructions in the related District Court case. EXS 1051, 1052. It is my opinion that claim 7 is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* regardless of which Party's construction(s) is utilized. For example, Snap has proposed that the meaning of Claim 7 is "wherein the preview is stored in temporary memory on the server and re-written to non-transient memory upon receiving a save request from the user." EX1051, 3. This

comports with my analysis in §V.A that a POSITA would have understood that the elements of the Challenged Claims are performed on the server side. Snap's construction is taught for at least the reasons above. For example, *Cohen* expressly teaches that recorded content is stored in temporary memory (*e.g.*, memory buffer 217 at the server) during user review and then is re-written to non-volatile memory (*e.g.*, content database 230 at the server) upon receiving a save request from the user (e.g., as part of the sending of the recorded content to content database 230 described in element [1n]), for at least the reasons above. PO has proposed that the meaning of claim 7 is "wherein the preview is stored in transient memory and is saved to non-transient memory upon receiving a save request from the user." EX1052, 13-14. This is also taught for at least the reasons above.

459. Therefore, it is my opinion that claim 7 is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

9. Dependent Claim 8

[8a] The method of claim 1, further comprising the steps of:

460. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [8a], rendering it obvious, for at least the reasons discussed for claim 1, above.

[8b] displaying a countdown to the recording session based on a user interaction with the record button, wherein the recording session comprises video recording; and

461. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [8b], rendering it obvious.

462. Specifically, it is my opinion that element [8b] is rendered obvious by *Cohen* because *Cohen* teaches displaying a countdown (*e.g.*, a numerical or textual countdown) to the recording session based on a user interaction with the record button, wherein the recording session comprises video recording (*see* element [1j]). *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0048] ("A recording session of audio, video, or a combination thereof, can also be initiated via the user interface by clicking a button on the audio player/recorder widget, for example. Before the recording session begins, typically playback of an audio track or video is stopped if playback is currently occurring. Once playback is paused/stopped, the user is provided with a countdown indicator to the initiation of the recording session. At the initiation of the recording session, the audio track or video content to which the recording user is recording over is played.") and ¶[0074] ("Once the user requests to record an audio track or a video, the recording engine 206 presents an indication

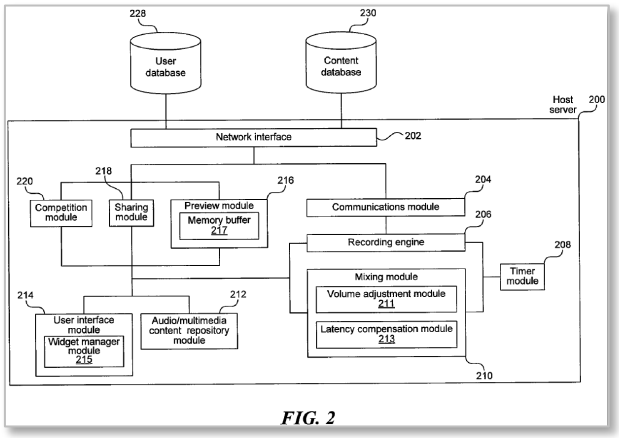


FIG. 2

of the initiation of the recording session. For example, the recording engine 206 can countdown to the initiation and present an indicator (e.g., visual indicator and/or aural indicator) of the countdown status. When countdown ends, the recording engine 206 begins to record audio or video detected from the audio or video input device.") *See also*, *e.g.*, EX1004 (*Cohen*) at ¶[0041], ¶[0076],¶[0152], and ¶[0166] (teaching a "lights, camera, record" countdown)), FIGS 1, 2.

463. In addition to the above, *Chu* also teaches the features of element [8b]. *See*, *e.g.*, EX1005 (*Chu*) at 14:9-19 ("The central processing unit 76 thereupon provides the performer 21 with a visual display of a numerical countdown on the video display monitor 42. At the termination of the countdown, the central processing unit 76 activates both the DVD/VCD player 74 and the appropriate audio and video recorder 54 and/or 56 to commence recording on the CD 55 and/or video tape cassette 57 which the performer 21 has previously inserted therein. This step is indicated at 123 in FIG. 3."), FIGS. 2 and 3.

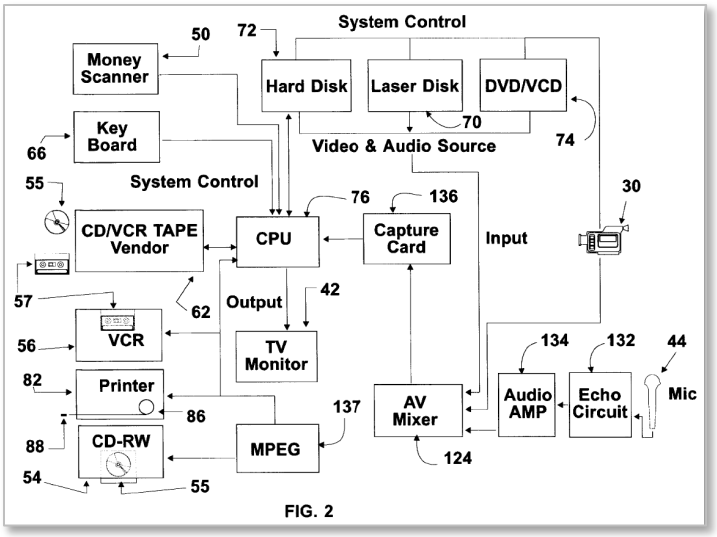


FIG. 2

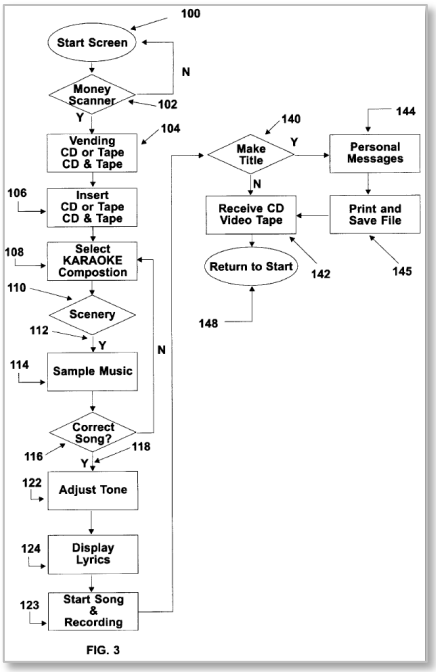
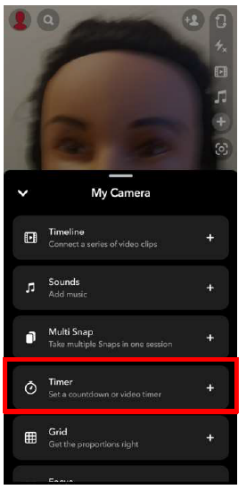
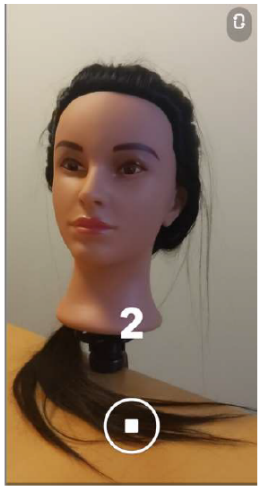


FIG. 3

464. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* with any of *Chu*, *Sherman*, and *Joslin*. With respect to this element, for example, this is at least because each reference is in the same technical field of multimedia content creation (the technical field of the '911 Patent) and each teaches similar known techniques for creating multimedia content using existing content and a user video, and sharing it with others.

465. Further, the provision of a countdown timer after a user request to record video was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.B). Thus, to the extent this feature was somehow found not to be taught by *Cohen* and *Chu* (and/or *Sherman* and *Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

466. Finally, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

displaying a countdown to the recording session based on a user interaction with the record button, wherein the recording session comprises video recording; and	***The Snapchat App displays a countdown to the recording session based on a user interaction with the record button, wherein the recording session comprises video recordingas shown below:*** The Snapchat App displays a countdown to the recording session once the user has interacted with (pressed) the record button. The recording session comprises video recording.  

EX1038 (*Infringement Contentions*) at 61-64.

467. Therefore, it is my opinion that element [8b] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[8c]	**providing the user an indication of the initiation of the recording session after the countdown to the recording session has counted down.**

468. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [8c], rendering it obvious.

469. Specifically, it is my opinion that element [8c] is rendered obvious by *Cohen* because *Cohen* teaches providing the user an indication of the initiation of the recording session (*e.g.*, a "record" instruction or the countdown reaching "0") after the countdown to the recording session (*e.g.*, the countdown as described in element [8b]) has counted down. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0166] ("A number of known and/or convenient methods to present such an indication are contemplated and are considered to be within the novel art of this disclosure. For

example, the service site can present a visual indicator that the recording session is to begin. The visual indication may be a numerical countdown and/or a literal expression (e.g., lights, camera, record). Aural indicators are in some embodiments used as well, including an audible countdown or audible instructions indicating initiation of the recording session.") A POSITA would have understood that the initiation point of a recording session to be when the "record" part of the example "lights, camera, record" is displayed or when the counter reaches "0" and/or disappears. *See also*, *e.g.*, EX1004 (*Cohen*) at ¶[0041], ¶[0048], ¶[0048], ¶[0152], each teaching that the recording session begins after the countdown finishes). In any case, a POSITA would have considered it obvious to provide some visual or audible cue at the end of the textual or numerical countdown that the recording session was beginning.

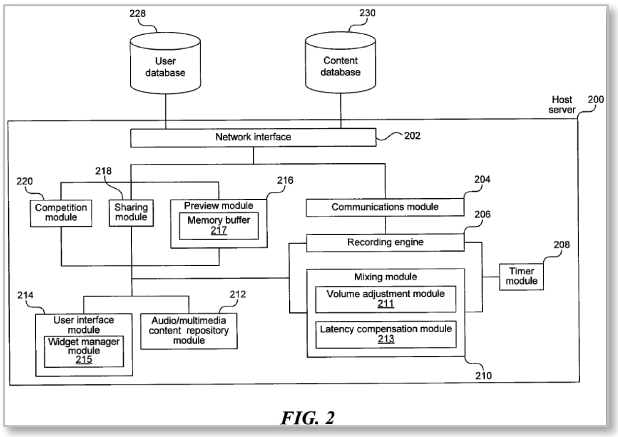


FIG. 2

470. In addition to the above, *Chu* also teaches the features of element [8b]. *See*, *e.g.*, EX1005 (*Chu*) at 14:9-19 ("The central processing unit 76 thereupon provides the performer 21 with a visual display of a numerical countdown on the video display monitor 42. At the termination of the countdown, the central processing unit 76 activates both the DVD/VCD player 74 and the appropriate

audio and video recorder 54 and/or 56 to commence recording on the CD 55 and/or video tape cassette 57 which the performer 21 has previously inserted therein. This step is indicated at 123 in FIG. 3."), FIGS. 2 and 3.

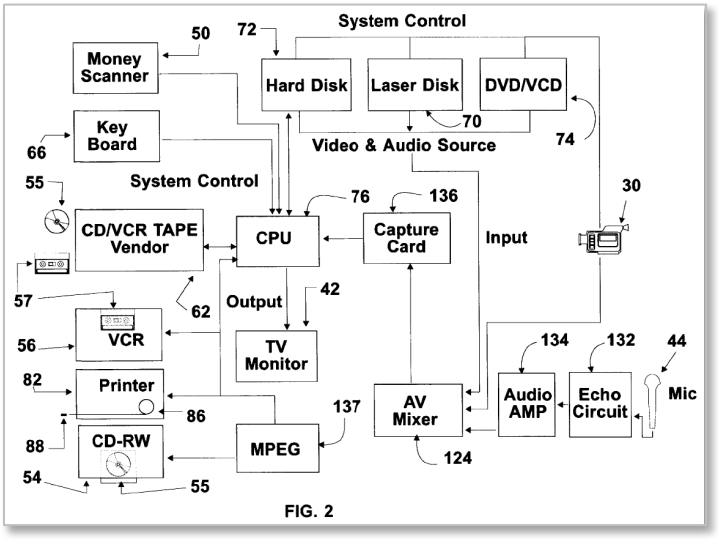


FIG. 2

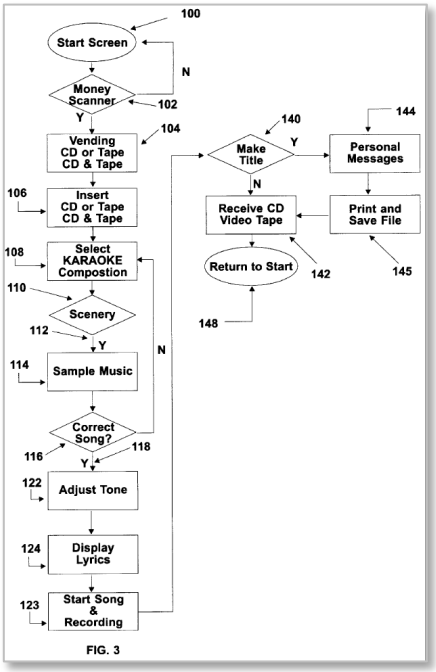


FIG. 3

471. As in *Cohen*, a POSITA would have understood the initiation point of a recording session to be when *Chu's* counter reaches "0" and/or disappears, corresponding to the system's activation of recording. And, as in *Cohen*, a POSITA would have considered it obvious to provide some visual or audible cue at the end of the numerical countdown that the recording session was beginning, to confirm to the user that recording is occurring.

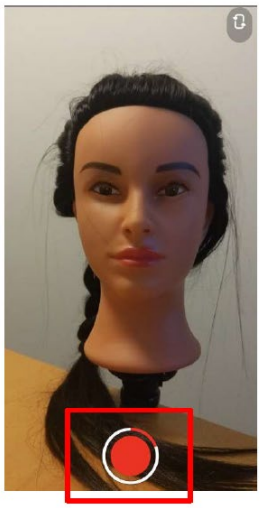
472. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* with any of *Chu*, *Sherman*, and *Joslin*. With respect to this element, for example, this is at least because each reference is in the same

technical field of multimedia content creation (the technical field of the '911 Patent) and each teaches similar known techniques for creating multimedia content using existing content and a user video, and sharing it with others.

473. Further, the provision of an indication of a recording session initiation after a countdown indication has counted down was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.B). Thus, to the extent this feature was somehow found not to be taught by *Cohen* and *Chu* (and *Sherman* and *Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

474. Finally, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

providing the user an indication of the initiation of the recording session after the countdown to the recording session has counted down.	***The Snapchat App provides the user an indication of the initiation of the recording session after the countdown to the recording session has counted down, as shown below:*** After the countdown, when recording has initiated, the Snapchat App's Record Button's outside circle begins to fill with red and the central white square becomes a large red circle. This indicates to the user that the recording session has initiated.



EX1038 (*Infringement Contentions*) at 65.

475. Therefore, it is my opinion that element [8c] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

10. Dependent Claim 9

[9]	**The method of claim 1, further comprising associating user-defined tags with the streamable video.**

476. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches claim 9, rendering it obvious.

477. Specifically, it is my opinion that claim 9 is rendered obvious by *Cohen* because *Cohen* teaches associating user-defined tags with user recordings, which are converted into streamable videos in accordance with the combined teachings of *Cohen*, *Chu*, *Sherman*, and *Joslin* (*see* elements [1o]-[1s]). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0121], [0123], [0125], [0126], and [0170], FIGS. 1, 2, 3A, 3B.

478. First, *Cohen* teaches that users can enter various metadata elements for their created content, which are then associated by the system with the content via relational databases. *See*, *e.g.*, EX1004 (*Cohen*) at ¶[0170] ("In addition to the type of multimedia content, the recording can be further classified based on genre, popularity, tempo, in alphabetical order, etc. The listing entry is typically selectable by other users for playback and/or to obtain additional information about the associated multimedia content. For example, the listing entry can include, by way of example but not limitation, artist information, tags, genre information, timing information (e.g., when created, recorded, and/or uploaded) comments, ratings, and/or challenges to the multimedia content"), ¶[0121] ("The database 328 can also store user content and/or data related to information of user content (e.g., user content data/metadata), for example, in database 328B. User content and user content metadata can either be explicitly submitted by the user or provided via one or more software agents and/or hardware modules coupled to the database 328B"), ¶[0123] ("FIG. 3B depicts a block diagram illustrating a content database 330 to store audio content 330A, audio content metadata 330B and/or 330C, according to one embodiment"), ¶[0125] ("The database of 330B stores beats (e.g., rhythms) and information

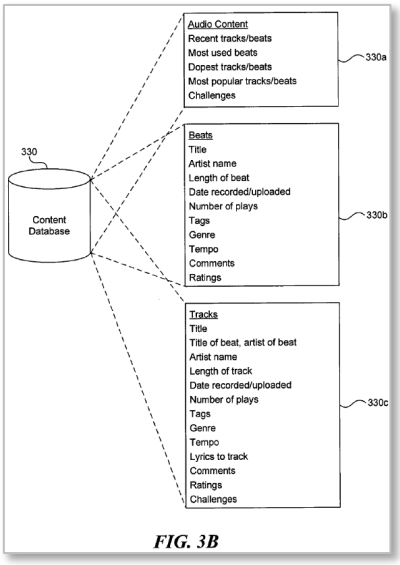


FIG. 3B

related to the beats. Information of each beat (e.g., beat metadata) can include by way of example but not limitation, the title of the beat, the name of the artist, the length of the beat in time (timing data), date the beat was recorded/uploaded, the number of times the beat has been played, tags, the genre, the tempo (tempo data), comments, and/or ratings (rating data). Beat metadata is, in some embodiments, manually submitted by one or more users. Beat metadata may also be automatically identified by an external agent coupled to the database 330B. For example, spectral analysis may be performed to determine tempo information. A track may be automatically tagged with identifiers indicating the track genre (e.g., "hip hop", "east coast", "west coast", etc.)"), and ¶[0126] ("The database 330C stores tracks (e.g., voice expressions recorded over beats) and information related to each track. Track information (e.g., or track metadata) can include, for example, title of the track, title of the beat, artist of the beat, name of track artist, length of track in time, date the track was recorded/uploaded, number of times the track has been played, tags, genre, tempo, lyrics, comments, ratings, and/or challenges. Similar to beat metadata, track metadata can be obtained based on user supplied information or automatically identified.").

479. A POSITA would have understood that tags are metadata, and therefore that the various metadata elements entered by the user for their created content are tags. Moreover, a POSITA would have understood that "user-defined

tags" are metadata/tags that have some type of user-selected information in them, such as title, artist name, genre, tempo, lyrics, *etc*.

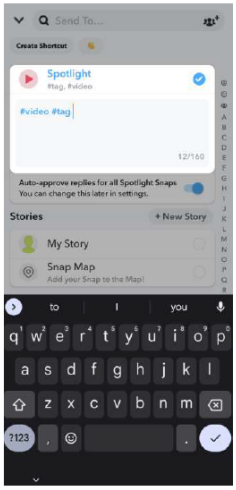
480. Moreover, a POSITA would have considered it obvious that any user-defined (or system defined) metadata/tags associated with the user content would have continued to be associated with the user content as it is moved from server to server in *Cohen's* system to preserve the related functionality taught by *Cohen* (*e.g.*, the ability to categorize and sort the user content). A POSITA would have further understood that the association would also have been maintained by the system as the user content was processed and encoded to create a streamable video as described in elements [1o]-[1s] above, for similar reasons. Maintaining associations of a multimedia file with its metadata through processing and encoding processes was well-known by 2009-2010. Thus it would have been obvious in view of *Cohen* alone or the knowledge of a POSITA that the tags would be associated with the created content and/or the streamable content. In other words, because the association of the tags with the content continues after the content is converted for streaming, *Cohen* teaches "associating user-defined tags with the streamable video." Alternatively, to the extent this claim is understood to require association of user-defined tags by a user with a streamable video only ***after*** the streamable video is created (it should not be), the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* also teaches this concept at least because *Cohen* teaches

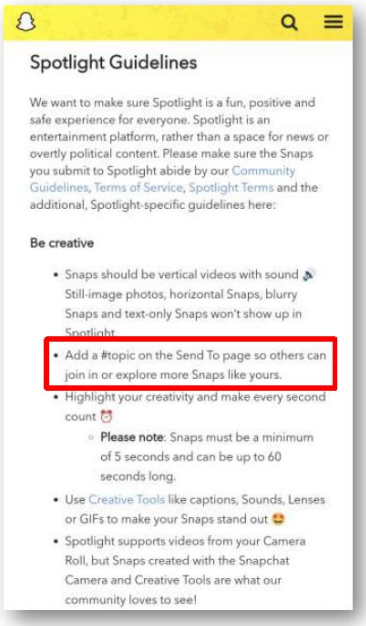
tag association for at least the reasons above and a POSITA would have considered it obvious to provide tag association functionality at any time in a content creation process as it is merely association of metadata to the file and the timing of such an association is of no particular import.

481. Further, associating user-defined tags with streamable video was generally known by POSITAs by 2009-2010 (*see, e.g.*, §I.G). Thus, to the extent this feature was somehow found not to be taught by *Cohen* (and/or *Chu*, *Sherman, and Joslin*), it would have been obvious to a POSITA to configure *Cohen's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

482. Finally, my above analysis is consistent with the assertion of infringement against Petitioner's product, as shown in the following excerpt, advanced in the related litigation.

The method of claim 1, further comprising associating user-defined tags with the streamable video.	***The Snapchat App associates user-defined tags with the streamable video, as shown below:*** The Snapchat App allows a user to enter user-defined tags (called #topics) when sharing a streamable video via the Snapchat App's "Spotlight" feature. The Snapchat App associates these user-defined tags with the streamable video.





Spotlight Guidelines

We want to make sure Spotlight is a fun, positive and safe experience for everyone. Spotlight is an entertainment platform, rather than a space for news or overtly political content. Please make sure the Snaps you submit to Spotlight abide by our Community Guidelines, Terms of Service, Spotlight Terms and the additional, Spotlight-specific guidelines here:

Be creative

- Snaps should be vertical videos with sound 🔊 Still-image photos, horizontal Snaps, blurry Snaps and text-only Snaps won't show up in Spotlight.
- Add a #topic on the Send To page so others can join in or explore more Snaps like yours.
- Highlight your creativity and make every second count ⏰
  - **Please note**: Snaps must be a minimum of 5 seconds and can be up to 60 seconds long.
- Use Creative Tools like captions, Sounds, Lenses or GIFs to make your Snaps stand out 🤩
- Spotlight supports videos from your Camera Roll, but Snaps created with the Snapchat Camera and Creative Tools are what our community loves to see!

(https://support.snapchat.com/en-US/article/spotlight-guidelines) (last visited January 10, 2023).

EX1038 (*Infringement Contentions*) at 67-70.

483. Therefore, it is my opinion that claim 9 is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

11. Independent Claim 10

484. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches claim 10, rendering it obvious.

[10a] A method for generating and sharing audio/video content to a social network, comprising:

485. This element is identical to element [1a]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10a], rendering it obvious, for the same reasons discussed above with regard to element [1a].

[10b] initiating a content creation process in response to a request from a user;

486. This limitation is identical to element [1b]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10b], rendering it obvious, for the same reasons discussed above with regard to element [1b].

[10c] prompting the user to record content;

487. This element is identical to element [1c]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10c], rendering it obvious, for the same reasons discussed above with regard to element [1c].

[10d] prompting the user to select an audio composition from a list of compositions retrieved from a host server;

488. This element is identical to element [1d]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10d], rendering it obvious, for the same reasons discussed above with regard to element [1d].

[10e] presenting the user with a record button;

489. This element is identical to element [1e]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10e], rendering it obvious, for the same reasons discussed above with regard to element [1e].

[10g] displaying a countdown to a recording session based on a user interaction with the record button, wherein the recording session comprises video recording;

490. This element is identical to element [8b]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10g], rendering it obvious for the same reasons discussed above with regard to element [8b].

[10h] providing the user an indication of the initiation of the recording session after the countdown to the recording session has counted down;

491. This element is identical to element [8c]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10h], rendering it obvious for the same reasons discussed above with regard to element [8c].

[10i] providing simultaneous aural playback of the audio composition during the recording session, thereby permitting the user to hear the composition during recording;

492. This element is identical to element [1i]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10i], rendering it obvious for the same reasons discussed above with regard to element [1i].

[10j] generating recorded content based on the recording session by compositing video captured during the recording session with a second video recording, such that the video captured during the recording session is selectively made transparent to reveal the second video recording;

493. This element is very similar to element [1j]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10j], rendering it obvious for the same reasons discussed above with regard to elements [1f] and [1j].

494. More specifically, element [10j] differs from element [1j] as follows:

> [10j] ~~[1j]~~ generating recorded content based on the recording session by compositing video captured during the recording session with a second video recording ~~the instance of pre-recorded visual media content~~, such that the video captured during the recording session is selectively made transparent to reveal the second video recording ~~the instance of pre-recorded visual media content~~;

495. The only difference between elements [1j] and [10j] is that the "prerecorded visual media content" of element [1j] has been changed to "second video recording" of element [10j]. It is my opinion that the "second video

recording" of element [10j] is taught for the same reasons as the "prerecorded visual media content" of elements [1j] and [1f], and therefore that element [10j] would have been obvious.

496. Therefore, it is my opinion that element [10j] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[10l]	**displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition;**

497. This element is identical to element [1l]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10l], rendering it obvious for the same reasons discussed above with regard to element [1l].

[10m]	**selecting a privacy attribute for the recorded content;**

498. This element is identical to element [1m]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10m], rendering it obvious for the same reasons discussed above with regard to element [1m].

[10n]	**sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute;**

499. This element is identical to element [1n]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10n], rendering it obvious for the same reasons discussed above with regard to element [1n].

[10p] prompting the user to continue editing the recorded content;

500. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10p], rendering it obvious.

501. Specifically, it is my opinion that element [10p] is rendered obvious by *Chu* because it teaches prompting the user to continue editing the recorded content (*e.g.*, *Chu's* system prompts a user through a user interface to incorporate a title or personal message to the recorded video and/or pre-recorded visual media content). EX1005 (*Chu*), 12:49-64, 16:12-24, and 16:40-57.

502. Specifically, *Chu* teaches providing an interface to allow the user to incorporate a title or personal message to the user's recorded performance as a distinct editing function. *See*, *e.g.*, EX1005 (*Chu*), 16:12-24 ("At the conclusion of the performance the central processing unit 76 will present a display at step 140 in FIG. 3 to the performer 21 through the video display monitor 42 asking the performer 21 whether or not the performer 21 wishes to make a title or provide a personal message for the performance"), 16:40-45 ("If the performer 21, through a selection on the keyboard 66, elects to provide a title or make a personal message, the central processing unit 76 provides a signal to the performer 21 to commence making the title by means, of a video message to the performer 21 presented through the video display monitor 42"), 16:46-57 ("The title or message may be incorporated into the recorded performance in two ways. The first way is to

incorporate the title or message into the beginning of the video portion of the selected karaoke musical composition. An area in the hard disk 72 is utilized for this purpose. When the user selects a title, a digitized version of the title is transmitted from the keyboard 66 through the central processing unit 76 to the hard disk 72 for temporary storage"), and FIGS. 2 and 3.

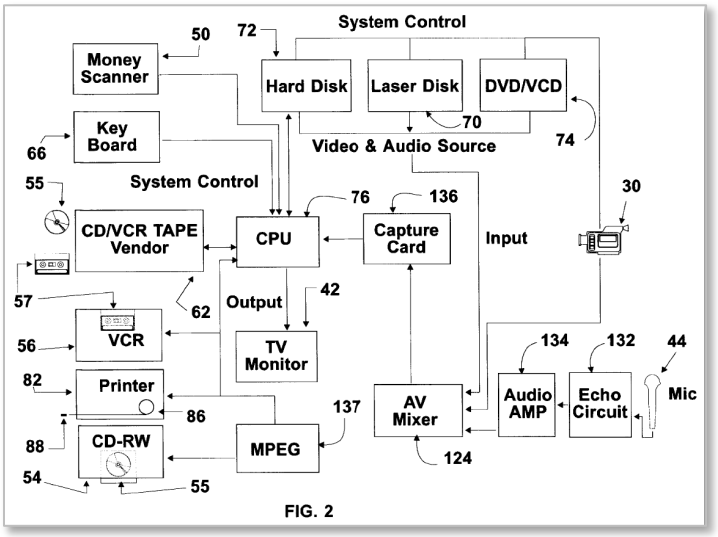


FIG. 2

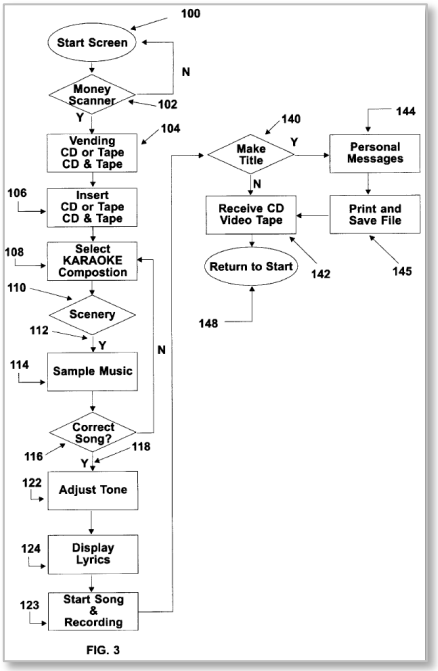


FIG. 3

503. As discussed above in §VI.A.1, a POSITA would have been motivated to modify *Cohen* (and *Joslin* and *Sherman*) in view of *Chu*. For example, a POSITA would have been motivated to modify *Cohen's* (and *Joslin* and *Sherman's*) teachings of recording user performances and adding titles or messages to the performances as taught by *Chu* to provide an improved system for creating a multimedia file that includes additional user-selectable content (*e.g.*, a user-selectable title and message) in addition to the underlying audio content and a

video of the user singing over the content in front of the background, which a POSITA would have recognized to be desirable in 2009-2010.

504. Further, adding titles or messages was generally known by POSITAs by 2009-2010 (*see, e.g.*, §§I.C, I.D, I.E). Thus, to the extent this feature was somehow found not to be taught by *Chu*, it would have been obvious to a POSITA to configure *Cohen*, *Chu*, *Sherman*, and *Joslin's* process to provide for such functionality in view of the basic understanding in the art for the same reasons identified above.

505. Therefore, it is my opinion that element [10p] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[10q] prompting the user to publish the recorded content;

506. It is my opinion that the combination *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10q], rendering it obvious, for at least the reasons discussed in element [1o]. For example, it is my opinion that limitation [10q] is rendered obvious by *Cohen* because *Cohen* teaches prompting the user to publish the recorded content (*e.g.*, *Cohen's* user interface widget 520 / widget interface manager 215 prompts a user to click on, for example, a Facebook post button, to publish the recorded multimedia content to social media websites, as described in element [1j]). *See*, *e.g.*, EX1004 (*Cohen*) at ¶¶[0064], [0092]-[0094], [0103]-[0105], [0142]-[0149], [0145], and [0208], and FIGS. 1, 2, and 5B-5G.

507. Therefore, it is my opinion that element [10q] is taught by the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

[10r] in response to a request to publish, processing and encoding individual components of the recorded content to create a streamable video; and

508. This element is identical to element [1r]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10r], rendering it obvious for the same reasons discussed above with regard to element [1r].

[10s] publishing the streamable video by copying the streamable video to a media server.

509. This element is identical to element [1s]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* teaches element [10s], rendering it obvious for the same reasons discussed above with regard to element [1s].

B. Ground 2: Claim 11 Is Rendered Obvious by *Cohen* in View of *Chu*, *Sherman*, *Joslin*, and *Lei*

510. It is my opinion that a POSITA would have found Claim 11 obvious based on the teachings of *Cohen* in view of *Chu*, *Sherman*, *Joslin*, and *Lei*, for at least the following reasons.

1. Combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei*

511. As discussed in detail herein, *Cohen*, *Chu*, *Sherman*, and *Joslin* teach very similar multimedia creation systems that provide similar features and functionality and have common components. For example, each of *Cohen*, *Chu*,

Sherman, and *Joslin* use cameras and microphones to capture a user's performance, each use various processing devices to composite audio and video to create a new multimedia file, each provide some mechanism to select the underlying audio or video content a user is recording over, each provide a storage mechanism for selectable files and the user's created multimedia, and each provide a mechanism for distributing the user's performance.

512. As also discussed above, a POSITA would have understood that the addition of more user-editing capabilities for the user-created multimedia content would have been recognized as highly desirable by 2009-2010, as evidenced by the desired use of backgrounds in *Chu*, *Sherman*, and *Joslin*, and the prior art discussed in §I.B (*see*, *e.g.*, the teachings that special effects and customization of multimedia was desirable in *Manico* (EX1012 (*Manico*) at ¶¶[0077]-[0079]) and *Gentile* (*Gentile* (EX1013), ¶[0061]).

513. As also discussed above, *Lei* teaches the use of a particular special effect in a recorded video—a trail line showing object movement such as trail lines 17 and 73 in FIG. 18, reproduced here. *Lei* (EX1008), ¶[0114]. *Lei* further teaches the underlying functionality to detect object movement and create the trail lines. *Lei* (EX1008), Abstract, ¶[0003], ¶¶[0111]-[114].

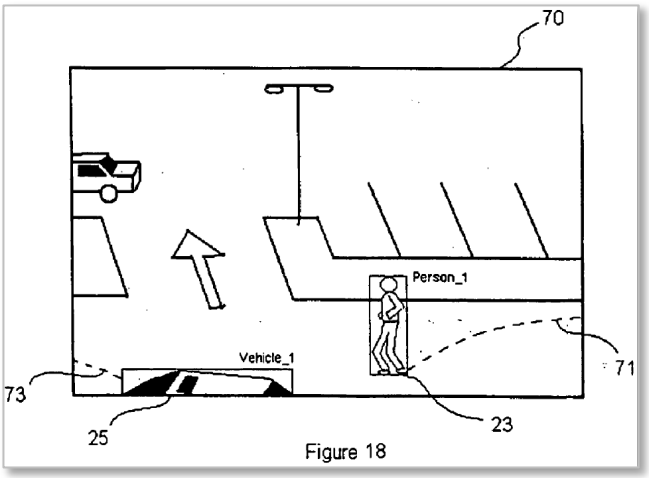


Figure 18

514. Accordingly, a POSITA would have been motivated to combine *Cohen*, *Chu*, *Sherman*, and *Joslin's* multimedia content creation systems with *Lei's* trail line creation teachings to provide a multimedia content creation system with additional special effect options, characteristics a POSITA would have recognized as highly desirable by 2009-2010 (as evidenced by the references themselves, among other references discussed herein).

515. Beyond the specific motivations to combine *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* provided by the references themselves and a POSITA's general understanding, a POSITA would have found it obvious to combine *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei's* teachings, and would have had a reasonable expectation of success in doing so, at least because each reference is in the same technical field

of multimedia content creation (the technical field of the ’911 Patent) and processing and each teaches similar known techniques for creating and editing multimedia content. A POSITA would have recognized that these similar known techniques: (i) would have been combined according to known methods to yield predictable results; (ii) would have been simply substituted for one another to obtain predictable results; (iii) would have been implemented in a resultant system to provide the respective improvements taught by *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei*; and (iv) reflect a finite number of identified, predictable solutions that would have been combined with a reasonable expectation of success, as described herein. For example, each of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teach various editing functions for a user, which a POSITA would have been motivated to use interchangeably in a resulting combination.

516. In other words, a POSITA would have also had a reasonable expectation of success in modifying *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei*’s systems with each other’s teachings because each reference is directed to very similar multimedia creation and editing systems that provide similar features and functionality and have common components. Thus, a POSITA would have utilized the editing teachings of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* largely interchangeably, including to improve aspects of the multimedia creation and editing taught by each.

517. Therefore, at the purported time of the alleged invention of the claims of the ’911 patent, a POSITA would have been motivated to, and it would have been obvious to a POSITA having the teachings of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* before him or her (along with the other knowledge explained above) to, combine the teachings of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* as described above (and below) to provide an improved multimedia creation system, with a reasonable expectation that such combination would have been successful.

2. Independent Claim 11

518. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei*, teaches claim 11, rendering it obvious.

[11a] A method for generating and sharing audio/video content to a social network, comprising:

519. This element is identical to elements [1a] and [10a]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [11a], rendering it obvious for the same reasons discussed above with regard to elements [1a] and [10a].

[11b] initiating a content creation process in response to a request from a user;

520. This element is identical to elements [1b] and [10b]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element

[11b], rendering it obvious for the same reasons discussed above with regard to elements [1b] and [10b].

[11c] prompting the user to record content;

521. This element is identical to elements [1c] and [10c]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [11c], rendering it obvious for the same reasons discussed above with regard to elements [1c] and [10c].

[11d] prompting the user to select an audio composition from a list of compositions retrieved from a host server;

522. This element is identical to elements [1d] and [10d]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [11d], rendering it obvious for the same reasons discussed above with regard to elements [1d] and [10d].

[11e] presenting the user with a record button;

523. This element is identical to elements [1e] and [10e]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [11e], rendering it obvious for the same reasons discussed above with regard to elements [1e] and [10e].

[11g] displaying a countdown to a recording session based on a user interaction with the record button, wherein the recording session comprises video recording;

524. This element is identical to elements [8b] and [10g]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [11g], rendering it obvious for the same reasons discussed above with regard to elements [8b] and [10g].

[11h] providing the user an indication of the initiation of the recording session after the countdown to the recording session has counted down;

525. This element is identical to elements [8c] and [10h]. It is my opinion that the combination of *Cohen*, *Chu*, *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [11h], rendering it obvious for the same reasons discussed above with regard to elements [8c] and [10h].

[11i] providing simultaneous aural playback of the audio composition during the recording session, thereby permitting the user to hear the composition during recording;

526. This element is identical to elements [1i] and [10i]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [11i], rendering it obvious for the same reasons discussed above with regard to elements [1i] and [10i].

[11j] generating recorded content based on the recording session;

527. This element is identical to the first part of elements [1j] and [10j]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei*

teaches element [11ij, rendering it obvious for the same reasons discussed above with regard to elements [1j] and [10j].

[11k] detecting user movement in the video captured during the recording session and representing that movement by a trailing light;

528. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [11k], rendering it obvious.

529. Specifically, it is my opinion that element [11k] is rendered obvious by *Cohen*, *Chu*, and *Lei* because *Cohen* and *Chu* teach generating recorded content during a recording session, and *Lei*, which also teaches generating recorded content, further teaches detecting user movement in the video captured during the recording session and representing that movement by a trailing light (*e.g.*, *Lei's* object tracking and trail line determination). *See*, *e.g.*, EX1008 (*Lei*), Abstract ("[i]n an intelligent video surveillance system, video processing software performs a number of operations on video data received from a camera, including foreground extraction, shadow removal and object tracking"), ¶[0003] (teaching background and foreground data in an image are determined, object movement is detected, and "a trajectory database is maintained so that the tracking history of each foreground object is available to higher level applications which may, for example, display a trail line indicating the cumulative path taken by one or more foreground objects in the video." ¶[0111] (teaching objects in an image may be identified with "object descriptors," which are passed to object tracking stage),

¶[0112] ("[t]he object tracking stage 5 receives the object descriptors from the object characterisation stage 18. Foreground objects are tracked from frame to frame. A correspondence is established between foreground objects in the current frame, and those already tracked in previous frames, using the object descriptors. A trajectory database is maintained so that the tracking history of each foreground object is available to one or more high level applications 7. For example, a high level application 7 may display a trail line indicating the cumulative path taken by one or more foreground objects in the video. If multiple foreground objects enter the view of the web camera11, a different colour can be assigned to each trail line for the purposes of quick identification"), and ¶[0114] ("The display of image data on the video monitor 15 is controlled by a display control application 70 stored on the hard drive of the PC 13. Referring to FIG. 17, the display control application 70 receives video data from all processing stages shown in FIG. 3, and is thereafter capable of displaying any video sequence represented by this video data. Indeed, an operator may view multiple images on a single screen. For example, an operator may wish to view both the background model 19 and the object classification mask 39 simultaneously. Of principle

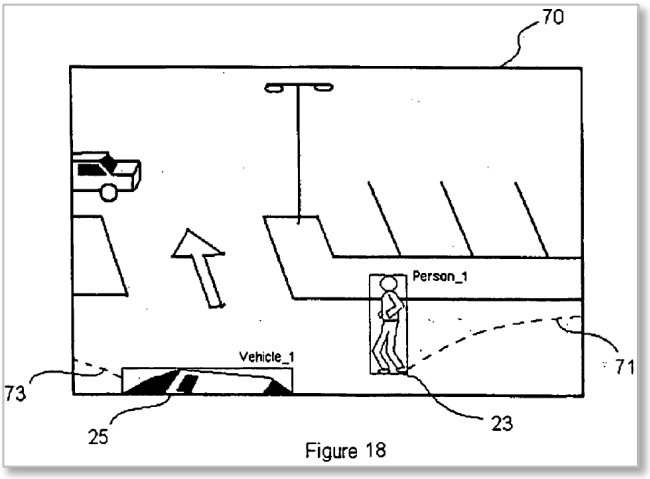


Figure 18

interest to an operator will be the post-processed video data from the object tracking stage 5 and the high level applications 7. A post-processed frame 70 is shown in FIG. 18. … Furthermore, each foreground object 23, 25 has been identified and tracked by the object tracking stage 5. The trail lines 71, 73 represent the cumulative path taken by the objects over the course of a video segment leading up to the current frame").

530. A POSITA would have understood that *Lei's* trail lines 71, 73 are "trailing lights" as that term is used in the art to describe a special effect to show movement in a video or image. A well-known example of this is a nighttime image of a highway showing the trails of car headlights or taillights. More concretely, a POSITA would have understood that *Lei's* trail lines 71, 73 are "trailing lights" at least because the lines are represented, as shown in FIG. 18 reproduced above, by illuminating/changing relevant pixels on the display to illustrate an object's movement.

531. As discussed above in §VI.B.1, a POSITA would have been motivated to modify *Cohen*, *Chu*, *Sherman*, and *Joslin* in view of *Lei* at least because each relate to multimedia creation and editing functionality and *Lei's* special effect teachings would have been considered a desirable improvement to the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin*.

532. Further, the detection of user movement in video captured during a recording session and representing that movement by a trailing light was generally known by POSITAs by 2009-2010. Indeed, the '911 Patent indicates "user movement can be detected by measuring an object or a change in speed in the camera's field of view, ***as well known in the prior art***. The motion can be represented by a trailing light and thus incorporated into a pre-recorded video recording." EX1001 (*'911 Patent*), 17:29-33 (emphasis added). Thus, it would have been obvious to a POSITA to configure the combination of *Cohen*, *Chu*, *Sherman*, and *Joslin* to include trailing light effects in view of the basic understanding in the art for the same reasons identified above.

533. Therefore, it is my opinion that element [11k] is taught by the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei*.

[11l]	**displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition;**

534. This element is identical to element [1l] and [10l]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [11l], rendering it obvious for the same reasons discussed above with regard to elements [1l] and [10l].

[11m] selecting a privacy attribute for the recorded content;

535. This element is identical to elements [1m] and [10m]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [11m], rendering it obvious for the same reasons discussed above with regard to elements [1m] and [10m].

[11n] sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute;

536. This element is identical to elements [1n] and [10n]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [11n], rendering it obvious for the same reasons discussed above with regard to elements [1n] and [10n].

[11o] receiving a request to publish the recorded content;

537. This element is identical to element [1o]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [1o], rendering it obvious for the same reasons discussed above with regard to elements [1o].

[11r] in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video; and

538. This element is identical to element [1r] and [10r]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element

[11r], rendering it obvious for the same reasons discussed above with regard to elements [1r] and [10r].

[11s]	**publishing the streamable video by copying the streamable video to a media server.**

539. This element is identical to elements [1s] and [10s]. It is my opinion that the combination of *Cohen*, *Chu*, *Sherman*, *Joslin*, and *Lei* teaches element [11s], rendering it obvious for the same reasons discussed above with regard to elements [1s] and [10s].

C. Grounds 3/4: Grounds 1/2 In Further View of *Austerberry*

540. In addition to and for the same reasons provided in Grounds 1 and 2, it is also my opinion that a POSITA would have found: (i) Claims 1-10 obvious based on the teachings of *Cohen* in view of *Chu*, *Sherman*, *Joslin*, and *Austerberry*; and (ii) Claim 11 obvious based on *Cohen* in view of *Chu*, *Sherman*, *Joslin*, *Lei*, and *Austerberry*.

541. Specifically, should "processing and encoding" of [1r], [10r], and [11r] be construed to require two separate steps as discussed in [1r] above (it should not), and should the *Cohen*/*Chu*/*Sherman*/*Joslin* combination be found deficient as to teaching two separate steps (it should not), it would still have been obvious to utilize *Austerberry's* pre-processing and encoding steps discussed in [1r] as part of the *Cohen*/*Chu*/*Sherman*/*Joslin* combination's MPEG conversion

processes to provide improved MPEG conversion as taught by *Austerberry* as discussed in [1r].

542. A POSITA would have been motivated to utilize *Austerberry's* pre-processing and encoding teachings with the *Cohen*/*Chu*/*Sherman*/*Joslin* or *Cohen*/*Chu*/*Sherman*/*Joslin*/*Lei* combinations because those combinations teach providing streamable MPEG files and *Austerberry* teaches processing for providing improved streamable MPEG files, which a POSITA would have understood to be desirable by 2009-2010 (as evidenced by the references themselves, among other references discussed herein).

543. Beyond the specific motivations to combine the references provided by the references themselves and a POSITA's general understanding, a POSITA would have found it obvious to combine *Austerberry* with the *Cohen*/*Chu*/*Sherman*/*Joslin* or *Cohen*/*Chu*/*Sherman*/*Joslin*/*Lei* combinations, and would have had a reasonable expectation of success in doing so, at least because each reference is in the same technical field of multimedia content creation (the technical field of the '911 Patent) and processing and each teaches similar known techniques for creating and editing multimedia content. A POSITA would have recognized that these similar known techniques: (i) would have been combined according to known methods to yield predictable results; (ii) would have been simply substituted for one another to obtain predictable results; (iii) would have

been implemented in a resultant system to provide the respective improvements taught by the references; and (iv) reflect a finite number of identified, predictable solutions that would have been combined with a reasonable expectation of success, as described herein. For example, each of the references teaches various editing functions for a user, which a POSITA would have been motivated to use interchangeably in a resulting combination.

544. In other words, a POSITA would have also had a reasonable expectation of success in modifying *Cohen*, *Chu*, *Sherman*, *Joslin*, *Lei*, and *Austerberry's* systems with each other's teachings because each reference is directed to multimedia creation, editing, and/or publishing systems. Thus, a POSITA would have been able to utilize the various creating, editing, and publishing teachings of *Cohen*, *Chu*, *Sherman*, *Joslin*, *Lei*, and *Austerberry* largely interchangeably, including to improve aspects of the multimedia creation and editing taught by each.

545. Therefore, at the purported time of the alleged invention of the claims of the '911 patent, a POSITA would have been motivated to, and it would have been obvious to a POSITA having the teachings of *Cohen*, *Chu*, *Sherman*, and *Joslin* and/or *Lei*, as well as *Austerberry*, before him or her (along with the other knowledge explained above) to, combine the teachings of *Cohen*, *Chu*, *Sherman*, and *Joslin* and/or *Lei* with *Austerberry* as described above to provide an improved

multimedia creation system, with a reasonable expectation that such combination would have been successful.

VII. BACKGROUND AND QUALIFICATIONS

546. This section contains a summary of my educational background, career history, publications, and other relevant qualifications. My full *curriculum vitae* is attached as Appendix 1 to this Declaration.

A. Background

547. I am currently a Full Professor in the Department of Electrical and Computer Engineering at McGill University in Montreal, Canada.

548. I received my B.Sc. in Electrical Engineering (with Honors) from the University of British Columbia in 1990, my M.Sc. in Computer Science from the University of Toronto in 1992, and my Ph.D. in Electrical and Computer Engineering from the University of Toronto in 1996.

549. I am a member of the Centre for Intelligent Machines, and a founding member of the Centre for Interdisciplinary Research in Music Media and Technology at McGill University. I presently direct a group of approximately 50 researchers at the Shared Reality Lab at McGill, which focuses on computer mediation to facilitate high-fidelity human communication and the synthesis of perceptually engaging, multimodal, immersive environments.

550. I have worked with IBM at the Haifa Research Center, Israel, and the Watson Research Center in Yorktown Heights, New York, the Sony Computer Science Laboratory in Tokyo, Japan, and was a visiting professor at Bang & Olufsen, Denmark, where I conducted research on telepresence technologies as part of the World Opera Project. I led the theme of Enabling Technologies for a Networks of Centres of Excellence on Graphics, Animation, and New Media (GRAND) and I am an associate editor of the Journal of the AES, the Frontiers Journal in Virtual Reality, and the Institute of Electrical and Electronics Engineers (IEEE) Transactions on Haptics.

551. I have carried out significant research involving design and implementation of audio- and video-based applications, including those that involve media selection, acquisition, replay, manipulation, storage, and network streaming of both live and archived media in addition to the design of user interfaces for such systems, beginning with my development of one the earliest examples of webcam streaming from my research laboratory while a graduate student at the University of Toronto (1994).

552. I served as Technical Leader of a demonstration of multichannel and multimedia audio distribution in the world's first Internet streaming demonstration of Dolby Digital 5.1 (1999), which was recognized with a Citation Award from the Audio Engineering Society, and was subsequently responsible for development of

a video streaming architecture under contract for the Canadian Federal Government (2002).

553. I was the engineering lead on design and implementation of the Ultra-Videoconferencing system (2002-2006), used in a demonstration of multiple simultaneous streams of uncompressed high-definition video at the IEEE/ACM Supercomputing conference, where my work was recognized with the Award for "Most Innovative Use of New Technology" (2005), and my adaptive bandwidth interactive streaming video prototype for "Real-Time Emergency Response", a prototype next-generation 911 technology, received the Mozilla Foundation and NSF Gold Prize in the Mozilla Ignite Challenge (2012).

554. My work on multimodal user interfaces as part of the "Autour" project has garnered further recognition, including the Hochhausen Research Award from the Canadian National Institute for the Blind and an Impact Award from the Canadian Internet Registry Association. I am also a recipient of several "best paper" awards from scholarly societies for my research.

555. My experience in academic and practical situations as well as my hands-on experience with multimedia production systems provides me with an appreciation of the subject matter of the '911 patent. In this regard, my opinion as an expert was sought in another IPR matter challenging the validity of a patent having closely related subject matter: Triller's U.S. Patent No. 9,691,429 (Systems

and methods for creating music videos synchronized with an audio track). My opinion regarding the invalidity of the Triller patent was adopted by the PTAB, which invalidated the Triller patent in September 2022

556. A copy of my *curriculum vitae* is included in Appendix 1.

B. Compensation

557. For my efforts in connection with the preparation of this Declaration I have been compensated at my standard rate for this type of consulting activity. My compensation is in no way contingent on the results of these or any other proceedings relating to the above-captioned patents.

C. Materials and Other Information Considered

558. I have considered information from various sources in forming my opinions. I have reviewed and considered each of the exhibits listed in the attached Appendix 2 (Materials Considered in the Preparation of This Declaration) in forming my opinions.

VIII. UNDERSTANDING OF THE LAW

559. I am not an attorney. In forming my opinions in this Declaration, I applied the relevant legal principles provided to me by counsel, which are summarized in Appendix 4.

IX. RESERVATION OF RIGHTS

560. My opinions are based upon the information that I have considered to date. I am unaware of any evidence of secondary considerations with respect to the '911 patent that would render any of the Challenged Claims non-obvious. I reserve the right, however, to supplement my opinions in the future to respond to any arguments raised by the owner of the '911 patent and to take into account new information that becomes available to me.

561. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed on May 26, 2023

By:



Jeremy Cooperstock, Ph.D.

APPENDIX 1: CURRICULUM VITAE OF JEREMY COOPERSTOCK

CURRICULUM VITAE

Jeremy R. Cooperstock

Version as of May 5, 2023

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Biographical

Personal Data

Nationality	Canadian
Languages	English, French and Hebrew
Address	Department of Electrical and Computer Engineering, McGill University 3480 University Street, Montreal, QC, H3A 0E9, Canada
Telephone	(514) 398-5992
email	jer@cim.mcgill.ca

Education

Ph.D.	Electrical and Computer Engineering, University of Toronto, 1996. Thesis: "Reactive Environments and Augmented Media Spaces." (Nominated for NSERC Doctoral Dissertation Award) Advisors: Prof. K.C. Smith and Prof. W. Buxton
M.Sc.	Computer Science, University of Toronto, 1992. Thesis: "Neural Network Operated Vision-Guided Mobile Robot Arm for Docking and Reaching." Advisor: Prof. E. Milios.
B.A.Sc.	Electrical Engineering, Computer Engineering Option, University of British Columbia, 1990 (Honours)

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Awards and Distinctions

2022	Honorable Mention, "The Sound of Hallucinations: Toward a more convincing emulation of internalized voices" (top 5% of papers), Human Factors in Computing Systems (CHI) [C2]
2022	Finalist, Best Applications Paper Award, "Speaking Haptically: from Phonemes to Phrases with a Mobile Haptic Communication System", Transactions on Haptics [J2]
2019	Honorable Mention, "Detecting Perception of Smartphone Notifications using Skin Conductance Responses" (top 5% of papers), Human Factors in Computing Systems (CHI) [C31]
2019	San Diego Opera, Opera Hack award, Hamsafar! ($10,000, with 5 co-awardees)
2018	Best poster presentation award, "Enhanced Pressure-Based Multimodal Immersive Experiences", Augmented Human [CP9]
2015	Gerald W. Farnell Teaching Scholar, Faculty of Engineering ($12,500)
2014	US Ignite Best App in Education, Augmented Reality for Improved Training of First Responders
2013	Canadian National Institute for the Blind, Hochhausen Access Technology Research Award ($10,000)
2013	Best paper award, "Vibrotactile Rendering of Splashing Fluids", Transactions on Haptics [J15]
2013	Best use of sound award, "The Walking Straight Mobile Application: Helping the Visually Impaired Avoid Veering, International Conference on Auditory Displays [C58]
2012	Mozilla Foundation and NSF Gold Prize in the Mozilla Ignite Challenge (out of 305 submissions in the Brainstorming Round) ($5,000) for Real-Time Emergency Response
2012	Canadian Internet Registry Association .CA Impact Award (Applications category) for In-Situ Audio Services Project ($5,000)
2011	Best paper award, "What's around me? Spatialized audio augmented reality for blind users with a smartphone", Mobile and Ubiquitous Systems [C69]
2010	Best paper award, "Design of a Vibrotactile Display via a Rigid Surface", Haptics Symposium [C78]
2009, 2010	Nominee, NSERC Brockhouse Canada Prize
2009	Best paper award, "SoundPark: Exploring Ubiquitous Computing through a Mixed Reality Multi-player Game Experiment", 9e Conférence Internationale sur Les NOuvelles TEchnologies de la REpartition [C88]
2005	ACM/IEEE Supercomputing, Most Innovative Use of New Technology for Wide Screen Window on the World: Life Size HD Videoconferencing
2001	Audio Engineering Society Citation Award for pioneering the technology enabling collaborative multichannel performance over the broadband internet

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Work Experience

Career Highlights

Haptic Information Delivery (2018-2021) My lab's haptics research has resulted in prominent visibility in the preeminent journal, IEEE Transactions on Haptics, and the two top-tier international conferences in the field, IEEE Haptics Symposium and IEEE World Haptics Conference, with a dozen publications in these forums between 2020 and 2021. Given my recognition in the field, I was invited to serve on the editorial boards of all of these bodies, in addition to the specialty section on haptics of the Frontiers Journal in Virtual Reality. Specific examples of significant contributions include the performance attained through use of our two-actuator apparatus and phonemic encoding for tactile communication of natural language [C28, J2, C6], which outperformed the previously cited best results on this task, achieved by Facebook Research Labs. A second contribution relates to the high recognition rates we attained for multi-dimensional tacton delivery (3 parameters, each at 3 levels), targeting clinical patient-monitoring scenarios. This work inspired studies of wearable vibrotactile devices for physiological monitoring of patients [C27, C16]. While our results were achieved initially using a set of three actuators [C40, C37, C29, C19], we subsequently demonstrated equivalent recognition performance via only a single vibrotactile actuator, with a novel parameter encoding scheme [C18]. We further demonstrated achievement of the highest information transfer rates reported in the literature for such a single-actuator device [C13].

Physiological Sensing (2017-2020) Our research for detection of smartphone notifications was recognized by an Honourable Mention (top 5% of papers) from the top-tier ACM Conference on Human Factors in Computing ([C31]), and led to a recent patent filing ([P3]). This work has the potential to serve as not only for more intelligent, context-sensitive notification delivery, but also, as a tool that can be exploited to combat the prevalent and adverse effects of Internet addiction, driven largely by "fear of missing out."

Real-Time Emergency Response (rtER) (2012-2013) provides an envisionment of the future of next-generation 911 (NG-911) technologies, supporting enhanced situational awareness for first responders through the use of citizen-supplied smartphone video streams and other relevant data [J13]. Our work was recognized by the *Gold Prize* from the Mozilla Ignite Fund, featured on the web site of the White House Office of Science and Technology, and prompted the launch of a funding program by the U.S. Department of Justice.

Autour (2009-2018) is an "eyes-free" app for the blind, which provides a rich, spatialized audio representation of one's environment [J21, C69, C60, C57]. The project further motivated a rigorous analysis of smartphone sensor reliability, resulting in what was the first comprehensive examination of practical limits on smartphone sensors, including the problems of gyro drift [C60].

Mobile Treatment Device for Amblyopia (2009-2012, in collaboration with ophthalmologist R. Hess) is a patented prototype Mobile Treatment Device for Amblyopia [P8] ("lazy eye"). Initial trials [J20], based on the popular Tetris game, provided highly promising early results [J27, J23], not only restoring the use of both eyes in a majority of patients but even resulting in binocular (3D) depth perception in some. Most significantly, the treatment has been found to work successfully

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on adult populations, whereas the prevailing wisdom had been that treatment was only possible on children. The technology has now been acquired by Novartis, who are commercializing the system.

Natural Interactive Walking (2008-2017) investigated multimodal interaction with virtual ground surfaces, resulting in important findings of tactile discrimination ability [J22] and the role of vibrotactile stimulation in perception of compliance [J28]. Our "Ecotile" prototype (patent [P5]) was showcased at numerous venues including SIGGRAPH, and led to related research involving limb modeling [C71, C55, C49], foot-water interaction [J15], and variable-friction walking interfaces [C65, C56, J6].

Ultra-Videoconferencing (2002-2006) is our low-latency, high-fidelity network transport, used for distance music teaching with Maestro Pinchas Zuckerman, cross-continental jazz jams, and remote sign language interpretation. The Globe and Mail described Cooperstock's 2001 demonstration as "a watershed event for the elite club of the world's computer network engineers." Ultra-Videoconferencing garnered my research group a prestigious Citation Award from the Audio Engineering Society and the Award for Most Innovative Use of New Technology from ACM/IEEE Supercomputing (2005). This research directly constituted the basis for subsequent funding of $2.2M from Valorisation Recherche Quebec and over $4M from Canarie, and influenced the designs of similar telepresence videoconferencing systems from Cisco, HP, and Polycom. Our follow-up work on **Open Orchestra** (with HQP N. Bouillot, A. Olmos, T. Knight, M. Tomiyoshi), resulted in an immersive simulator for orchestral training, used by professional and semi-professional musicians [J19].

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Academic Experience

Jan 2018–present	**McGill University, Montreal, QC** Full Professor, Electrical and Computer Engineering. Director, Shared Reality Lab Member, McGill Institute for Aerospace Engineering Member, International Laboratory on Learning Systems Associate Member, Faculty of Music, Department of Theory Founding Member, Centre for Interdisciplinary Research in Music, Media and Technology Member, Centre for Intelligent Machines
Feb 2022–present	**York University, Ontario** Affiliate Member, Vision: Science to Applications (VISTA)
Sep 2018–Jun 2019	**Technion–Israel Institute of Technology, Haifa, Israel** Visiting Professor, Industrial Engineering and Management
Sep 2018–Jun 2019	**IDC, Herzliya, Israel** Visiting Professor, Department of Computer Science
May 2003–Dec 2017	**McGill University, Montreal, QC** Associate Professor, Electrical and Computer Engineering
Aug 2011–Jul 2012	**University of Auckland, New Zealand** Invited Professor, Department of Computer Science
May–June 2009	**Bang & Olufsen, Denmark** Visiting Professor, World Opera Project
Jan 2009–present	**Bielefeld University, Germany** Virtual Member, Center of Excellence Cognitive Interaction Technology (CITEC)
Feb 2008	**Arizona State University** Visiting Scholar, School of Arts, Media and Engineering
Sep 2004–Aug 2005	**Université de Paris VI, Paris France** Invited Professor, Laboratoire des Instruments et Systemes d'Ile-de-France
Nov 1997–May 2003	**McGill University, Montreal, QC** Assistant Professor, Electrical and Computer Engineering.

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Industrial and Consulting Experience

Sep 2019–Oct 2021	**RedPill Canada VR, Montreal** Director and Advisor
Apr–Jun 2019	**(Confidential project as consulting expert)** Providing expert report on topics concerning Human-Computer Interaction.
Aug–Nov 2014	**Menya Solutions and DRDC-Valcartier** Providing expert advice related to human-computer interfaces, visualization, and collaboration.
Aug 2012	**Tamaggo Inc.** Provide guidance and advice on digital imagery
May 2012	**York University** Review draft application to Canada Excellence Research Chairs program
May 2002 –Nov 2003	**Solicitor General of Canada** Media streaming configuration and user interface design.
May 2001	**National Research Council** Instructor of short course in Soft Computing, Institut des Materiaux Industriels.
Jan–Sep 1999	**Audio Engineering Society** Technical leader of demonstration of multichannel and multimedia audio distribution
Jan–Aug 1999	**Ontario Science Center** Scientific Director of Timescape Millenium Exhibit
Jul 1998	**Nortel** Instructor of short course in videoconferencing systems for the Nortel International SL-1 User's Association (ILUA), Long Beach
Sep 1996–Oct 1997	**Sony Computer Science Laboratory** Visiting Researcher, Sony Computer Science Laboratory, Tokyo, Japan. Developed speech-interface controlled VCR with visual tape database functionality. Wrote two patent applications, one filed.
Jun–Aug 1990	**Fibronics Research** Visiting Researcher, Fibronics Advanced Research Center, Haifa, Israel. Developed and tested an FDDI-to-token ring bridge.
May–Aug 1989	**IBM T.J. Watson Research Center** Research Intern, IBM T.J. Watson Research Center, Yorktown Heights, NY. Improved implementation of a VLIW architecture simulator.

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Litigation and Expert Witness Experience

Parties I represented are marked by an asterisk.

Feb 2023–ongoing	**Immersion Corporation v. Meta Platforms, Inc.*** Case No. 6:22-cv-00541-ADA (W.D. Texas and related *Inter Partes* Review proceedings
Feb 2023–ongoing	**Playvuu, Inc. v. Snap Inc.*** Central District of California Case No. 2:22-cv-06019. Involved in litigation matters related to U.S. Patent No. 10,931,911.
Sep 2022–ongoing	**Apple* v. Taction Technologies, Inc** Involved in *Reexamination Requests* of U.S. Patent Nos. 10,659,885 and 10,820,117 in the United States Patent and Trademark Office.
Aug 2022–ongoing	**Westwood One, LLC v. Local Radio Networks, LLC*** United States District Court, Northern District of Indiana, Case No. 1:21-cv-00088-HAB-SLC. Involved in litigation matters related to U.S. Patent Nos. 7,412,203 and 7,860,448
Jan–May 2022	**iFIT Inc. f/k/a ICON Health & Fitness* v. Peloton Interactive** United States District Court, District of Delaware, Civil Action No. 20-cv-1386-RGA
Sep 2021–ongoing	**Brazos* v. Google** United States District Court, Western District of Texas Waco Division, Case Nos. 6:20-CV-00571-ADA through 6:20-CV-00585-ADA
Sep 2021–ongoing	**AmLaw 100 Firm*** Providing independent expert consulting services for an AmLaw 100 Firm on behalf of an owner of patents covering smartphone-based vehicle operation detection. Deposition testimony on expert report.
Jan 2021–ongoing	**GUI Global Products, Ltd. v. Apple*** United States District Court, Southern District of Texas, Case No. 4:20-cv-2652 and *Inter Partes* Review of U.S. Patent Nos. 10,259,020, 10,259,021, 10,562,077, and 10,589,320 in the United States Patent and Trademark Office. Deposition testimony on expert report (2 depositions)
Dec 2020–Feb 2021	**Expert consultation re possible litigation in IT-related matter** Work done on behalf of Sheridan Ross P.C.
Nov 2020–ongoing	**Koss v. Apple*** Civil Action No. 6:20-cv-00665, Western District of Texas. Involved in *Inter Partes* Review of U.S. Patent Nos. 10,206,025, 10,469,934, 10,506,325, 10,491,982, and 10,298,451 before the United States Patent and Trademark Office. Deposition testimony on expert reports (4 depositions).
Oct 2020-Oct 2021	**ByteDance* and TikTok* v. Triller** *Inter Partes* Review of U.S. Patent No. 9,691,429 before the United States Patent and Trademark Office. Deposition testimony on expert report.

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Sep 2020–ongoing	**Content Square v. Quantum Metric* and Decibel Insight*** United States District Court, Massachusetts District Court, Case No. 1-20-cv-11184 and Delaware District Court, Case No. 20-cv-00832. Involved in invalidity arguments and petitions for *Inter Partes* Review. Deposition testimony on expert reports (5 depositions).
Sep 2020–ongoing	**Wiesel v. Apple*** United States District Court, Eastern District of New York, Case No. 1:19-cv-7261. Engaged for source code review of products related to the Apple Watch (case presently stayed).
Aug–Oct 2020	**Finish Time* v. Garmin** United States District Court, District of Maine, Case No. 2:20-cv-00184. Involved in review of infringement arguments, discovery, related to fitness applications.
Dec 2019-Nov 2022	**Pinn v. Apple*** United States District Court, Central District of California, Case No. 8:19-cv1805, *Inter Partes* Review IPR2020-00999, Post Grant Review PGR2020-00066 and PGR2020-00073. Involved in preparation of expert witness declarations, code analysis involving multiple products related to earbuds and charging circuitry. Deposition testimony on expert reports, in-court trial testimony.
Oct 2019	**Apple* v. Qualcomm** *Inter Partes* Review, Case no. IPR2018-01279. Deposition testimony on expert witness declaration related to multimedia messaging.
Mar 2019–Feb 2022	**Cruz Hernandez* v. Air Canada and Lufthansa** Canadian Transportation Agency Case no. 20-01712, Petitioner before the Agency regarding passengers' rights to compensation under EC 261/2014
May 2018–May 2019	**Samsung* v. Immersion** Civil Action No. 2:2018-cv-00055 in the Eastern District of Texas and *Inter Partes* Review, case no. IPR2018-01499. Consulted on technical details and involved in preparation of two expert witness declarations related to haptic feedback effects and force feedback in a multimodal system.
May 2016–Nov 2017	**Cooperstock* v. Air Canada** Petitioner before the Canadian Transportation Agency. Brought successful complaint against Air Canada for the airline's making false or misleading statements to the public, Decision No. 105-C-A-2017 (otc-cta.gc.ca/eng/ruling/105-c-a-2017)
Jan–May 2014	**St. Lewis v. Rancourt*** Provided expert report on web server location, Ontario Superior Court File No. 11-51657
Mar–Sep 2013	**Cooperstock* v. United Airlines** Brought and argued successful appeal regarding anti-SLAPP legislation before the Quebec Court of Appeal, Decision 2013 QCCA 1670 (goo.gl/pgz301). Argued appeal in person (September 26, 2013)

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Nov 2012–Aug 2017	**United Airlines v. Cooperstock***
	Pro se litigant, Federal Court File No. T-2084-12. Deposition as litigant (August 2013) and testified at trial (December 2016).
Nov 2012–Jan 2017	**United Airlines v. Cooperstock***
	Pro se litigant, Quebec Superior Court File No. 500-17-074743-124. Deposition as litigant (October 2014) and testified at trial (April 2016).
Sep 2012	**Lukács* v. Air Canada**
	Provided expert report on database query and execution times, Canadian Transportation Agency File No. M4120-3/11-06673, Decision No. 204-C-A-2013
May 2007–Jan 2008	**Market Maker c. Brim Solutions***
	Provided expert witness report and in-court testimony (October 2007) on software-related intellectual property case. Quebec Superior Court File No. 500-17-036750-076.
Feb–Oct 2004	**Crawford Adjusters Canada**
	Provided analysis of artifacts in high definition video
Jul 2002–May 2016	**Court of Quebec, Small Claims Division**
	Brought 14 consumer rights complaints before the Court, 11 of which were successful

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Research Dissemination

Notes on publication strategy: In my research field, papers in the ACM CHI (H5-index=87), UIST (H5-index=46), DIS (H5-index=33), and Mobile HCI (H5-index=28) conferences are considered to be top-tier, archival publications, competitive with the top HCI journals in terms of impact and visibility. Overall acceptance rates for these conferences are typically in the 20-25% range. As a measure of research impact, my publications have garnered over 5000 citations to date (Google Scholar) with approximately half of these since 2017, an h-index of 36, and i10-index of 105. HQP under my supervision (names in bold) are typically given first authorship on co-authored work.

Articles in Refereed Publications

[J1] **Nathan Duarte**, R. K. Arora, G. Bennett, M. Wang, M. P. Snyder, J. R. Cooperstock, and C. E. Wagner. "Deploying wearable sensors for pandemic mitigation: a counterfactual modelling study of Canada's second COVID-19 wave." In: *PLOS Digital Health* PDIG-D-22-00126R1 (Sept. 2022). DOI: https://doi.org/10.1371/journal.pdig.0000100. URL: https://journals.plos.org/digitalhealth/article?id=10.1371/journal.pdig.0000100.

[J2] **M. F. de Vargas**, **D. Marino**, **A. Weill–Duflos**, and J. R. Cooperstock. "Speaking Haptically: from Phonemes to Phrases with a Mobile Haptic Communication System." In: *Transactions on Haptics* 14.3 (July 2021), pp. 479–490. DOI: 10.1109/TOH.2021.3054812. URL: https://ieeexplore.ieee.org/document/9337220. 🏆 Finalist, Best Applications Paper Award.

[J3] **P. Vyas**, **F. Al-Taha**, **J. R. Blum**, **A. Weill–Duflos**, and J. R. Cooperstock. "Ten Little Fingers, Ten Little Toes: Can Toes Match Fingers for Haptic Discrimination?" In: *Transactions on Haptics* 13.1 (2020). DOI: 10.1109/TOH.2020.2966969. URL: https://ieeexplore.ieee.org/document/8960637. Also presented at Haptics Symposium 2020.

[J4] **E. Sulmont**, E. Patitsas, and J. R. Cooperstock. "What Is Hard About Teaching Machine Learning to Non-Majors? Insights From Classifying Instructors' Learning Goals." In: *Transactions on Computing Education, Special Issue on Machine Learning Education* 19.4 (Aug. 2019). URL: http://dl.acm.org/authorize?N682238.

[J5] **J. Blum**, **P. Fortin**, **F. Al-Taha**, **P. Alirezaee**, **M. Demers**, **A. Weill–Duflos**, and J. R. Cooperstock. "Getting Your Hands Dirty Outside the Lab: A Practical Primer for Conducting Wearable Vibrotactile Haptics Research." In: *IEEE Transactions on Haptics, Special Issue on Wearable and Hand-held Haptics* 12.3 (July 2019), pp. 232–246. DOI: 10.1109/TOH.2019.2930608. URL: https://ieeexplore.ieee.org/document/8770138.

[J6] **G. Millet**, **M. Otis**, **D. Horodniczy**, and J. R. Cooperstock. "Design of Variable-Friction Devices for Shoe-Floor Contact." In: *Mechatronics* 46 (2017), pp. 115–125. URL: https://www.sciencedirect.com/science/article/abs/pii/S0957415817301034.

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[J7] **P. Fortin** and J. R. Cooperstock. "Laughter and Tickles: Toward Novel Approaches for Emotion and Behavior Elicitation." In: *IEEE Transactions on Affective Computing* 8.4 (2017). TAFFCSI-2016-07-0124.R1, pp. 508–521. URL: http://ieeexplore.ieee.org/document/8052511/.

[J8] E. Aguilera, J. J. Lopez, and J. R. Cooperstock. "Spatial Audio for Audioconferencing in Mobile Devices: Investigating the Importance of Virtual Mobility and Private Communication and Optimizations." In: *Journal of the Audio Engineering Society* 64.5 (May 2016), pp. 332–341. URL: http://www.aes.org/e-lib/browse.cfm?elib=18138.

[J9] **D. El-Shimy** and J. R. Cooperstock. "User-Driven Techniques for the Design and Evaluation of New Musical Interfaces." In: *Computer Music Journal* 40.2 (2016), pp. 35–46. URL: http://www.mitpressjournals.org/doi/pdf/10.1162/COMJ_a_00357.

[J10] **F. Tordini**, A. Bregman, and J. R. Cooperstock. "Prioritizing foreground selection of natural chirp sounds by tempo and spectral centroid." In: *Multimodal User Interfaces, Special Issue on Auditory Display* 10.3 (Sept. 2016). Ed. by B. Katz and G. Marentakis, pp. 221–234. URL: http://link.springer.com/article/10.1007%2Fs12193-016-0223-x.

[J11] R. F. Hess, **L. To**, J. Zhou, **G. Wang**, and J. Cooperstock. "3D Vision: the haves and havenots." In: *i-Perception* 6.3 (July 2015). DOI: 10.1177/2041669515593028. URL: http://ipe.sagepub.com/content/6/3/2041669515593028.full.pdf+html.

[J12] **N. Hieda** and J. R. Cooperstock. "Digital Facial Augmentation for Interactive Entertainment." In: *EAI Endorsed Transactions on e-Learning* 15.8 (Aug. 2015). DOI: 10.4108/icst.intetain.2015.259444.

[J13] **J. Blum**, **A. Eichhorn**, **S. Smith**, **M. Sterle-Contala**, and J. R. Cooperstock. "Real-Time Emergency Response: Improved Management of Real-Time Information During Crisis Situations." In: *Multimodal User Interfaces* 8.2 (July 2014). JMUI-D-13-00047R3, pp. 161–173. DOI: 10.1007/s12193-013-0139-7. URL: http://www.springer.com/alert/urltracking.do?id=L4b94d11Mf77f37Sb05893a.

[J14] **D. Dansereau**, N. Brock, and J. R. Cooperstock. "A Particle Filter for Predicting an Orchestral Conductor's Baton Movements." In: *Computer Music J.* 37.2 (Apr. 2013), pp. 28–45. URL: http://www.mitpressjournals.org/doi/pdf/10.1162/COMJ_a_00173.

[J15] **G. Cirio**, M. Marchal, A. Lécuyer, and J. R. Cooperstock. "Vibrotactile Rendering of Splashing Fluids." In: *Transactions on Haptics* 6.1 (May 2013), pp. 117–122. URL: http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=6226398. Best paper award.

[J16] F. Grond, **A. Olmos**, and J. Cooperstock. "Making Sculptures Audible through Participatory Sound Design (Artists' statement)." In: *Leonardo Music J.* 23 (Dec. 2013), pp. 12–13. DOI: doi:10.1162/LMJ_a_00140. URL: http://srl.mcgill.ca/publications/2013-LEONARDO.pdf.

[J17] **J. Blum**, **M. Bouchard**, and J. R. Cooperstock. "Spatialized audio environmental awareness for blind users with a smartphone." In: *Mobile Networks and Applications* 18.3 (June 2013), pp. 295–309. DOI: 10.1007/s11036-012-0425-8. URL: http://srl.mcgill.ca/publications/2012-MONET.pdf.

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[J18] **S. Pelletier** and J. R. Cooperstock. "Real-time free viewpoint video from a range sensor and color cameras." In: *Machine Vision and Applications* 24.4 (May 2013), pp. 739–751. URL: http://link.springer.com/article/10.1007%2Fs00138-012-0428-2.

[J19] **A. Olmos**, **N. Bouillot**, **T. Knight**, **N. Mabire**, **J.Redel**, and J. R. Cooperstock. "A High-Fidelity Orchestra Simulator for Individual Musicians' Practice." In: *Computer Music Journal* 36.2 (2012), pp. 55–73. URL: http://www.mitpressjournals.org/doi/pdf/10.1162/COMJ_a_00119.

[J20] J. M. Black, R. F. Hess, J. R. Cooperstock, **L. To**, and B. Thompson. "The measurement and treatment of suppression in amblyopia." In: *Visualized Experiments* 14.70 (Dec. 2012). DOI: 10.3791/3927. URL: http://www.jove.com/video/3927/the-measurement-and-treatment-of-suppression-in-amblyopia.

[J21] **D. El-Shimy**, F. Grond, **A. Olmos**, and J. R. Cooperstock. "Eyes-Free Environmental Awareness for Navigation." In: *Multimodal User Interfaces, Special Issue on Interactive Sonification* 5.3-4 (2012), pp. 131–141. DOI: 10.1007/s12193-011-0065-5. URL: http://www.springerlink.com/content/857h542884084ql2/.

[J22] B. L. Giordano, **Y. Visell**, H. Yao, V. Hayward, J. R. Cooperstock, and S. McAdams. "Identification of walked-upon materials in auditory, kinesthetic, haptic and audio-haptic conditions." In: *Acoustical Society of America* 131.5 (May 2012). URL: http://srl.mcgill.ca/publications/2012-JASA.pdf.

[J23] R. F. Hess, B. Thompson, J. M. Black, G. Maehara, P. Zhang, W. R. Bobier, **L. To**, and J. R. Cooperstock. "An iPod treatment for amblyopia: An updated binocular approach." In: *Optometry* 83.2 (Feb. 2012), pp. 87–94. URL: http://www.ncbi.nlm.nih.gov/pubmed/23231369.

[J24] **S. Pelletier** and J. R. Cooperstock. "Preconditioning for Edge-Preserving Image Super-Resolution." In: *IEEE Transactions on Image Processing* 21.1 (June 2012), pp. 67–79. URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5898412.

[J25] **Z. Qi** and J. R. Cooperstock. "Toward Dynamic Image Mosaic Generation With Robustness to Parallax." In: *IEEE Transactions on Image Processing* 21.1 (Jan. 2012), pp. 366–378. URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5959979.

[J26] J. R. Cooperstock. "Multimodal Telepresence Systems: Supporting Demanding Collaborative Human Activities." In: *IEEE Signal Processing* 28.1 (Jan. 2011). special issue on Immersive Communications, pp. 77–86. DOI: 10.1109/MSP.2010.939040.

[J27] **L. To**, B. Thompson, **J.R. Blum**, G. Maehara, R. Hess, and J. R. Cooperstock. "A game platform for treatment of amblyopia." In: *IEEE Transactions on Neural Systems and Rehabilitation Engineering* 19.3 (Feb. 2011), pp. 280–289. URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5713843.

[J28] **Y. Visell**, B. Giordano, **G. Millet**, and J. R. Cooperstock. "Vibration Influences Haptic Perception of Surface Compliance During Walking." In: *PLoS ONE* 6.3:e17697 (Mar. 2011). DOI: doi:10.1371/journal.pone.0017697. URL: http://dx.plos.org/10.1371/journal.pone.0017697.

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[J29] **R. Pellerin**, **N. Bouillot**, **T. Pietkiewicz**, M. Wozniewski, Z. Settel, E. Gressier-Soudan, and J. R. Cooperstock. "SoundPark: Exploring Ubiquitous Computing through a Mixed Reality Multi-player Game Experiment." In: *Studia Informatica Universalis* 8.3 (2010). Special Issue: Best Papers from NOTERE 2009, 21 pages. URL: http://srl.mcgill.ca/publications/2009-NOTERE.pdf.

[J30] R. H. Ellaway, D. Topps, K. Lachapelle, and J. R. Cooperstock. "Integrating Simulation Devices and Systems." In: *Studies in Health Technology and Informatics* 142 (Jan. 2009). Ed. by J. D. Westwood, S. W. Westwood, R. S. Haluck, H. M. Hoffman, G. T. Mogel, R. Phillips, R. A. Robb, and K. G. Vosburgh, pp. 88–90. URL: http://srl.mcgill.ca/publications/2009-MMVR-Ellaway.pdf.

[J31] **G. Wang**, L. Mercier, D. L. Collins, and J. R. Cooperstock. "A Comparative Study of Monoscopic and Stereoscopic Display for a Probe-Positioning Task." In: *Studies in Health Technology and Informatics* 142 (Jan. 2009). Ed. by J. D. Westwood, S. W. Westwood, R. S. Haluck, H. M. Hoffman, G. T. Mogel, R. Phillips, R. A. Robb, and K. G. Vosburgh, pp. 417–419. URL: http://srl.mcgill.ca/publications/2009-MMVR-Wang.pdf.

[J32] V. N. Salimpoor, **M. Benovoy**, G. Longo, J. R. Cooperstock, and R. J. Zatorre. "The Rewarding Aspects of Music Listening are Related to Degree of Emotional Arousal." In: *PLoS ONE* 4.10:e7487 (2009). DOI: 10.1371/journal.pone.0007487. URL: http://dx.plos.org/10.1371/journal.pone.0007487.

[J33] **Y. Visell**, **A. Law**, and J. R. Cooperstock. "Touch Is Everywhere: Floor Surfaces as Ambient Haptic Interfaces." In: *IEEE Transactions on Haptics* 2.3 (July 2009), pp. 148–159. DOI: 10.1109/TOH.2009.31. URL: http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=5166445.

[J34] **W. Sun** and J. R. Cooperstock. "An Empirical Evaluation of Factors Influencing Camera Calibration Accuracy Using Three Publicly Available Techniques." In: *Machine Vision and Applications Journal* 17.1 (Feb. 2006), pp. 51–67. DOI: 10.1007/s00138-006-0014-6. URL: http://www.springerlink.com/content/5824738r1w66v6wl/.

[J35] W. Woszczyk, J. R. Cooperstock, J. Roston, and W. Martens. "Shake, Rattle and Roll: Getting Immersed in Multisensory, Interactive Music via Broadband Networks." In: *Journal of the Audio Engineering Society* 53.4 (Apr. 2005), pp. 336–344. URL: http://www.aes.org/e-lib/browse.cfm?elib=13416.

[J36] **J. Yin** and J. R. Cooperstock. "Color Correction Methods with Applications to Digital Projection Environments." In: *Journal of Winter School of Computer Graphics* 12.3 (2004), pp. 499–506. URL: http://srl.mcgill.ca/publications/2004-WSCG-color.pdf.

[J37] L. R. Winer and J. R. Cooperstock. "The "Intelligent Classroom": Changing teaching and learning with an evolving technological environment." In: *Journal of Computers and Education* 38 (2002), pp. 253–266. URL: http://srl.mcgill.ca/publications/2002-CAE.pdf.

[J38] **A. Xu**, W. Woszczyk, Z. Settel, B. Pennycook, R. Rowe, P. Galanter, J. Bary, G. Martin, J. Corey, and J. R. Cooperstock. "Real-Time Streaming of Multichannel Audio Data over Internet." In: *Journal of the Audio Engineering Society* 48.7/8 (July 2000), pp. 627–641. URL: http://srl.mcgill.ca/publications/2000-JAES.pdf.

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[J39] J. R. Cooperstock, S. S. Fels, W. Buxton, and K. C. Smith. "Reactive Environments: Throwing Away Your Keyboard and Mouse." In: *Communications of the ACM* 40.9 (Sept. 1997), pp. 65–73. URL: http://dl.acm.org/authorize?N06288.

[J40] J. R. Cooperstock and E. Milios. "Self-supervised learning for docking and target reaching." In: *Journal of Robotics and Autonomous Systems* 11 (1993), pp. 243–260. DOI: 10.1016/0921-8890(93)90029-C. URL: http://srl.mcgill.ca/publications/1993-JRAS.pdf.

Refereed Conference Publications

[C1] **D. Marino**, **M. Henry**, **P. Fortin**, **R. Bhayana**, and J. R. Cooperstock. "I See What You're Hearing: Facilitating The Effect of Environment on Perceived Emotion While Teleconferencing." In: *Computer-Supported Cooperative Work and Social Computing (to appear)*. Minneapolis, MN: ACM, Oct. 2023.

[C2] **H. Lee**, **R. Jiang**, **Y. Yoo**, **M. Henry**, and J. R. Cooperstock. "The Sound of Hallucinations: Toward a more convincing emulation of internalized voices." In: *Human Factors in Computing Systems (CHI)*. New Orleans, LA: ACM, Apr. 2022. DOI: 10.1145/3491102.3501871. URL: https://dl.acm.org/doi/10.1145/3491102.3501871. Honorable Mention.

[C3] **J. Regimbal**, **J. R. Blum**, and J. R. Cooperstock. "IMAGE: A Deployment Framework for Creating Multimodal Experiences of Web Graphics." In: *Web4All 2022 - Accessibility in a Hybrid World*. virtual event, Apr. 2022. DOI: 10.1145/3493612.3520460. URL: https://dl.acm.org/doi/pdf/10.1145/3493612.3520460.

[C4] **P. Fortin** and J. R. Cooperstock. "Understanding Smartphone Notifications' Activity Disruption via In Situ Wrist Motion Monitoring." In: *Human Factors in Computing Systems (CHI), Late-Breaking Work (LBW) track*. New Orleans, LA: ACM, Apr. 2022. DOI: 10.1145/3491101.3519695. URL: https://dl.acm.org/doi/10.1145/3491101.3519695. acceptance rate: 36.1%.

[C5] **A. Rai**, **C. Ducher**, and J. R. Cooperstock. "Improved Attribute Manipulation in the Latent Space of StyleGAN for Semantic Face Editing." In: *International Conference on Machine Learning and Applications*. virtually online, Dec. 2021. URL: https://ieeexplore.ieee.org/document/9680017.

[C6] **D. Marino**, **M. F. de Vargas**, **A. Weill–Duflos**, and J. R. Cooperstock. "Conversing Using WhatsHap: a Phoneme Based Vibrotactile Messaging Platform." In: *World Haptics Conference*. Virtual Conference: IEEE, July 2021. DOI: 10.1109/WHC49131.2021.9517186. URL: https://ieeexplore.ieee.org/document/9517186. Acceptance rate: 55.7%.

[C7] **E. Waite**, **T. Fitz-Gerald**, **A. Sadaqa**, **Huaijin Shi**, **Pascal Fortin**, **A. Weill–Duflos**, and J. R. Cooperstock. "3D Printed Tactile Illusions and Demonstrations." In: *World Haptics Conference, Work in Progress Paper*. Virtual Conference: IEEE, July 2021. DOI: 10.1109/WHC49131.2021.9517237. URL: https://ieeexplore.ieee.org/document/9517237.

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[C8] **M. Demers**, **P. Fortin**, **A. Weill–Duflos**, **Y. Yoo**, and J. R. Cooperstock. "Active Sampling for Efficient Subjective Evaluation of Tactons at Scale." In: *World Haptics Conference*. Virtual Conference: IEEE, July 2021. DOI: 10.1109/WHC49131.2021.9517257. URL: https://ieeexplore.ieee.org/document/9517257. Acceptance rate: 55.7%.

[C9] K. E. MacLean, V. Levesque, O. Schneider, P. Irani, A. Weill–Duflos, and J. R. Cooperstock. "CanHap 501: Learning Haptic UX Design in Remote Teams." In: *World Haptics Conference, Work in Progress Paper*. Virtual Conference: IEEE, July 2021. DOI: 10.1109/WHC49131.2021.9517152. URL: https://ieeexplore.ieee.org/document/9517152.

[C10] **N. J. A. Pollet**, **E. Uzan**, **P. B. Ruivo**, **T. Abravanel**, **A. Talhan**, **Y. Yoo**, and J. R. Cooperstock. "Multimodal Haptic Armrest for Immersive 4D Experiences." In: *World Haptics Conference, Work in Progress Paper*. Virtual Conference: IEEE, July 2021. DOI: 10.1109/WHC49131.2021.9517151. URL: https://ieeexplore.ieee.org/document/9517151.

[C11] **Y. Li**, **Y. Yoo**, **A. Weill–Duflos**, and J. R. Cooperstock. "Context-aware Automatic Haptic Effect Generation Algorithm for Improved Content Viewing Experience." In: *World Haptics Conference, Work in Progress Paper*. Virtual Conference: IEEE, July 2021. DOI: 10.1109/WHC49131.2021.9517148. URL: https://ieeexplore.ieee.org/document/9517148.

[C12] **Y. Li**, **Y. Yoo**, **A. Weill–Duflos**, and J. R. Cooperstock. "Towards Context-aware Automatic Haptic Effect Generation for Home Theatre Environments." In: *Virtual Reality Software and Technology*. Osaka, Japan: ACM, Dec. 2021. Acceptance rate 26%.

[C13] **Y. Yoo**, **J. Regimbal**, and J. R. Cooperstock. "Identification and Information Transfer of Multidimensional Tactons Presented by a Single Vibrotactile Actuator." In: *World Haptics Conference*. Virtual Conference: IEEE, July 2021. DOI: 10.1109/WHC49131.2021.9517169. URL: https://ieeexplore.ieee.org/document/9517169. Acceptance rate: 55.7%.

[C14] **A. Weill–Duflos**, **P. Fortin**, **F. Al-Taha**, and J. R. Cooperstock. "Haptic Augmentation of Audio and its Effects on Speech Perception." In: *International Workshop on Haptic and Audio Interaction Design*. Montreal, Canada, June 2020. URL: https://hal.archives-ouvertes.fr/hal-02901210.

[C15] A. Farooq, H. Tan, **A. Weill–Duflos**, J. R. Cooperstock, and R. Raisamo. "Embedded Haptic Waveguides to Improve Tactile Feedback: Designing a Custom 3D-Printed Surface to Enhance Signal Mediation." In: *Sensors*. Oct. 2020. URL: https://ieeexplore.ieee.org/document/9278770.

[C16] M. Gellert, N. Katzman, J. P. Klein, A. Frenkel, M. Klein, J. R. Cooperstock, J. J. Schlesinger, and Y. Bitan. "Comparing auditory and tactile cues to inform clinicians of patients' vital signs." In: *Annual Meeting of the Human Factors and Ergonomics Society*. Chicago, IL, USA, Oct. 2020.

[C17] **J. R. Blum**, J. Cauchard, and J. R. Cooperstock. "Habituation to Pseudo-Ambient Vibrotactile Patterns for Remote Awareness." In: *Haptics Symposium*. Washington DC, USA: IEEE, Mar. 2020. DOI: https://doi.org/10.1109/HAPTICS45997.2020.ras.HAP20.153.550dbcba. URL: https://ieeexplore.ieee.org/document/9086336/. Acceptance rate: 38%.

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[C18] **J. Regimbal**, **N. Radi**, **A. Weill–Duflos**, and J. R. Cooperstock. "Single-Actuator Simultaneous Haptic Rendering for Multiple Vital Signs." In: *HCI International*. Copenhagen, Denmark, July 2020.

[C19] **P. Alirezaee**, **A. Weill–Duflos**, J. Schlesinger, and J. R. Cooperstock. "Exploring the Effectiveness of Haptic Alarm Displays for Critical Care Environments." In: *Haptics Symposium*. Washington DC, USA: IEEE, Mar. 2020. URL: https://ieeexplore.ieee.org/document/9086328. Acceptance rate: 38%.

[C20] **P. Fortin**, **J. Blum**, **A. Weill–Duflos**, and J. R. Cooperstock. "Contact Force Estimation from Raw Photoplethysmogram Signal." In: *Sensors*. Oct. 2020. URL: https://ieeexplore.ieee.org/document/9278658.

[C21] **P. Vyas**, **F. Al-Taha**, **J. R. Blum**, **A. Weill–Duflos**, and J. R. Cooperstock. "Ten Little Fingers, Ten Little Toes: Can Toes Match Fingers for Haptic Discrimination?" In: *Haptics Symposium (also appears in Transactions on Haptics)*. Washington DC, USA: IEEE, Mar. 2020. DOI: 10.1109/TOH.2020.2966969. URL: https://ieeexplore.ieee.org/document/8960637. Acceptance rate: 38%.

[C22] **P. Vyas**, **F. Al-Taha**, **J. R. Blum**, and J. R. Cooperstock. "HapToes: Vibrotactile Numeric Information Delivery via Tactile Toe Display." In: *Haptics Symposium*. Washington DC, USA: IEEE, Mar. 2020. DOI: https://doi.org/10.1109/HAPTICS45997.2020.ras.HAP20.34.8ad689d4. URL: https://ieeexplore.ieee.org/document/9086321. Acceptance rate: 38%.

[C23] **A. Weill–Duflos**, **F. Al-Taha**, **P. Fortin**, and J. R. Cooperstock. "BarryWhaptics: Towards Countering Social Biases Using Real-Time Haptic Enhancement of Voice." In: *World Haptics Conference*. Tokyo, Japan, June 2019. URL: http://srl.mcgill.ca/publications/2019-WHC-BarryWhaptic.pdf. Acceptance rate: 46%.

[C24] **E. Sulmont**, E. Patitsas, and J. R. Cooperstock. "Can You Teach Me To Machine Learn?" In: *Special Interest Group on Computer Science Education Technical Symposium*. Minneapolis, MN, Feb. 2019. URL: http://dl.acm.org/authorize?N682231.

[C25] **G. Yin**, M. Otis, **P. Fortin**, and J. R. Cooperstock. "Evaluating Multimodal Feedback for Accomplishing Assembly Tasks in a Virtual Environment." In: *Engineering Interactive Computing Systems*. Valencia, Spain: ACM SIGCHI, June 2019. URL: http://dl.acm.org/authorize?N682239.

[C26] **J. Blum** and J. R. Cooperstock. "Single-Actuator Vibrotactile Numeric Information Delivery in the Face of Distraction." In: *World Haptics Conference*. Tokyo, Japan, June 2019. URL: http://srl.mcgill.ca/publications/2019-WHC-Numeric.pdf. Acceptance rate: 46%.

[C27] N. Katzman, M. Gellert, J. J. Schlesinger, T. Oron-Gilad, J. R. Cooperstock, and Y. Bitan. "Evaluation of tactile cues for simulated patients' status under high and low workload." In: *International Meeting*. Seattle, WA, USA: Human Factors and Ergonomics Society (HFES), Oct. 2019. DOI: https://doi.org/10.1177/1071181319631285.

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[C28] **M. F. de Vargas**, **A. Weill–Duflos**, and J. R. Cooperstock. "Haptic Speech Communication Using Stimuli Evocative of Phoneme Production." In: *World Haptics Conference*. Tokyo, Japan, June 2019. URL: http://srl.mcgill.ca/publications/2019-WHC-Speech.pdf. Acceptance rate: 46%.

[C29] **P. Alirezaee**, J. Schlesinger, and J. R. Cooperstock. "Ergonomic Haptic Displays - Reducing Clinician Dependence on Patient Monitors and Auditory Alarms." In: *Human Factors and Ergonomics in Healthcare Symposium*. Chicago, IL, USA, Mar. 2019.

[C30] **P. Fortin**, **D. Huang**, and J. R. Cooperstock. "Exploring the Use of Fingerprint Sensor Gestures for Unlock Journaling: A Comparison with Slide-to-X." In: *Mobile HCI*. Taipei, Taiwan: ACM, Oct. 2019. URL: http://dl.acm.org/authorize?N684389.

[C31] **P. Fortin**, **E. Sulmont**, and J. R. Cooperstock. "Detecting Perception of Smartphone Notifications using Skin Conductance Responses." In: *Human Factors in Computing (CHI)*. Glasgow, Scotland: ACM, Apr. 2019. URL: http://dl.acm.org/authorize?N682230. Honorable mention, Acceptance rate: 24%.

[C32] **J. Anlauff**, **T. Kim**, and J. R. Cooperstock. "Feel-a-Bump: Haptic Feedback for Foot-based Angular Menu Selection." In: *Haptics Symposium*. San Francisco, CA: IEEE, Mar. 2018. URL: https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=8357172. Acceptance rate: 44%.

[C33] **P. Fortin**, **E. Sulmont**, and J. R. Cooperstock. "SweatSponse: Closing the Loop on Notification Delivery Using Skin Conductance Responses." In: *User Interface Software and Technology (UIST)*. Berlin, Germany: ACM, Oct. 2018. URL: http://dl.acm.org/authorize?N682232.

[C34] **T. Kim**, **H. Ju**, and J. R. Cooperstock. "Pressure or Movement? Usability of Multi-Functional Foot-Based Interfaces." In: *Designing Interactive Systems (DIS)*. Hong Kong: ACM, June 2018. URL: http://dl.acm.org/authorize?N682246. Acceptance rate: 23%.

[C35] E. Cupellini, J. R. Cooperstock, and M. Olivetti. "The Sound Motion Controller: a distributed system for interactive music performance." In: *Conference of the European Society for the Cognitive Sciences of Music*. Ghent, Belgium, July 2017.

[C36] **D. Horodniczy** and J. R. Cooperstock. "Free the Hands! Enhanced Target Selection via a Variable-Friction Shoe." In: *Human Factors in Computing Systems (CHI)*. Denver, CO, May 2017. URL: http://dl.acm.org/authorize?N682249. Acceptance rate: 25%.

[C37] D. M. Gay-Betton, **P. Alirezaee**, J. R. Cooperstock, and J. J. Schlesinger. "HAPTIC – Haptic Anatomical Positioning To Improve Clinical Monitoring." In: *Design & Semantics of Form & Movement (DeSForM)*. Delft-Eindhoven, Netherlands, Oct. 2017. URL: https://www.intechopen.com/books/proceedings-of-the-conference-on-design-and-semantics-of-form-and-movement-sense-and-sensitivity-desform-2017/haptic-haptic-anatomical-positioning-to-improve-clinical-monitoring.

[C38] **J. Anlauff**, J. Fung, and J. R. Cooperstock. "VibeWalk – Foot-Based Tactons During Walking and Quiet Stance." In: *World Haptics Conference*. Munich, Germany, June 2017. URL: https://ieeexplore.ieee.org/document/7989977/. Acceptance rate: 59%.

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[C39] **M. Diaz**, **R. Girgis**, T. Fevans, and J. R. Cooperstock. "To Veer or Not to Veer: Learning How to Stay Within the Crosswalk from Experts." In: *International Workshop on Assistive Computer Vision and Robotics*. Venice, Italy: IEEE, Oct. 2017. URL: https://ieeexplore.ieee.org/document/8265384.

[C40] **P. Alirezaee**, **R. Girgis**, **T. Kim**, J. Schlesinger, and J. R. Cooperstock. "Did you feel that? Developing Novel Multimodal Alarms for High Consequence Clinical Environments." In: *International Conference on Auditory Displays*. Happy Valley, PA, USA, June 2017, pp. 175–181. URL: https://smartech.gatech.edu/handle/1853/58377.

[C41] **J. Blum** and J. R. Cooperstock. "Expressing Human State via Parameterized Haptic Feedback for Mobile Remote Implicit Communication." In: *Augmented Human*. Geneva, Switzerland: ACM, Feb. 2016. URL: http://dl.acm.org/authorize?N682240.

[C42] **N. Hieda**, **J. Anlauff**, **S. Smith**, **Y. Visell**, and J. R. Cooperstock. "An Intelligent Floor Surface for Foot-based Exploration of Geospatial Data." In: *International Workshop on Multimedia Signal Processing*. Montreal, Canada, Sept. 2016.

[C43] **D. El-Shimy** and J. R. Cooperstock. "EmbodiNet: Enriching Distributed Musical Collaboration through Embodied Interactions." In: *IFIP TC13 Conference on Human-Computer Interaction (INTERACT)*. Bamberg, Germany, Sept. 2015.

[C44] **F. Tordini**, A. Bregman, and J. R. Cooperstock. "The loud bird doesn't (always) get the worm: Why computational salience also needs brightness and tempo." In: *International Conference on Auditory Displays*. Graz, Austria, July 2015. URL: https://smartech.gatech.edu/handle/1853/54145.

[C45] **J. Blum**, I. Frissen, and J. R. Cooperstock. "Improving Haptic Feedback on Wearable Devices through Accelerometer Measurements." In: *User Interface Software and Technology*. Charlotte, NC: ACM, Nov. 2015. URL: http://dl.acm.org/authorize?N682241. Acceptance rate: 21%.

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[C47] **N. Hieda** and J. R. Cooperstock. "sharedFace: Interactive Facial Projection Mapping." In: *International Conference and Exhibition of Virtual Technologies and Uses*. Laval, France, Apr. 2015. URL: http://dl.acm.org/authorize?N682242.

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[C49] P. Fortin, M. Otis, V. Duchaine, and J. R. Cooperstock. "Event-based haptic vibration synthesis using a recursive filter for lower limb prosthetics." In: *International Symposium on Haptic, Audio and Visual Environments and Games (HAVE)*. Dallas, TX, Oct. 2014. URL: http://srl.mcgill.ca/publications/2014-HAVE.pdf.

[C50] **M. Xie** and J. R. Cooperstock. "Error-Compensation for Time-of-Flight Cameras Used in 3D Reconstruction Applications." In: *Seventh International Symposium on Computational Intelligence and Design (ISCID)*. Hangzhou, China, Dec. 2014.

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[C51] **M. Xie** and J. R. Cooperstock. "Heterogeneous Sensor Data Fusion: How Many Cameras Are Needed For An Accurate 3D Reconstruction of Large Scene?" In: *Seventh International Symposium on Computational Intelligence and Design (ISCID)*. Hangzhou, China, Dec. 2014.

[C52] **D. El-Shimy** and J. R. Cooperstock. "Reactive Environment for Network Music Performance." In: *New Interfaces for Musical Expression (NIME)*. Daejoen, South Korea, May 2013.

[C53] **F. Tordini**, A. Bregman, A. Ankolekar, T. E. Sandholm, and J. R. Cooperstock. "Toward an improved model of auditory saliency." In: *International Conference on Auditory Displays*. Lodz, Poland, July 2013. URL: http://srl.mcgill.ca/publications/2013-ICAD-FT.pdf.

[C54] **F. Tordini**, A. Bregman, A. Ankolekar, T. E. Sandholm, and J. R. Cooperstock. "Your attention, please! Determining saliency of competing audio stimuli in natural scenarios." In: *Meetings on Acoustics – International Congress on Acoustics*. Vol. 19. Montreal, QC: Acoustical Society of America, June 2013, pp. 189–196. URL: http://asadl.org/poma/resource/1/pmarcw/v19/i1/p010031_s1?bypassSSO=1.

[C55] **J. Anlauff**, J. Fung, and J. R. Cooperstock. "Augmented Feedback for Learning Single-Legged Stance on a Slackline." In: *International Conference on Virtual Rehabilitation*. Philadelphia, PA, Aug. 2013.

[C56] **M. Otis**, **G. Millet**, and J. R. Cooperstock. "Vibration-Induced Friction Control for Walkway Locomotion Interface." In: *Systems, Man, and Cybernetics, Part SMC: Human-Machine*. Manchester, UK: IEEE, Oct. 2013, 6 pgs. URL: http://ieeexplore.ieee.org/xpl/articleDetails.jsp?reload=true&arnumber=6722429.

[C57] **S. Panëels**, **A. Olmos**, **J. Blum**, and J. R. Cooperstock. "Listen to It Yourself! Evaluating Usability of "What's Around Me?" for the Blind." In: *Human Factors in Computing Systems (CHI)*. Paris, France: ACM, Apr. 2013. URL: http://dl.acm.org/authorize?N06272. Acceptance rate: 20%.

[C58] **S. Panëels**, **D. Varenne**, **J. Blum**, and J. R. Cooperstock. "The Walking Straight Mobile Application: Helping the Visually Impaired Avoid Veering." In: *International Conference on Auditory Displays*. Lodz, Poland, July 2013, pp. 25–32. URL: http://srl.mcgill.ca/publications/2013-ICAD-WS.pdf. Best use of sound.

[C59] **D. El-Shimy**, T. Hermann, and J. R. Cooperstock. "A Reactive Environment for Dynamic Volume Control." In: *New Interfaces for Musical Expression (NIME)*. Ann Arbor, Michigan, May 2012. URL: http://srl.mcgill.ca/publications/2012-NIME.pdf.

[C60] **J. Blum**, **D. Greencorn**, and J. R. Cooperstock. "Smartphone sensor reliability for augmented reality applications." In: *Mobile and Ubiquitous Systems (Mobiquitous)*. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering. Beijing, China: Springer, Dec. 2012. URL: http://srl.mcgill.ca/publications/2012-MOBIQUITOUS.pdf.

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[C61] K. Kim, J. Bolton, A. Girouard, J. Cooperstock, and R. Vertegaal. "TeleHuman: Effects of 3D Perspective on Gaze and Pose Estimation with a Life-size Cylindrical Telepresence Pod." In: *Human Factors in Computing Systems (CHI)*. Austin, Texas: ACM Press/Addison-Wesley Publishing Co., May 2012, pp. 2531–2540. URL: http://dl.acm.org/authorize?N06274. Acceptance rate: 23%.

[C62] **T. Knight**, **N. Bouillot**, and J. R. Cooperstock. "Visualization feedback for musical ensemble practice: A case study on phrase articulation and dynamics." In: *Visualization and Data Analysis*. IS&T/SPIE Symposium on Electronic Imaging, Jan. 2012, 9 pgs. URL: http://srl.mcgill.ca/publications/2012-VDA.pdf.

[C63] **A. Olmos**, P. Rushka, D. Ko, G. Foote, W. Woszczyk, and J. R. Cooperstock. "Where do you want your ears? Comparing performance quality as a function of listening position in a virtual jazz band." In: *Sound, Music and Computing*. July 2011, 6 pgs. URL: http://srl.mcgill.ca/publications/2011-SMC.pdf.

[C64] F. Bérard, **G. Wang**, and J. R. Cooperstock. "On the Limits of the Human Motor Control Precision: the Search for a Device's Human Resolution." In: *IFIP TC13 Conference on Human-Computer Interaction (INTERACT)*. Lisbon, Portugal, Sept. 2011, pp. 107–122. URL: http://srl.mcgill.ca/publications/2011-INTERACT.pdf.

[C65] **G. Millet**, **M. Otis**, **G. Chaw**, and J. R. Cooperstock. "Initial Development of a Variable-Friction Floor Surface." In: *Canadian Medical and Biological Engineering Conference*. Festival of International Conferences on Caregiving, Disability, Aging and Technology, June 2011, 4 pgs.

[C66] **G. Wang**, M. McGuffin, F. Bérard, and J. R. Cooperstock. "Pop-up Depth Views for Improving 3D Target Acquisition." In: *Graphics Interface*. St. John's, NL, May 2011, pp. 41–48.

[C67] **I. Garcia-Dorado** and J. R. Cooperstock. "Automatic multi-projector calibration with an uncalibrated camera." In: *International Workshop on Projector-Camera Systems*. Colorado Springs: IEEE, June 2011, pp. 29–36.

[C68] **J. Blum**, **H. Sun**, **A. Olmos**, and J. R. Cooperstock. "End-User Viewpoint Control of Live Video from a Medical Camera Array." In: *International Conference on Distributed Smart Cameras*. Ghent, Belgium, Aug. 2011, pp. 1–6. URL: http://srl.mcgill.ca/publications/2011-ICDSC.pdf.

[C69] **J. Blum**, **M. Bouchard**, and J. R. Cooperstock. "What's around me? Spatialized audio augmented reality for blind users with a smartphone." In: *Mobile and Ubiquitous Systems (Mobiquitous)*. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering. Copenhagen, Denmark: Springer, Dec. 2011. URL: http://srl.mcgill.ca/publications/2011-MOBIQUITOUS.pdf. Best paper award.

[C70] **J. Ip** and J. R. Cooperstock. "To Virtualize or Not? The Importance of Physical and Virtual Components in Augmented Reality Board Games." In: *International Conference on Entertainment Computing*. Vancouver, BC, Canada: Springer-Verlag, Oct. 2011.

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[C72] **N. Bouillot**, **M. Tomiyoshi**, and J. R. Cooperstock. "Extended User Control over Multichannel Content Delivered over the Web." In: *Conference on Audio Networking*. San Diego: Audio Engineering Society, Nov. 2011, 5 pgs. URL: http://srl.mcgill.ca/publications/2011-AES.pdf.

[C73] **A. Olmos**, K. Lachapelle, and J. R. Cooperstock. "Multiple Angle Viewer for Remote Medical Training." In: *International Workshop on Multimedia Technologies for Distance Leaning*. Firenze, Italy: ACM, Oct. 2010, pp. 19–24. ISBN: 978-1-4503-0158-9. DOI: 10.1145/1878052.1878058. URL: http://dl.acm.org/authorize?N06285.

[C74] R. Ellaway, J. R. Cooperstock, and B. Spencer. "Simulation Integration for Healthcare Education, Training and Assessment." In: *Fifth International Conference on Digital Information Management*. Thunder Bay, ON, Canada, July 2010, pp. 484–489. URL: http://srl.mcgill.ca/publications/2010-DIM.pdf.

[C75] **M. Benovoy** and J. R. Cooperstock. "Psychophysiological signal analysis and classification." In: *CHI 2010 Brain Body and Bytes Workshop*. Atlanta, GA, USA, Apr. 2010, pp. 75–78. URL: http://srl.mcgill.ca/publications/2010-BRAIN-BODY-BYTES.pdf.

[C76] **R. Rajalingham**, **Y. Visell**, and J. R. Cooperstock. "Probabilistic Tracking of Pedestrian Movements via In-Floor Force Sensing." In: *Seventh Canadian Conference on Computer and Robot Vision (CRV)*. Ottawa, ON, Canada, May 2010, pp. 143–150. DOI: 10.1109/CRV.2010.26. URL: http://srl.mcgill.ca/publications/2010-CRV.pdf.

[C77] **Y. Visell**, **A. Law**, **J. Ip**, **S. Smith**, and J. R. Cooperstock. "Interaction Capture in Immersive Virtual Environments via an Intelligent Floor Surface." In: *IEEE Virtual Reality (VR)*. Waltham, MA, USA, Mar. 2010, pp. 313–314. DOI: 10.1109/VR.2010.5444748. URL: http://srl.mcgill.ca/publications/2010-VR.pdf.

[C78] **Y. Visell** and J. R. Cooperstock. "Design of a Vibrotactile Display via a Rigid Surface." In: *Haptics Symposium*. Waltham, MA, USA: IEEE, Mar. 2010, pp. 133–140. DOI: 10.1109/HAPTIC.2010.5444664. URL: http://srl.mcgill.ca/publications/2010-HAPTICS-SYMPOSIUM.pdf. Best paper award.

[C79] **Y. Visell**, **S. Smith**, **A. Law**, **R. Rajalingham**, and J. R. Cooperstock. "Contact Sensing and Interaction Techniques for a Distributed, Multimodal Floor Display." In: *IEEE 3D User Interfaces (3DUI)*. Waltham, MA, USA, Mar. 2010, pp. 75–78. DOI: 10.1109/3DUI.2010.5444718. URL: http://srl.mcgill.ca/publications/2010-3DUI.pdf.

[C80] **A. Law**, **J. Ip**, **B. Peck**, **Y. Visell**, P. Kry, and J. R. Cooperstock. "Multimodal floor for immersive environments." In: *SIGGRAPH Emerging Technologies*. New Orleans, LA, USA: ACM, Aug. 2009, 16:1. DOI: 10.1145/1597956.1597972. URL: http://dl.acm.org/authorize?N06286.

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[C82] F. Bérard, **J. Ip**, **M. Benovoy**, **D. El-Shimy**, **J. Blum**, and J. R. Cooperstock. "Did 'Minority Report' Get it Wrong? Superiority of the Mouse over 3D Input Devices for a 3D Placement Task." In: *IFIP TC13 Conference on Human-Computer Interaction (INTERACT)*. Uppsala, Sweden, Aug. 2009, pp. 400–414. URL: http://srl.mcgill.ca/publications/2009-INTERACT.pdf.

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[C84] **D. El-Shimy**, G. Marentakis, and J. R. Cooperstock. "Multimodal Feedback in 3D Target Acquisition." In: *IEEE 3D User Interfaces (3DUI)*. Lafayette, LA, USA, Mar. 2009, pp. 95–98. URL: http://srl.mcgill.ca/publications/2009-3DUI.pdf.

[C85] **J. Anlauff**, T. Hermann, T. Grosshauser, and J. R. Cooperstock. "Modular tacTiles for Sonic Interactions with Smart Environments." In: *Haptic and Audio Interaction Design (HAID), Fourth International Workshop*. Dresden, Germany, Sept. 2009, pp. 100–108. URL: http://srl.mcgill.ca/publications/2009-HAID.pdf.

[C86] **N. Bouillot** and J. R. Cooperstock. "Challenges and Performance of High-Fidelity Audio Streaming for Interactive Performances." In: *New Interfaces for Musical Expression (NIME)*. Pittsburgh, PA, USA, June 2009, pp. 135–140. URL: http://srl.mcgill.ca/publications/2009-NIME.pdf.

[C87] **N. Bouillot**, **M. Brulé**, and J. R. Cooperstock. "Performance metrics for network audio systems: Methodology and a preliminary comparison." In: *Audio Engineering Society 127th Convention*. New York, NY, USA, Oct. 2009. URL: http://www.aes.org/e-lib/browse.cfm?elib=15134.

[C88] **R. Pellerin**, **N. Bouillot**, **T. Pietkiewicz**, M. Wozniewski, Z. Settel, E. Gressier-Soudan, and J. R. Cooperstock. "SoundPark: Exploring Ubiquitous Computing through a Mixed Reality Multi-player Game Experiment." In: *9e Conférence Internationale sur Les NOuvelles TEchnologies de la REpartition*. Montreal, QC, Canada, July 2009, 9 pgs. URL: http://srl.mcgill.ca/publications/2009-NOTERE.pdf. Best paper award.

[C89] **R. Pellerin**, **N. Bouillot**, **T. Pietkiewicz**, M. Wozniewski, Z. Settel, E. Gressier-Soudan, and J. R. Cooperstock. "SoundPark: Towards Highly Collaborative Game Support in a Ubiquitous Computing Architecture." In: *9th IFIP International Conference on Distributed Applications and Interoperable Systems*. Lisbon, Portugal, June 2009, pp. 22–45. URL: http://srl.mcgill.ca/publications/2009-DAIS.pdf.

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[C90] V. N. Salimpoor, **M. Benovoy**, G. G. Longo, K. Larcher, A. Dagher, J. R. Cooperstock, and R. J. Zatorre. "The Rewarding Aspects of Music Listening Involve the Dopaminergic Striatal Reward Systems of the Brain: An Investigation with [C11]Raclopride PET and fMRI." In: *15th Annual Meeting of the Organization for Human Brain Mapping*. San Francisco, CA, USA, June 2009.

[C91] Z. Settel, M. Wozniewski, **N. Bouillot**, and J. R. Cooperstock. "Audio Graffiti: A location based audio-tagging and remixing environment." In: *International Computer Music Conference*. Montreal, QC, Canada, Aug. 2009. URL: http://srl.mcgill.ca/publications/2009-ICMC.pdf.

[C92] **Y. Visell**, **A. W. Law**, and J. R. Cooperstock. "Toward Iconic Vibrotactile Information Display Using Floor Surfaces." In: *Third Joint Eurohaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems*. Salt Lake City, UT, USA, Mar. 2009, pp. 267–272. URL: http://srl.mcgill.ca/publications/2009-WHC.pdf.

[C93] **A. Law W.**, **B. Peck V.**, **Y. Visell**, P. Kry, and J. R. Cooperstock. "A Multi-modal Floor-space for Experiencing Material Deformation Underfoot in Virtual Reality." In: *International Workshop on Haptic Audio Visual Environments and Games*. Ottawa, ON, Canada: IEEE, Oct. 2008. URL: http://srl.mcgill.ca/publications/2008-HAVE.pdf.

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Refereed Conference Publications (Posters)

[CP1] **M. F. de Vargas**, **D. Marino**, **A. Weill–Duflos**, and J. R. Cooperstock. "Speaking Haptically: from Phonemes to Phrases with a Mobile Haptic Communication System." In: *World Haptics Conference*. Virtual Conference: IEEE, July 2021.

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[CP2] J. Cooperstock and **J.R. Blum**. "Touch me like it matters: exploring location and encodings for explicit and implicit communication." In: *Haptics Symposium, Interactive Session associated with the Cross-Cutting Challenge on Using the Skin as a Medium of Communication*. Washington, DC, Mar. 2020.

[CP3] N. Katzman, M. Gellert, T. Oron-Gilad, J. R. Cooperstock, Y. Bitan, and J. J. Schlesinger. "Wearable haptic devices to monitor soldiers' physiology–discreet sensory input improves safety and monitoring in hostile low-light and high-noise conditions." In: *Military Health System Research Symposium*. Department of Defense, 2020. URL: https://mhsrs.amedd.army.mil/SitePages/Home.aspx.

[CP4] **P. Fortin**, **J. Blum**, and J. R. Cooperstock. "Towards Consistent Haptic Coupling with HaptiStrap: Doing Better than "Tight yet Comfortable"." In: *User Interface Software and Technology (UIST)*. New Orleans, USA: ACM, Oct. 2019. Acceptance rate: 48.8%.

[CP5] **F. Al-Taha**, **P. Fortin**, **A. Weill–Duflos**, and J. R. Cooperstock. "Reversing Voice-Related Biases Through Haptic Feedback." In: *User Interface Software and Technology (UIST)*. Berlin, Germany: ACM, Oct. 2018. URL: http://dl.acm.org/authorize?N682233.

[CP6] **F. Tordini**, A. Bregman, and J. R. Cooperstock. "Effects of global brightness on salience and auditory foreground perception." In: *Speech in Noise Workshop*. Glasgow, Scotland, Jan. 2018. URL: https://spin2018.eu/?p=program&id=66.

[CP7] **J. Blum** and J. R. Cooperstock. "Exploring the Limits of Vibrotactile Numeric Information Delivery." In: *Ubicomp*. Singapore: ACM, Oct. 2018. URL: http://dl.acm.org/authorize?N682245.

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[CP9] **T. Kim** and J. R. Cooperstock. "Enhanced Pressure-Based Multimodal Immersive Experiences." In: *Augmented Human*. Seoul, Korea: ACM, Feb. 2018. URL: http://dl.acm.org/authorize?N682247. Best poster presentation award, Acceptance rate: 34%.

[CP10] **P. Fortin**, **J. Blum**, and J. R. Cooperstock. "Raising the Heat: Electrical Muscle Stimulation for Simulated Heat Withdrawal Response." In: *User Interface Software and Technology (UIST)*. Quebec City, Canada: ACM, Oct. 2017. URL: http://dl.acm.org/authorize?N682248. Acceptance rate: 23%.

[CP11] **J. Anlauff**, J. Fung, and J. R. Cooperstock. "Modular Haptic Belt for Augmented Balance Feedback." In: *Intl. Society for Posture and Gait Research*. Seville, Spain, June 2015.

[CP12] **D. El-Shimy** and J. R. Cooperstock. "EmbodiComp: Embodied Interaction for Mixing and Composition." In: *Sound and Music Computing Conference (ICMC — SMC)*. Athens, Greece, Sept. 2014.

[CP13] **F. Tordini** and J. R. Cooperstock. "Auditory salience modeling via streaming: A behavioural view." In: *Milestones in Music Cognition: BKN 25*. Montreal, Canada, July 2014.

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[CP14] **D. Glesser**, F. Bérard, and J. R. Cooperstock. "Overcoming Limitations of the Trackpad for 3D Docking Operations." In: *Human Factors in Computing Systems (CHI), Extended Abstracts*. Paris, France: ACM, Apr. 2013. URL: http://dl.acm.org/authorize?N06273. Acceptance rate: 20%.

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[CP16] **S. Arseneau** and J. R. Cooperstock. "Automated Camera Tracking in a Real-World Environment." In: Montreal, QC, Canada, 2000.

[CP17] J. R. Cooperstock. "Rethinking the Remote Control." In: *HCI International, Conference on Human-Computer Interaction*. San Francisco, CA, USA, Aug. 1997, p. 116.

Book Chapters

[B1] **T. Kim**, **J. Blum**, **P. Alirezaee**, **A. Arnold**, **P. Fortin**, and J. R. Cooperstock. "Usability of Foot-Based Interaction Techniques for Mobile Solutions." In: *Mobile Solutions and Their Usefulness in Everyday Life*. Springer International Publishing AG, Jan. 2019, pp. 309–329. DOI: https://doi.org/10.1007/978-3-319-93491-4_16. URL: https://link.springer.com/chapter/10.1007/978-3-319-93491-4_16.

[B2] **M. Wozniewski**, Z. Settel, and J. R. Cooperstock. "Sonic Interaction via Spatial Arrangement in Mixed Reality Environments." In: *Sonic Interaction Design*. Ed. by K. Franinovic and S. Serafin. MIT Press, 2013, pp. 329–340. URL: http://xplorebcpaz.ieee.org/xpl/login.jsp?tp=&arnumber=6504636.

[B3] M. Marchal, **G. Cirio**, **Y. Visell**, F. Fontana, S. Serafin, J. R. Cooperstock, and A. Lécuyer. "Multimodal Rendering of Walking over Virtual Grounds." In: *Human Walking in Virtual Environments*. Ed. by Y. Visell, A. Lécuyer, F. Steinicke, and J. Campos. Springer Verlag, 2013, pp. 263–295. URL: http://www.springer.com/engineering/robotics/book/978-1-4419-8431-9.

[B4] **Y. Visell** and J. R. Cooperstock. "Interacting with augmented floor surfaces." In: *Human Walking in Virtual Environments*. Ed. by Y. Visell, A. Lécuyer, F. Steinicke, and J. Campos. Springer Verlag, 2013, pp. 377–399. URL: http://www.springer.com/engineering/robotics/book/978-1-4419-8431-9.

[B5] **Y. Visell**, **R. Rajalingham**, and J. R. Cooperstock. "A review of nonvisual signatures of human walking with applications to person tracking in augmented environments." In: *Walking with the senses: Perceptual techniques for walking in virtual environments*. Ed. by Y. Visell and F. Fontana. Logos Verlag, 2012, pp. 33–68.

[B6] **Y. Visell**, **S. Smith**, and J. R. Cooperstock. "Distributed human-computer interaction with augmented floor surface." In: *Walking with the senses: Perceptual techniques for walking in virtual environments*. Ed. by Y. Visell and F. Fontana. Logos Verlag, 2012, pp. 15–32.

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[B7] J. R. Cooperstock. "Human-Computer Interaction." In: *Wiley Encyclopedia of Computer Science and Engineering*. Ed. by B. W. Wah. Vol. 3. Wiley-Interscience, Mar. 2009, pp. 1529–1542. DOI: 10.1002/9780470050118.ecse524. URL: http://onlinelibrary.wiley.com/doi/10.1002/9780470050118.ecse524/abstract.

[B8] **F. Aubé** and **R. Shield**. "Modeling the Effect of Leadership on Crowd Flow Dynamics." In: *Cellular Automata*. Ed. by P. Sloot, B. Chopard, and A. Hoekstra. Vol. 3305. Lecture Notes in Computer Science. originally presented in International Conference on Cellular Automata for Research and Industry. Amsterdam: Springer Berlin / Heidelberg, Oct. 2004, pp. 601–611. URL: http://dx.doi.org/10.1007/978-3-540-30479-1_62.

Other Refereed Publications

[O1] **N. Hieda** and J. R. Cooperstock. *SharedFace2*. International Conference and Exhibition of Virtual Technologies and Uses: Laval Virtual ReVolution (refereed interactive demonstration). Laval, France, Apr. 2015.

[O2] **Y. Visell**, **G. Millet**, and J. R. Cooperstock. *Haptic Display via a Vibrating, Rigid Surface*. Demonstration in IEEE Haptics Symposium. Waltham, MA, USA, Mar. 2010.

[O3] **A. Law**, **J. Ip**, **B. Peck**, **Y. Visell**, P. Kry, and J. R. Cooperstock. *A Multimodal Floor for Virtual Environments*. Demonstration in SIGGRAPH Emerging Technologies. Aug. 2009.

[O4] **M. Wozniewski**, Z. Settel, and J. R. Cooperstock. *Ménagerie Imaginaire*. Artwork Performance in New Interfaces for Musical Expression (NIME). New York, NY, USA, June 2007.

Non-refereed Contributions

[N1] J. Cooperstock. "Situating UbiComp Education within or distinct from HCI?" In: *Ubiquitous Computing Education: Why, What, and How:* ed. by A. Girouard, A. L. Kun, A. Roudaut, and O. Shaer. Vol. 9. 6. Dagstuhl, Germany: Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik, Mar. 2019. URL: http://drops.dagstuhl.de/opus/volltexte/2019/11460.

[N2] **E. Sheepy**, M. Orjuela-Laverde, and J. R. Cooperstock. "Encouraging active and collaborative learning in two engineering courses." In: *Supporting Active Learning and Technological Innovation in Studies of Education*. Montreal, Canada, June 2016.

[N3] J. R. Cooperstock and G. Lukács. *How to complain to airlines*. CBC Marketplace blog. Mar. 2014. URL: http://www.cbc.ca/marketplace/blog/plane-wrong-how-to-complain-to-airlines.

[N4] **F. Tordini** and J. R. Cooperstock. "Auditory salience modeling via streaming: A behavioural view." In: *Milestones in Music Cognition: BKN 25*. Montreal, Canada, July 2014.

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[N5] J. R. Cooperstock. "Overcoming Complexity in the Teaching and Learning Environment." In: *Materials Science and Technology*. Ralph Lloyd Harris Memorial Symposium. Montreal, Oct. 2013.

[N6] J. R. Cooperstock. *From Rehearsal to Performance: Ensemble Learning in Open Orchestra and Distributed Rehearsal for World Opera*. Presentation in Music Anywhere, Anytime: International Symposium on Synchronous Distance Learning. Oct. 2011.

[N7] **Benovoy, M.**, J. Cooperstock, and M. Levine. *Real-Time Facial Recognition*. Phase II Project Report for Department of National Defence. 2010.

[N8] M. Levine, **Benovoy, M.**, and J. Cooperstock. *An Automatic Real-Time Facial Recognition System*. Phase I Project Report for Department of National Defence. 2009.

[N9] **N. Bouillot**, E. Cohen, J. R. Cooperstock, A. Floros, N. Fonseca, R. Foss, M. Goodman, J. Grant, K. Gross, S. Harris, B. Harshbarger, J. Heyraud, L. Jonsson, J. Narus, M. Page, T. Snook, A. Tanaka, J. Trieger, and U. Zanghieri. "AES White Paper AESTD1003V1: Best Practices in Network Audio." In: *Journal of the Audio Engineering Society* 57.9 (Sept. 2009), pp. 729–741. URL: http://www.aes.org/e-lib/browse.cfm?elib=14839.

[N10] V. N. Salimpoor, **M. Benovoy**, G. Longo, J. R. Cooperstock, and R. J. Zatorre. *Qualifying the Chills Response: Differences between Transient and Prolonged Chills in Response to Music*. Presentation in Auditory Perception, Cognition, and Action Meeting. Chicago, IL, USA, 2008.

[N11] J. Cooperstock. "Plus de largeur du bande, s'il vous plaît." In: *L'interdiscplinarité dans les sciences et technologies de la musique (invited)*. Montreal: Association francophone pour le savoir (ACFAS), May 2006.

[N12] J. Cooperstock. "Integrating Communication with Interaction: Computer Vision Challenges for Interactive and Intelligent Environments." In: *Workshop on Computer Vision for Interactive and Intelligent Environments (invited)*. Lexington, KY, USA, Nov. 2005. URL: http://srl.mcgill.ca/publications/2005-CV4IIE.pdf.

[N13] J. Cooperstock, J. Roston, and Woszczyk. "Broadband Networked Audio: Entering the Era of Multisensory Data Distribution." In: *18th International Congress on Acoustics (invited)*. Kyoto, Apr. 2004.

[N14] **Cayouette, F.**, **Sud, D.**, **Patel, K.**, **Sarikaya, D.**, and J. Cooperstock. "McGill Reddogs Final Report." In: *Robocup*. 2002.

[N15] J. Cooperstock. "Classroom of the Future: Enhancing Education through Augmented Reality." In: *HCI International, Conference on Human-Computer Interaction (invited)*. New Orleans, 2001.

[N16] **Sud, D.**, **Cayouette, F.**, **Gu, J.**, and J. Cooperstock. "McGill Reddogs Final Report." In: *Robocup*. 2001.

[N17] A. Saroyan, R. Harris, and J. R. Cooperstock. *Applying pedagogical principles to teaching and learning with technology*. Multi-cultural perspectives on the use of technology in education. Montreal, QC, Canada, 2000. URL: http://www.education.mcgill.ca/NAFTA.

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Patents

[P1] **H. Lee**, **R. Wang**, **M. Henry**, and J. R. Cooperstock. "Voice Parameter Determination Method, System and Device." US and Canada application (United States). 2023.

[P2] **P. Fortin**, **J. Blum**, **Antoine Weill–Duflos**, and J. R. Cooperstock. "System and Method for Wearable Device Contact Force Estimation and Adjustment Feedback." provisional application US 05001770-936USPR (United States). 2021.

[P3] **P. Fortin**, S. Kim, and J. R. Cooperstock. "Closed-loop XR Stimulus Presentation and Perception Feedback using Multi-Channel Physiological Signals." application US 2020P00157WO (United States). 2021.

[P4] J. R. Cooperstock and **J. Blum**. "Improving Haptic Feedback on Wearable Devices through Accelerometer Measurements." provisional application US 62/237,772; US 62/416,910 (United States). 2015.

[P5] J. R. Cooperstock, **Y. Visell**, **A. Law**, and K. Franinovic. "Floor-based Haptic Communication System." US 9,041,521 (United States). May 2015.

[P6] J. R. Cooperstock, **J. Blum**, **M. Bouchard**, **A. Olmos**, **S. Panëels**, and **D. El-Shimy**. "Spatialized audio augmented reality for blind users with a smartphone." provisional application US 61/727,828 (expired) (United States). 2012.

[P7] J. R. Cooperstock, **G. Millet**, and **M. Otis**. "Floor-Based Variable Friction Display." provisional application US 61/577,148 (expired) (United States). 2011.

[P8] J. R. Cooperstock, **L. To**, and R. Hess. "A Tetris-style gaming approach to treat amblyopia." US 8,066,372 (United States). Nov. 2011.

[P9] J. Roston, J. R. Cooperstock, J. MacDougall, and **S. Spackman**. "Remote sign language interpretation system." US 60/463,332; CA 2,426,161;US 7,395,200 (United States). Feb. 2003.

[P10] **S. Spackman**, **S. Pelletier**, and J. R. Cooperstock. "High-resolution Video Synthesis." application 2,435,791 filed July 24, 2003 (expired) (Canada). 2003.

[P11] J. R. Cooperstock, **Y. Zhang**, and **S. Spackman**. "Adaptive Compression for the Storage, Transmission, and Arbitrary Quality Reconstruction of Spatial Data." US 60/339,816, provisional application filed Dec. 17, 2001 (expired) (United States). 2001.

[P12] J. R. Cooperstock and **S. Arseneau**. "A robust person tracking method and system." US 60/234,197 provisional application, filed Sept. 20, 2000 (expired) (United States). 2000.

[P13] J. R. Cooperstock. "Pixel Count-Sensitive PDA Tool Mechanism with Cut/Paste and/or Copy/Paste Function." P09-022797, filed in Japan by Sony Corp. (Japan). Feb. 1997.

Technology Transfer

License agreement signed in 2014 with amblyotech.com to commercialize amblyopia treatment (protected under US patent 8,066,372 "Binocular vision assessment and/or therapy"). The technology was subsequently acquired by Novartis in April 2020.

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Research Demonstrations

[D1] 3D Printed Haptic Illusions and Demonstrations. IEEE World Haptics, Tokyo, Japan (conducted by Antoine Weill–Duflos and Pascal Fortin), July 2019.

[D2] Distributed Musical Practice and Performance, I Medici di McGill, Oscar Peterson Hall, Montreal, April 28, 2008.

[D3] Wide Screen Window on the World: Life Size HD Videoconferencing. Supercomputing 2005, Bandwidth Challenge, Seattle, November 16, 2005.

[D4] Streaming DSD Audio comes to the AES. Audio Engineering Society 117th Convention, San Francisco, October 31, 2004.

[D5] Cross-continental low-latency ultra-videoconferencing. McGill-Stanford jazz jam, June 13, 2002.

[D6] Remote master's class using SDI video and multichannel audio. McGill-National Research Council session with Pinchas Zukerman, March 25, 2002.

[D7] SDI video and multichannel audio. CANARIE's 7th Advanced Networks Workshop, Toronto, November 28, 2001.

[D8] Low-latency distributed violin duet in full-frame video. RISQ 2001 Conference, Montreal, November 5, 2001.

The Globe and Mail noted that *"Cooperstock's demonstration was a watershed event for the elite club of the world's computer network engineers. No one had ever before been able to demonstrate that, under the right conditions, it is possible for natural, normal human interaction to occur over the Internet."*

[D9] The Recording Studio that Spans a Continent. Audio Engineering Society 109th Convention, Los Angeles, September 23, 2000.

The Audio Engineering Society noted that this *"Landmark demonstration shows cost effective and high performance transmission systems for high quality 24-bit, 96kHz uncompressed mulitchannel audio are on horizon"*

[D10] Dolby Digital 5.1 audio with MPEG-2 video around the world. Internet Global Summit INET 2000 Conference, Yokohama, July 20, 2000.

CBC Radio noted that *"McGill University in Montreal has made Internet history by setting up the first intercontinental netcast of a live concert in surround sound and full-screen video."*

[D11] Dolby Digital 5.1 audio with MPEG-2 video. CANARIE's 5th Advanced Networks Workshop, Toronto, November 29, 1999.

[D12] First real-time Multichannel Audio Internet demo. Audio Engineering Society 107th Convention, New York, September 26, 1999.

The Learning Technologies Networked noted that *"The performance marked the first real time multichannel audio Internet transmission, a feat made possible by software developed at McGill University by a team under the leadership of Professor Jeremy Cooperstock."*

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Invited Talks

Invited Talks to Industry, Students, and the Public

[T1] "Using smartphones to answer 'What's around me?', 'Am I crossing the street safely?' and 'Where's the entrance?"', Accessible Coding Demonstrations for Youth with Visual Impairment, Science Odyssey 2021, May 1, 2021.

[T2] "From flight simulators to the passenger experience: what can we learn from pilot-training tools to improve airline customer service", AIST–NRC Collaboration Meeting on Improving Client-Agent Interaction, January 17, 2020.

[T3] "I Feel the Earth Move (Under My Feet): Haptic Interaction for Telepresence and Information Delivery", Department of Information Engineering and Computer Science, University of Trento, July 4, 2019.

[T4] "I Feel the Earth Move (Under My Feet): Haptic Interaction for Telepresence and Information Delivery", Department of Industrial Engineering and Management, Ben Gurion University, March 11, 2019.

[T5] "I Feel the Earth Move (Under My Feet): Haptic Interaction for Telepresence and Information Delivery", Information Systems, University of Haifa, November 7, 2018.

[T6] "What's around me? Audio augmented reality for blind users with a smartphone, Pint of Science, Montreal, May 15, 2018.

[T7] Presenter at Canadian National Institute for the Blind's TechnoVision+ Conference, Montreal, May 5, 2017.

[T8] "Innovations for Gaming, AR, Simulation & Training", Innovations for gaming, augmented reality, simulation and training, and other applications, Centre d'entreprises et d'innovation de Montreal (CEIM), April 8, 2016.

[T9] "Enhanced Human: Wearable computing that transforms how we perceive and interact with our world", Department of Computer Science, Technion–Israel Institute of Technology, February 11, 2016.

[T10] "Is Humanity Smart Enough for AI?", McGill Science Outreach Program, Freaky Friday public outreach lecture, October 23, 2015.

[T11] "Delivering a Compelling User Experience in a Computer-Mediated Environment", HCIN 5300, Interactive Entertainment Technologies, Carleton University, March 7, 2014.

[T12] "Multimedia as a Building Block: How audio, video and haptics integrate in a Shared Reality", Multimedia Systems, GLIS 633, School of Information Studies, McGill University, February 13, 2014.

[T13] "Are we there yet? Cognitive Science Challenges in Telepresence and Virtual Reality", Student Association of Cognitive Science, Cognitive Science Research Day, McGill University, November 13, 2013.

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[T14] "Telepresence doesn't quite cut it: Multimodal Challenges in Virtual and Shared Reality", Institute of Telecommunications and Multimedia Applications, Universidad Politècnica de València, July 10, 2013.

[T15] "Telepresence doesn't quite cut it: Multimodal Challenges in Virtual and Shared Reality", Dawson College, First Choice Science speakers series, April 17, 2013.

[T16] "Dangerous AI or dangerous us?", Academia Week Artificial Intelligence event, Science Undergraduate Society, McGill University, January 24, 2013.

[T17] "They don't use Skype on the Holodeck", Department of Computer Science, University of British Columbia, July 4, 2012.

[T18] "But can the Holodeck do a good Shiraz?", School of Computer Science and IT, Royal Melbourne Institute of Technology, February 17, 2012.

[T19] "But can the Holodeck do a good Shiraz?", School of Information Technologies, University of Sydney, February 15, 2012.

[T20] "Distributed Music Performance and Latency Issues", School of Drama, Fine Art and Music, University of Newcastle (Australia), February 13, 2012.

[T21] "But can the Holodeck do a good Pinot noir?", Department of Computer Science, University of Otago, January 23, 2012.

[T22] "Shared Reality: Toward perceptually convincing computer-mediated environments", Department of Computer Science, University of Auckland, August 25, 2011.

[T23] "This is your brain on Shared Reality: Toward perceptually convincing computed-mediated environments", Vanier College, Science Week Presentation, March 24, 2011.

[T24] "This is your brain on Shared Reality: Toward perceptually convincing computed-mediated environments", Simula Lab, Oslo, May 15, 2009.

[T25] "This is your brain on Shared Reality: Toward perceptually convincing computed-mediated environments", Ambient Intelligence Group, CITEC, Bielefeld University, May 6, 2009.

[T26] "Distributed and Multimodal Interaction in Virtual and Augmented Reality Environments", McGill University, School of Physical and Occupational Therapy, November 25, 2008.

[T27] "Shared Reality: Effective Interaction for (Demanding) Distributed Tasks", University of Victoria, September 16, 2008.

[T28] "Bidirectional video communication for real-time applications", Institut für Telematik, University of Lübeck, Germany, May 15, 2008.

[T29] "Shared Reality: Effective Interaction for (Demanding) Distributed Tasks", Aalborg University, Esbjerg, Denmark, May 14, 2008.

[T30] "Distributed Multimodal Interaction", Bang & Olufsen, Struer, Denmark, May 13, 2008.

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[T31] "Distributed Musical Practice and Performance", Biology and Music Lecture, I Medici di McGill, April 28, 2008.

[T32] "Shared Reality: Effective Interaction for (Demanding) Distributed Tasks", Arts, Media and Engineering, Arizona State University, February 29, 2008

[T33] "From Videoconferencing to Shared Reality" Department of Electrical and Computer Engineering, University of British Columbia, October 4, 2007.

[T34] "Engaging Technolog(ies) for Effective Interaction" Department of Computer Science, Hebrew University of Jerusalem, April 19, 2005.

[T35] "Engaging Technolog(ies) for Effective Interaction" Intelligence, Agents, Multimedia Group, University of Southampton, UK, March 7, 2005.

[T36] "From Videoconferencing to Shared Reality" l'Institut de Recherche et Coordination Acoustique/Musique (IRCAM), Paris, November 25, 2004.

[T37] "From Videoconferencing to Shared Reality" Taiyuan University, Taiyuan, China, April 18, 2004.

[T38] "From Videoconferencing to Shared Reality" Tsighua University, Beijing, China, April 14, 2004.

[T39] "From Videoconferencing to Shared Reality" Beijing University, Beijing, China, April 14, 2004.

[T40] "From Videoconferencing to Shared Reality" Beihan University, Beijing, China, April 12, 2004.

[T41] "From Videoconferencing to Shared Reality" Advanced Telecommunications Research (ATR), Nara, Japan, April 9, 2004.

[T42] "From Videoconferencing to Shared Reality" Dept. of Industrial Engineering, Musashi Institute of Technology, April 5, 2004.

[T43] "High-fidelity telepresence" Graphics and Geometric Computing Seminar Series, Technion – Israel Institute of Technology, January 1, 2003.

[T44] "The Virtual Studio" Royal Conservatory of Music, Toronto, February 25, 2002.

[T45] "Building a Shared Reality" Department of Computer Science, University of Toronto, February 25, 2002.

[T46] "Distributed Concerts and Shared Reality: Just how much streamed data and computation do we need to support effective interaction?" Department of Computer Science, Clarkson University, November 1, 2001.

[T47] "Robotics and Design" Round Table Panel, Centre Design UQAM, February 9, 2000.

[T48] "The Shared Reality Environment" Department of Electrical and Computer Engineering, Ecole Polytechnique, Montreal, May 28, 1999.

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Invited Talks in Scholarly Conferences and Workshops

[T49] Speaker in "Ethics Research I am Excited About", Laidley Centre for Business Ethics, Montreal, April 28, 2023.

[T50] Speaker in "Next Gen Health Powered By The Open Grid And Edge AI", IEEE Future Networks Forum, Montreal, October 14, 2022.

[T51] "Touch and feel when it isn't real: Integrating haptics into the XR experience", InterDigital Scientific Seminar series, December 4, 2020.

[T52] "Taking Haptics Out of the Lab and Into the Wild", Introduction to Haptics for Next Generation XR. International Conference on Intelligent Robots and Systems Tutorial Session, October 29, 2020.

[T53] "Assistive Technology Research in the Shared Reality Lab", Conférence scientifique du CRIR-Institut Nazareth et Louis-Braille, September 25, 2019.

[T54] "Learning from sparse feedback: Adapting an environmental awareness app to visually impaired user preferences", ACM-SIGCHI sponsored summer school on Intelligent User Interfaces in the Era of IoT and Smart Environments, Haifa, Israel, October 3, 2018.

[T55] Speaker in "AR/VR panel", IEEE Multimedia Signal Processing Workshop, Montreal, September 23, 2016.

[T56] "Immersive multimedia and mobile interaction: Applications to new media, gaming, medicine, and beyond" Keynote speaker, Entertainment Technology Summit, Concordia University, Montreal, September 17, 2016.

[T57] "Leveraging video in public safety scenarios", Ninth Canadian Public Safety Interoperability Workshop (CITIG 9), Toronto, December 1, 2015.

[T58] "Future Cities (2040) – Mind: Human and Machine", Institute for the Public Life of Arts and Ideas, Symposium on Future Cities, March 13, 2015.

[T59] "UltraVideo and the Quest for Minimal Latency", International Workshop on High Quality Dynamic cross-continental Networked Artistic interaction, World Opera Association, Struer, Denmark, August 29, 2013.

[T60] "Assisting the blind and treating amblyopia: Two more things you can do with your smartphone", 15e Symposium scientifique sur l'incapacité visuelle et la réadaptation (presented with J. Blum). University of Montreal, February 12, 2013.

[T61] "Revolutions in human-device interaction: How new paradigms impact user experience", International Conference on Consumer Electronics, Consumer Electronics Society, Las Vegas, January 12, 2013.

[T62] "Around the World in 80 ms." Panel presentation in Workshop of the Audio Engineering Society Convention, San Francisco, November 5, 2010.

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[T63] "UltraVideo and Virtual Presence: A Video Perspective." Presentation on Teaching in Distributed Performance, Tromsø, Norway, October 15, 2010.

[T64] "Future Interfaces for Audio." Panel presentation in Workshop of the Audio Engineering Society Convention, New York, October 10, 2009.

[T65] "World Opera Technologies and Tests", Danish Sound Technology Network, Aalborg University, June 8, 2009.

[T66] "The Montreal World Opera Experiments". Presentation at the World Opera Symposium, Struer, Denmark, May 12, 2009.

[T67] "Audio-Visual-Haptic-Tactile: Putting them all together for an engaging immersive experience". Panel presentation in Workshop of the Audio Engineering Society Convention, Munich, Germany, May 10, 2009.

[T68] "New Technologies for Audio over IP". Panel presentation in Workshop of the Audio Engineering Society Convention, Munich, Germany, May 10, 2009.

[T69] "A Platform to Create and Support Ocean Science Virtual Organizations (Oceans 2.0)" and "HSVO Health Services Virtual Organization", RISQ 2008 Colloquium, Montreal, November 14, 2008.

[T70] "The Future of VC: Music Teaching and High Fidelity Video", Elevate 2008: Reaching New Heights in Educational Video-conferencing, Banff, August 27–28, 2008.

[T71] "Creating an immersive video space", International Symposium on The World Opera: When the Opera stage becomes worldwide, Tromsø, Norway, May 9, 2008.

[T72] "Multimodal Streaming and Distributed Audio Interaction", High Quality Audio over Networks (ANET II) Summit, Banff Centre, April 12, 2008.

[T73] "Music and Games: How Fun Applications Stimulate Core Technologies", Canadian University Software Engineering Conference, January 19, 2008.

[T74] "From Teleoperation to Teleimmersion: Design Challenges for Distributed Interaction", Canadian University Software Engineering Conference, January 19, 2007.

[T75] "CANARIE sur UCLP et ROADM, deux technologies qui changent le monde des télécoms", Round Table panel, RISQ Annual Conference, Quebec City, October 16, 2006.

[T76] "La recherche sur en ultra-videoconference", Panel on "Vitrine technopédagogique sur la vidéoconférence", RISQ Annual Conference, Quebec City, October 16, 2006.

[T77] "Broadband transmission of multimodal content at the Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT)", RISQ-CA*net4 Advanced Networking Day, Montreal, October 24, 2005.

[T78] "Low-Latency Ultra-Videoconferencing and Shared Reality" Interfaces Montreal, Rencontre du Génie numérique et des Affaires. Montreal, October 11, 2005.

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[T79] "Shared Spaces" Asia-Pacific Advanced Networks (APAN) Conference, Taipei Aug. 22–27, 2005.

[T80] "Engaging Technolog(ies) for Effective Interaction" Keynote speaker, World Conference on Educational Multimedia, Hypermedia and Telecommunications, Montreal, June 29, 2005.

[T81] "Broadband Distance Education in 2007: Views from the Demand Side" Invited Panelist. World Conference on Educational Multimedia, Hypermedia and Telecommunications, Montreal, June 29, 2005.

[T82] "Ultra-Videoconferencing and Intelligent Classrooms" Keynote speaker, Canadian Higher Education and Information Technology Conference, Montreal, June 28, 2005.

[T83] "From Videoconferencing to Shared Reality" Bell University Laboratories' Annual Conference, Toronto, November 3, 2004.

[T84] "History of Internet Audio Experiments at McGill" High Quality Audio over Networks (ANET) Summit, Banff Centre, August 20–22, 2004.

[T85] "Advanced Video Applications: Developments in Extreme Video" Southeastern Universities Research Association Video Development Initiative (SURA/ViDe) 6th Annual Digital Video Workshop. Indianapolis, March 24, 2004.

[T86] "The Democratic Revolutions – Peer to Peer Meets Open Source: Design, Philosophy, Engineering" Intimate Technologies/Dangerous Zones. Banff New Media Institute, Banff Centre, April 27, 2002.

[T87] "The Development of Ultra VC Applications and Technology" Southeastern Universities Research Association Video Development Initative (SURA/ViDe) 4th Annual Digital Video Workshop. University of Alabama at Birmingham, April 25, 2002.

[T88] "High quality wide-screen SDI video and multichannel audio over CA*net3" CANARIE's 7th Advanced Networks Workshop, Toronto, November 28, 2001.

[T89] "Low-latency comes to videoconferencing: The Frères Jacques duet at a distance" RISQ 2001 Conference, Montreal, November 5, 2001.

[T90] Advanced Networking and the Arts: Innovations in Outreach, Collaboration, and Performance. Panel Discussion at Internet Global Summit INET 2001 Conference, Stockholm, June 6, 2001.

[T91] "The McGill–Calgary Advanced Learnware Network" CANARIE's 6th Advanced Networks Workshop, Montreal, November 29, 2000.

[T92] "Networks and Music Instruction" Panel Discussion with Pinchas Zukerman and Wieslaw Woszczyk, CANARIE's 6th Advanced Networks Workshop, Montreal, November 29, 2000.

[T93] "Tools for Distributed VR" Canadian Working Group on Virtualized Reality Systems, Montreal, November 28, 2000.

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[T94] "Evolution of the Intelligent Classroom" Multicultural Perspectives on the use of Technology in Education. Montreal, October 2, 2000.

[T95] The Brave New World of Ubiquitous Bandwidth" Internet Global Summit INET 2000 Conference, Yokohama, July 20, 2000.

[T96] "Multichannel Audio over the Internet: The Next Phase" RISQ 2000 Conference, May 31, 2000.

[T97] "Multichannel Audio over the Internet" CANARIE's 5th Advanced Networks Workshop, Toronto, November 29, 1999.

[T98] "When Telemedicine feels like Regular Medicine" Communications and Information Technology Ontario (CITO) Healthcare for the Future: Telemedicine, February 18, 1999.

Media Exposure

[M1] Ami-Télé, Ça me regarde, February 8, 2018

[M2] Forbes, March 9, 2017

[M3] Discovery Channel, Daily Planet, Mar. 7, 2017

[M4] Télé-Québec, Electrons Libre, Jan. 17, 2017

[M5] ACB Radio, Mainstream, Nov. 18, 2016

[M6] CBC Radio, Tech Column, Aug. 8, 2016

[M7] CJAD Radio, Tech Talk, Aug. 6, 2016

[M8] Mobile Syrup, Aug. 4, 2016

[M9] CBC News, Aug. 4, 2016

[M10] Betakit, Aug. 3, 2016

[M11] Accessible Media Inc., Live from Studio 5, Aug. 2, 2016

[M12] La Presse, Jul. 31, 2016

[M13] CTV News, Jul. 29, 2016

[M14] Stevivor, Mar. 2015

[M15] Venture Beat, Mar. 3, 2015

[M16] Club Social (TV5), Feb. 4, 2011

[M17] Global TV (National), Jan. 29, 2009

[M18] Global TV (Montreal), Jan. 27, 2009

[M19] CBC Radio, As it Happens, Jan. 27, 2009

[M20] National Post, Jan. 27, 2009

[M21] Montreal Gazette, Jan. 27, 2009

[M22] Montreal Gazette, Feb. 20, 2009

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[M23] Inside Higher Education, Sept. 3, 2008

[M24] CBC Radio (Daybreak), Sept. 3, 2008

[M25] CJAD radio, Sept. 2, 2008

[M26] Cabling Networing Systems, Jan. 2006

[M27] McGill Reporter, Nov. 24, 2005

[M28] CTV Quebec, Global News, Dec. 23, 2002

[M29] New York Times, Technology Section, Dec. 19, 2002

[M30] Discovery Channel, Daily Planet, Oct. 30, 2002

[M31] CFCF (CTV Quebec) Global News, June 19, 2002

[M32] National Post, June 15, 2002

[M33] CBC Television, The National, May 3, 2002

[M34] McGill Reporter, Learning the Strings, April 11, 2002

[M35] Ottawa Citizen, March 29, 2002

[M36] Montreal Gazette, March 27, 2002

[M37] Globe & Mail, Dec. 1, 2001

[M38] Canal Z, La Revanche des Nerdz, Nov. 13, 2001

[M39] Montreal Gazette, Nov. 10, 2001

[M40] CJAD Radio, The World Today, July 31, 2001

[M41] McGill Reporter, April 5, 2001

[M42] Globe & Mail Report on Business, Oct. 28, 2000

[M43] TQS Double Clic!, Oct. 7, 2000

[M44] McGill Reporter, Sept. 21, 2000

[M45] UPath.com, Vol 40, 2000

[M46] CBC (Montreal) Home Run, Aug. 22, 2000

[M47] Montreal Gazette, Aug. 22, 2000

[M48] CFCF (CTV Quebec) Pulse News, Aug. 21, 2000

[M49] CBC Radio The Arts Report, July 20, 2000

[M50] Elle Quebec, June 2000

[M51] Journal Le Monde des Affaires, May 2000

[M52] Canal Z, Technofolie, May 3, 2000

[M53] TQS Double Click, April 29, 2000

[M54] McGill Reporter, April 6, 2000

[M55] Briefing Digital, April 2000

[M56] Interface: La Revue de la Recherche, Vol. 21, No. 2, March-April 2000

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[M57] American Society of Mechanical Engineers, Mechanical Advantage, Vol 9, No 3, March 2000

[M58] Canal Z, La Revanche des Nerdz, Feb. 2000

[M59] CFCF (CTV Quebec) Pulse News, Feb. 29, 2000

[M60] Canal Vox: CityMag, Jan. 15, 2000

[M61] Montreal Mirror, Jan. 6, 2000

[M62] Plan Mega: La revue du genie québecois, Ordre des ingenieurs du Québec. Vol 1, Jan. 2000

[M63] Radio Corporation of Singapore: Science and Technology Watch, Dec. 1999

[M64] Radio Canada (CBC French) Les Annees lumiere, Nov. 28, 1999

[M65] Financial Times Life/Technology, Nov. 25, 1999

[M66] CBC Radio: As it Happens, Nov. 22, 1999

[M67] Journal de Montreal, Nov. 19, 1999

[M68] Le Devoir, Nov. 18, 1999

[M69] TVA CyberClub, Nov. 13, 1999

[M70] La Presse, Sept. 26, 1999

[M71] CJAD Radio, April 11, 1999

[M72] Montreal Mirror, April 8, 1999

[M73] McGill Reporter, Jan. 14, 1999

[M74] High-Tech Shower International, Nov. 26, 1997

[M75] CBC Newsworld "Futureworld", Oct. 5, 1996

[M76] Discovery Channel, Sept. 18, 1996

[M77] Toronto Star, Sept. 15, 1996

[M78] University of Toronto Varsity, Sept. 3, 1996

[M79] TV Ontario "Studio Two", June 26, 1995

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Research Supervision

Research Professionals

Name	Period	Project title	Present Position
Singh, Jaydeep	Sep 2021–	web developer, IMAGE project	
Novack, Kaylee	Sep 2021–Apr 2022	medical doctor researcher on Avatar Therapy project	
Kuo, Cyan	Aug 2021–	Usability Research Lead, IMAGE project	
Patil, Gandharv	Jun 2021–Mar 2022	ML Research Lead, IMAGE project	
Grond, Florian	Apr 2021–	Audio Research Lead, IMAGE project	
Eichhorn, Alexander	Feb 2013 – Aug 2013	research associate under GRAND	CTO of Kidtsunami
Bouchard, Mathieu	Jan 2011 – Nov 2018	research assistant under MSG project	
Chen, Guangyi	Jan 2010 – Jul 2010	research associate under Canarie NEP	
Vincent, Coralie	Oct 2010 – Mar 2011	research assistant	CNRS, France
Dansereau, Don	Jun 2009 – Jan 2010	research associate under FRQNT grant	Senior Lecturer, University of Sydney
To, Long	Jan 2009 – Sep 2011	research associate under NSERC I2I	Software engineer, Abcam
Blum, Jeff	Oct 2008 – Aug 2013	research assistant under MSG project	

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Name	**Period**	**Project title**	**Present Position**
Olmos, Adriana	Sep 2008 – July 2012	user interface engineer under Canarie NEP	Interaction designer, Google/YouTube
Sun, Haijian	Sep 2008 – Oct 2010	computer engineer under Canarie NEP	programmer, Desjardins
Soukhodolski, I.	Oct 2005 – Dec 2007	web services programmer under Canarie IIP	Owner, W4 Technology
Kiewe, Howard	Oct 2005 – Dec 2007	user interface developer under Canarie IIP	consultant
Spackman, S.	2000–2006	research associate on Canarie and VRQ projects	Google, Mountain View
Sarikaya, Deniz	2003–2004	research assistant on VRQ projects	deceased
Soucy, Gilbert	1999	research associate on CFI project	Imaging Specialist, 36pix Inc., Montreal

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Post-doctoral Fellows

Name	Period	Project title	Present Position
Fontana De Vargas, Mauricio	Jan 2023-	Ai-Digital Nurse Avatar (ADiNA)	
Sullivan, John	Sep 2021–Apr 2022	Multimodal Rendering for the IMAGE Project	post-doctoral fellow, Université Paris-Saclay
Jyoti, Vishav	Mar 2021–Feb 2022	Mixed-Reality Platform for Simulation and Synthesis of Multi-Modal Hallucinations	
Talhan, Aishwari	Jan 2021–Dec 2022	Wearable Haptics	Research Scientist, SUNY Research Foundation, Albany, New York
Yoo, Yongjae	Mar 2020–Jul 2022	Wearable Haptics and Haptics Lead, IMAGE project	Assistant Professor, Hanyang University ERICA, South Korea
Weill – Duflos, A.	Jan 2018 – Jan 2021	Wearable Haptics	Director of Research and Product Integration, Haply Robotics
Arnold, Andre	Oct 2017 – Dec 2017	Wearable Haptics	Product Manager – AI Nuvoola
Panëels, S.	Jan 2011 – Jan 2012	Natural Interactive Walking and In-Situ Audio Services	Researcher, Commissariat à l'énergie atomique et aux énergies alternatives (CEA)
Pelletier, S.	Nov 2009 – Jun 2011	Real-time Image-based Rendering (Canarie NEP, 2009-2010)	

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Name	**Period**	**Project title**	**Present Position**
		Parallax Barrier Display rendering software optimization (NSERC ENGAGE, 2011	Game Programmer, Behaviour Interactive
Otis, Martin	Jan 2010 – Dec 2010	Natural Interactive Walking (FRQNT Scholarship)	Assoc. Professor, U. Québec à Chicoutimi
Millet, G.	Nov 2009 – Mar 2012	Natural Interactive Walking	Patent Examiner, EPO, The Hague
Bouillot, Nicolas	Sep 2007 – Dec 2011	Mobile Audio Interaction (NSERC New Media Initiative, 2007-2009)	
		Open Orchestra (Canarie NEP-2 Project)	Research Engineer, Societé des arts technologiques
Darolti, Cristina	Jan – Dec 2009	Real-time Image-based Rendering (Canarie NEP)	Patent Examiner, EPO, The Hague
Wang, Guangyu	Sep 2007 – Mar 2011	Neurosurgical Visualization and Virtual Presence (NSERC Strategic and NCE)	Facebook, Mountain View
Wang, Yan	2002–2003	Channel and spatial view allocation for videoconferencing (VRQ)	V.P. Marketing, AMH Canada

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Ph.D. Students

Name	Period	Thesis title	Present Position
Samuel, Segun *	Jan 2023– present	IMAGE project	
Conan, Corentin*	Sep 2022– present	Advanced Airspace Usability	
Astles, Samantha*	Sep 2022– present	Advanced Airspace Usability	
Shen, Lichao*	Oct 2021– present	Social telepresence	
Regimbal, J.*◇‡	Sep 2021– present	Audio-haptic authoring for information rich content delivery	
Fortin, P.*◇	Sep 2016 – Sep 2021	Methods and Interfaces for Closed-Loop Smartphone Communications	Asst. Professor, U. Québec à Chicoutimi
Blum, Jeff*†g	Sep 2013– present	Implicit Communication for Enriched Human Interaction	
Erfani-Joorabchi, M.*	Jan 2013 – Jan 2015		iOS Software Engineer, Google
Anlauff, Jan*	Jan 2011– present	Sensor-Actor Wearables	
Tordini, F.	Jan 2011 – Feb 2018	Auditory salience modeling for continuous processes sonification	Technology Transfer Manager, Innovation and Partnerships, McGill University
Ghourchian, N.*†	Jan 2010 – Apr 2011	Affective Evaluation	transferred to another group
El-Shimy, D.†	Jan 2009 – Nov 2014	Reactive Environment for Network Music Performance	Senior UX Research Manager, Miro

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Name	**Period**	**Thesis title**	**Present Position**
Benovoy, M.†	Oct 2007 – Aug 2010	Biosignals analysis	transferred to another group
Visell, Yon	Sep 2005 – Mar 2011	Walking on virtual ground: physics, perception, and interface design	Assistant Professor (ECE), UC Santa Barbara
Qi, Zhi	Jan 2004 – Dec 2008	Towards dynamic mosaic generation with robustness to parallax effects	Associate Professor (School of Electronic Science & Engineering), Southeast University, China
Pelletier, S.^{p}	Jan 2003 – Oct 2009	Acceleration methods for image super-resolution	Game Programmer, Behaviour Interactive
Yin, Jianfeng	Sep 2000 – Aug 2008	Toward an Alternative Approach to Multi-Camera Scene Reconstruction	Software engineer, Geomagical Labs
Sun, Wei	2002–2006	Multi-camera Object Segmentation in Dynamically Textured Scenes Using Disparity Contours	Apple Inc., Cupertino
Cayouette, F.†	2003–2006	human tracking (withdrew from program)	Programmer, Behaviour Interactive, Montreal
Arseneau, S.	2000–2006	Representing Junctions through Asymmetric Tensor Diffusion	Chief Engineer for R&D, Laser Shot, Houston

* McGill Engineering Doctoral Award recipient
† NSERC PGS D Scholarship recipient
‡ NSERC CGS D Scholarship recipient
◇ FRQNT Scholarship recipient
^{g} Graphics Animation and New Media (GRAND) Scholarship recipient
^{p} Precarn Scholarship

Additional Ph.D. Supervisory Service

I co-supervised a portion of the thesis work of the following students:

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- Liu, X., (Nov 2013-Dec 2015), visiting student from University of Electronic Science and Technology, China
- Xie, M., (Sep 2012-Mar 2014), visiting student from Beijing University of Aeronautics and Astronautics, China
- Grond, F. (Jul-Dec 2010), visiting student from Bielefeld University, Germany
- Zambon, S.. (Jul-Oct 2010), visiting student from Verona University, Italy
- Cirio, G. (Jun-Aug 2010), visiting student from INRIA-IRISA, France
- Rizutti, C. (Sep-Oct 2008), visiting student from Università della Calabria, Italy
- Bossi, E. (Sep-Oct 2008), visiting student from Università della Calabria, Italy
- Pellerin, R. (Jun-Sep 2008), visiting student from Conservatoire Nationale des Arts et Métiers, France
- Cupellini, E. (Jul-Aug 2007), visiting student from Università della Calabria, Italy
- Usher, J. (2003-2004), Ph.D. student, Faculty of Music, McGill University
- Mohammadi, M. (Feb-Aug 2004). visiting student from Sharif University, Iran

I served as external reviewer or examiner of the following theses:

- Mauricio Fontana de Vargas, School of Information Studies, McGill University (2022)
- Richard Olayniyan, Department of Computer Science, McGill University (2021)
- Xavier de Tingu, Université Rennes, France (2020)
- Damien Brun, Le Mans Université, France (2020)
- Cheryl Savery, Queen's University (2014)
- Alexandre Plouznikoff, École Polytechnique de Montréal (2009)
- Xiaoyong Sun, School of Information Technology and Engineering, University of Ottawa (2007)
- Nicolas Bouillot, Conservatoire Nationale des Arts et Métiers, France (2006)
- Harold Okai-Tettey, Computer Science, Rhodes University, South Africa (2006)

I served on the supervisory and/or examination committees of the following students:

- Department of Electrical and Computer Engineering: Edouard Antoniou, Oliver Astley, Carmen Au, Marc Boulé, Wei Chu, Olivier St-Martin Cormier, Vincent Levesque, Muhua Li, Rui Ma, Dante De Nigris Moreno, Jun Ouyang, Jerome Pasquero, Andrew Phan, Ala Qumsieh, Harkirat Sahambi, Wei Sun, Yick Kei Wong, Dingrong Yi, Olivier St-Martin Cormier, Karl Fayad, Shalaleh Rismani, Lixiao Zhu
- School of Information Studies: Xiaofeng (Allan) Yong
- Faculty of Music: Jason Corey, Cory McKay, Caroline Medeiros, Sean Olive, Dale Stammen, Vanessa Yarmechuk, Mark Zadel

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- Grad. School of Library and Information Studies: Charles-Antoine Julien
- Department of Educational Psychology and Counselling: Adam Finkelstein
- Department of Mechanical Engineering: Zahir Albadawi
- School of Computer Science: Paul Haroun, Wisam Al Abed

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Masters Students

Name	Period	Thesis title	Present Position
Bazin, Romain	Sep 2022–	TBD	
Quadros, Venissa Carol	Sep 2022–	IMAGE Project	
Aubet, Antoine	Sep 2022–	TBD	
Liu, Yujing	Sep 2021–	Graphical rendering strategies for avatar therapy	
Wilson, É.	Sep 2021–	Lightfield rendering techniques for XR musical interaction	
Duarte, Nathan$^{\diamond}$	Sep 2021–	Wearable sensor deployment for pandemic mitigation	
Henry, Max	Sep 2021–	Spatial-aware audio rendering for immersive telepresence	
Lewis-Lane, Jonathan	Sep 2021–	Wearable haptic feedback for real-time training tasks	
Akut, Rohan	Jan 2021–	Active learning for image labelling	
Gannavarapu, S.	Sep 2020–	Haptic rendering and perception	
Isran, Rayan	Sep 2020–	Haptic rendering and perception	
Kirby, Linnea	Sep 2020–	Multimodal feedback to guide body-movement	
Knappe, Sabrina	Sep 2020 – Dec 2022-	Towards a User Interface for Audio-Haptic Exploration of Internet Graphics by People who are Blind and Partially Sighted	Ph.D. student (see above)
Regimbal, J.	Sep 2020 – Aug 2021	Haptic effects authoring in artistic and utilitarian contexts	(fast-tracked to Ph.D. program)

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Name	Period	Thesis title	Present Position
Ducher, Clara‡	Sep 2019 – Sep 2021	GAN-based interaction paradigms for photorealistic avatar creation	Pipeline Technical Director, Double Negative
Marino, David	Sep 2019 – Nov 2021	Implicitly Conveying Emotion While Teleconferencing	R&D Scientist, Hitachi Energy, Montreal
Lee, Hyejin	Sep 2019 – Apr 2022	Generating Convincing Simulation of Internalized Voices for Human-avatar Interaction	Full-stack developer, Société Générale, Montreal
Li, Yaxuan	Sep 2019 – May 2022	Towards Context-aware Automatic Multimodal Haptic Effect Generation for Home Theatre Environments	
Bouanane, Y.	Jan 2019 – Dec 2020	EchoDepth: Using a depth camera and sonification for blind navigation	Entrepreneur, sktch.io
Demers, Marc	Sep 2018 – Mar 2021	A Data-Driven Strategy for Evaluating Tacton Perceptual Similarity	Data Scientist, Maxen Technologies
Vyas, Preeti	Sep 2017 – Apr 2020	Foot-based Haptic Interfaces for Numeric Information Delivery and Dance Learning	Ph.D. student, UBC
Sulmont, E.	Sep 2017 – Dec 2018	Improved Learning of Machine Learning by Non-Majors	Curriculum Manager, DataCamp
Patil, Gandharv	Jan 2017 – Dec 2019	Min-Max Inverse Reinforcement Learning for learning bi-modal dialogue policies	
Girgis, Roger	Sep 2016 – Apr 2019	Assessing the Use of Deep Learning in Assisting Visually Impaired People with Outdoor Exploration	Ph.D. student, MILA
Kim, Taeyong	Sep 2016 – Aug 2019	Exploration of foot based interaction for menu control and virtual reality applications	HRI Researcher, Hyundai Robotics

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Name	**Period**	**Thesis title**	**Present Position**
Alirezaee, P.	Sep 2016 – Dec 2019	Multimodal approaches to improved hospital alarms	Product Designer, Unity Technologies
Diaz, Manfred	Sep 2016 – Aug 2017	Interactive and Uncertainty-Aware Imitation Learning	
Ahmer, Z.	Jan 2016 – Jan 2019	Automated musical accompaniment to children's stories	
Yin, G.	Sep 2015 – Oct 2018-	Augmented Reality Tools for Workplace Safety	Software Engineer, Kooltra
Fortin, P.	Sep 2015 – Aug 2016	Physiological Perception of Tickling Sensation	(fast-tracked to Ph.D. program)
Horodniczy, D.†	Sep 2014 – Dec 2016	Characterization and Application of a Variable-Friction Foot Device	Software Developer, Philips Innovative Imaging Technologies
Vuibert, Vanessa	Sep 2013 – Aug 2015	Efficient and Accurate Performance with Unconstrained Mid-air Interaction	Software Developer, Guavus
Hieda, Naoto	Sep 2012 – Aug 2015	Digital Video Projection for Interactive Entertainment	Visiting Researcher, Pola Art Foundation Fellow, Concordia University
Viswanathan, R.	Jan 2010 – Dec 2012	Testing the Two-Stream Hypothesis in an Immersive Virtual Environment	Developer, MontrealTel
Knight, Trevor	Jan 2010 – Sep 2011	Music Visualization for Open Orchestra (CIRMMT Student Award)	Software Developer, Noteloop Systems
Li, Weizhong	Sep 2008 – May 2009	(recommended alternative supervision)	
Ip, Jessica	Sep 2008 – Mar 2011	Augmented Reality for Interactive Play in a Virtual and Physical Environment	iOS developer, Shopify, Toronto

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Name	**Period**	**Thesis title**	**Present Position**
Namit, Gaurav	May 2008 – Oct 2009	(withdrew in 2009 to pursue social entrepreneurship venture)	
El-Shimy, D.	Sep 2007 – Dec 2008	Gestural interaction for complex tasks	(fast-tracked to Ph.D. program)
Law, A.	Sep 2007 – Sep 2010	A Vibrotactile Floor for Enabling Interaction through Virtual Walking Spaces	Data Systems Engineer, AECOM, Vancouver
Benovoy, M.	Sep 2006 – Oct 2007	Biosignals analysis and its application in a performance setting	(fast-tracked to Ph.D. program)
Audet, Samuel†	2005-2007	Shadow Removal from Multi-Projector Displays via Three-Dimensional Modeling and Object Tracking	Deeplearning4j (Skymind), Tokyo, Japan
Wozniewski, M.	2003-2006	A framework for interactive three-dimensional sound and spatial audio processing in a virtual environment	research engineer, Societé des arts technologiques, Montreal
Rudzicz, Frank*	2004-2006	CLAVIUS: Understanding Language Understaing in Multimodal Interaction	Professor, University of Toronto
Rioux, Francois†	2003-2005	Software Framework for Parsing and Interpreting Gestures in a Multimodal Virtual Reality Context	Ph.D., Laval; Software Architect, Thales Canada
Chan, Siu-Chi	2002-2005	Hand and Fingertip Tracking for Gesture Recognition	Technical Staff, AMD Toronto
Hilario, Nadia*	2002-2005	Occlusion Detecion in Front Projection Environments	Software Developer, Stingray Digital
Perez, Michael	2002-2005	Multimodal Human-Computer Interaction for a Public Kiosk System	User Interface Designer, Nuance
Sud, Daniel	2002-2005	Design of a Multi-Projector Display System	Senior Producer, Lucky Hammers

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Name	**Period**	**Thesis title**	**Present Position**
Boussemart, Y.	2002-2005	Design and Implementation of Framework for Immersive Environments in a Shared Context	Chief Design Officer, QuantumBlack, UK
Pelletier, S.	2001-2003	High-Resolution Video Synthesis from Mixed-Resolution Video Based on the Estimate-and-Correct Method	(see above)
Gu, Jinhua	2000-2002	A distributed software architecture for the Shared Reality Environment.	VP, Radian Asset Assurance Inc., NY
Yao, Jie	2000-2002	Human Arm Gesture Detection and Recognition in a Classroom Environment.	Ph.D. student, Concordia University
Zhang, Yuan	2000-2002	An efficient coding method for spatial data: the rotating, hierarchical, overlapping representation.	Ph.D. student, University of Delaware
Doutriaux, S.	1998-1999	(withdrew in 1999 to launch start-up company)	
Arseneau, S.	1998-2000	Robust Image Segmentation Towards an Action Recognition Algorithm.	(see above)
Xu, Aoxiang	1998-2000	A High-Performance Audiovisual Communication System.	QNX Software Systems, Ottawa

* FRQNT Graduate Scholarship recipient
† NSERC PGS M Scholar recipient
‡ McGill nominee for Northeastern Association of Graduate Schools Distinguished Thesis Award
◇ McCall MacBain Scholar

Additional Masters Supervisory Service

I co-supervised a portion of the thesis work of the following students:

- Dever, Ani (Sep 2017-Feb 2018), visiting student from Polytechnic University of Turin, Italy
- Gallo, Nicola (Sep 2015-Feb 2016), visiting student from Polytechnic University of Turin, Italy
- Roy, Louise (Jul-Dec 2015), visiting student from Ensimag, Grenoble, France
- Glesser, David (Feb-Jun 2012). visiting student from Ensimag, Grenoble, France
- Penin, O. (Jul-Aug 2011). visiting student from Paris-Sud 11, France

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- Mabire, N. (Apr-Sep 2010). visiting student from Supélec, Metz, France
- Brulé, M. (Feb.-Aug 2009). visiting student from Université de Louis Pasteur, Strasbourg, France
- Anlauff, J. (Dec 2008-Mar 2009). visiting student from Bielefeld University, Germany
- Delattre, G. (Apr-Aug 2007). visiting student from Université Paris VI, France

I served on the supervisory and/or examination committees of the following students:

- Zhonghao Zhao (M. Eng. project), Electrical and Computer Engineering, McGill University
- Anne-Marie Burns, Faculty of Music, McGill University
- Frank Riggi, Electrical and Computer Engineering, McGill University
- Eric Benzacar, Electrical and Computer Engineering, McGill University
- Oles Protsiym, Faculty of Music, McGill University

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Funding

Individual Research Grants and Contracts

Date	Source	Amount	Title/Description
2023	MEDTEQ/ NSERC	$531,000	*Improving Intelligibility of Speech in Noisy Environments.* MEDTEQ Partenar-IA funding approved pending successful review of NSERC Alliance grant
2023	Humanware	$33,600	*Prototype experience for IMAGE content on the Monarch* Research contract
2023-2024	MEDTEQ/ HBHL	$282,188	*Haptic devices for conveying non-textual visual information on the internet for individuals with vision loss.* MEDTEQ Partenar-IA funding through the Ministère de l'Économie, de l'Innovation et de l'Énergie
2022	HBHL	$50,000	*Extending Internet Multimodal Access to Graphical Exploration.* CFREF Healthy Brains, Healthy Lives Neuro Commercialization Ignite Grant
2022	Meta	$30,000	Unrestricted gift
2021	Mitacs	$13,333	*Analyse et recherche d'optimisation d'un processus d'adaptation de contenu issu de la numérisation 3D à un contenu photo-réaliste et interactif.* Mitacs Accelerate – Intern: Chen, Hongjun
2021-2022	ISED	$608,594	*Enabling Access to Graphical Image Content Published via the Internet for People Who Are Blind, Deaf-Blind or Visually Impaired.* Innovation, Science and Economic Development Canada (ISED), Accessible Technology Program (Total project budget of $765,787)
2019-2021	NSERC/ MEDTEQ	$374,366	*Mixed-Reality Platform for Simulation and Synthesis of Multi-Modal Hallucinations with Applications to Schizophrenia Treatment.* Collaborative Research and Development Grant with Industrial Partners, iMD Research and IA Précision Santé Mentale
2019	NSERC	$25,000	*360 degree imaging for navigation assistance for the visually impaired.* Engage Grants Program with Industrial Partner, ImmerVision.
2019	Mitacs	$15,000	*Advanced sensor control implementations for energy optimization in commercial buildings using machine learning and data visualisation applied to building automation systems.* Mitacs Accelerate – Intern: Demers, Marc

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Date	Source	Amount	Title/Description
2019	Mitacs	$6,000	*Facilitating Human Interaction with a Robotic Exercise Coach using Smart Objects.* Mitacs Globalink – Intern: Vyas, Preeti
2018	Mitacs	$6,000	*Mobile Remote Implicit Communication.* Mitacs Globalink: Intern: Blum, Jeff
2018	NSERC	$25,000	*Educational wine recommendations from initially sparse data.* Engage Grants Program with Industrial Partner, Wineout Inc.
2017-2018	McGill	$7500	*Physiological confirmation of stimulus reception.* Faculty of Engineering TechAccelR Grant
2017-2020	NSERC	$631,650	*Wearable Haptics.* Collaborative Research and Development Grant with InterDigital Corporation
2017-2018	CIRA	$44,500	*Intelligent Agent for the Visually Impaired: Vision-based scene description and contextual awareness for Autour.* Canadian Internet Registry Authority .CA Community Investment Program
2017-2022	NSERC	$ 222,000	*Multimodal Influences on Perception and Action in Computer-Mediated Environments.* Discovery grant.
2017-2018	MSP	$177,673	*Social Media Monitoring Architecture.* Research Contract with Ministère de la Sécurité publique
2015	CIRA	$53,878	*What's Around Me? Conveying Environmental Awareness to the Visually Impaired Community.* Canadian Internet Registry Authority .CA Community Investment Program
2014-2015	Mitacs	$15,000	*Effect of Mobile Technologies in Emergency Response.* Mitacs Accelerate – Intern: Erfani-Joorabchi, Minoo
2014	NSERC	$25,000	*Haptic user experience delivered through the shoes.* Engage Grants Program with Industrial Partner, InterDigital Canada
2013-2014	NSERC	$137,474	*3D immersive projection infrastructure with full-body motion capture and analysis.* Research Tools and Instruments Grants
2012-2013	Mozilla	$50,000	*Real-Time Emergency Response.* Mozilla Ignite Development Challenge (in partnership with the National Science Foundation)
2012-2017	NSERC	$210,000	*Improved Shared Reality for Multi-Party, Multimodal Simulation and Interaction.* Discovery grant.
2012	Toyota	$30,000	*Haptic interaction with an augmented steering wheel.* Toyota Infotechnology Centre
2011	HP	$60,950	*Capturing attention via spatialized audio cues.* HP Labs Innovation Research Program (IRP)

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Date	Source	Amount	Title/Description
2011	NSERC	$25,000	*Improved Parallax Barrier Autostereoscopic Display Software.* Engage Grants Program with Industrial Partner, Holoptick Technologies Inc.
2010-2011	Google	$50,000	*A Spatialized Audio Map System for Mobile Blind Users.* Google Faculty Research Awards.
2010-2011	Honda	$30,000	*Facial Expression Recognition for Machines.* Honda Research Institute.
2010	UVic	$8,000	*NEPTUNE Pleora streamer.* University of Victoria software license
2008-2012	MDEIE	$367,195	*Natural Interactive Walking.* Support for International Research and Innovation Initiatives, Ministère du Développement économique, de l'Innovation et de l'Exportation; for Canadian participation in EU FP-7 program with partners in France, Italy, and Denmark.
2007-2010	MDEIE	$15,000	*Un environment virtual pour la création de musique et de son à partir de systèmes chaotiques.* Support for International Research and Innovation Initiatives, Ministère du Développement économique, de l'Innovation et de l'Exportation.
2006-2009	NSERC	$317,785	*A pervasive multi-user augmented space for mobile immersive interaction with sound and music.* (additional funding for artist collaborator received from Canada Council for the Arts) New Media Initative STPGP 337999-06.
2006-2011	NSERC	$100,000	*Enhanced video for shared reality environments.* Discovery grant.
2004-2006	NSERC	$136,600	*Soundscape performance works via interactive environment for immersive audiovisual scene generation.* (additional funding for artist collaborator received from Canada Council for the Arts) New Media Initative NMIPJ 307934-04.
2002-2006	NSERC	$100,000	*Shared Reality Interaction over High Bandwidth Connectivity.* Discovery grant.
2000	LUB	$100,000	*Distributed Visualization Environment.* Laboratoire universitaire Bell Equipment Grant.
1999-2000	Petro-Canada	$20,500	*Interactive Web Tools for Critique of Presentation Skills and Evaluation of Student Learning.* Young Innovator Award.
1999-2002	FCAR	$45,000	*Augmenting an Electronic Classroom for Improved Instructor-Student Interaction.* New Researchers Award.

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Date	**Source**	**Amount**	**Title/Description**
1999	FCAR	$15,700	*Augmenting an Electronic Classroom for Improved Instructor-Student Interaction.* Equipment Grant.
1999	AES	$25,000	*Multichannel audio over Internet.* Audio Engineering Society.
1999	OSC	$15,000	*Timespace Exhibit.* Ontario Science Center contract.
1999	MFM	$10,000	*Intelligent Classroom tools.* McGill Faculty of Management.
1998-2002	NSERC	$76,000	*Reactive Hospital Environment.* Discovery research grant.
1998	FGSR	$20,000	McGill Graduate Studies and Research Development Fund

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Team Research Grants and Contracts

(Percentages refer to my portion.)

Date	Source	Amount	Title/Description
2023	Mitacs	\$150,000 (70%)	**Avatar Care Provider for Seniors Residences* Mitacs Accelerate (with K. Moffatt)
2022-2025	CRIAQ	\$800,000 (25%)	†NSERC Alliance with Consortium for Aerospace Research and Innovation of Québec (CRIAQ) *ADvanced Airspace Usability (ADAIR)* (with P. Doyon-Poulin (Poltechnique), Joon Chung (Ryerson), and 6 aerospace industrial partners)
2020-2021	CIRMMT	\$1,500	*Agile Seed Funding for *Conveying paralinguistic cues and context while teleconferencing* (with students David Marino, Max Henry and Pascal Fortin)
2017-2018	SSHRC	\$199,680 (10%)	†*Real time impact signalling and collective goods* Partnership Development Grant (with R. Janda and 6 co-investigators)
2016-2017	NAKFI	\$100,000 (20%)	*Empathy Mirror* National Academies Keck *Futures Initiative* Art and Science, Engineering and Medicine Grant (with B. Korgel and 3 co-applicants)
2015-2018	FRQNT	\$182,880 (25%)	†*Étude des modèles d'interactivité humain-robot en réalité mixte afin de réduire l'apparition des troubles musculo-squelettiques en utilisant une cellule de travail hybride* Recherche en équipes (with M. Otis and 6 co-applicants)
2014	Mozilla	\$20,000 (90%)	**Augmented Reality Tools for Improved Training of First Responders* Mozilla Gigabit Community Fund (with R. Dearden)
2011	CIRMMT	\$10,000 (90%)	**Acoustic Sculptures* CIRMMT Strategic Innovation Fund Award (with A. Olmos and 3 others)
2010-2011	NSERC	\$49,815 (90%)	**Novel Portable Treatment Device for Lazy Eye* Idea to Innovation (I2I) Booster (Phase Ib) (with R. Hess)
2009-2011	MSG	\$200,000 (80%)	**Location-Based Spatialized Audio Interaction for the Blind and Visually Impaired* Programme Appui au passage à la société de l'information (Support for the transition to an information society program), Ministère des Services gouvernementaux (MSG) (with M. Wozniewski and Z. Settel)
2010-2014	CHRP	\$327,000 (?%)	*Computational and statistical tools for image guided neurosurgery of brain tumors* NSERC Collaborative Health Research Projects (with L. Collins and 7 others)

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Date	Source	Amount	Title/Description
2009-2010	CCSIP	$48,000 (4%)	**Digitally Merged Environments* California-Canada Strategic Initiatives Program (with S. Brown, UCSD and 20 co-applicants)
2009-2011	Canarie	$927,648 (40%)	*†Open Orchestra* Network-Enabled Platforms 2 (with J. Roston and W. Woszczyk)
2010-2014	NCE	$23,000,000 (2%)	*†GRAND: Graphics, Animation and New Media* Networks of Centres of Excellence (With K. Booth and 49 others)
2009	DND	$47,500	*†Video-Based Facial Recognition–Algorithm and Demonstration* Department of National Defence Contract (with M. Levine)
2008-2009	NSERC	$120,250 (90%)	**Novel Portable Treatment Device for Lazy Eye* Idea to Innovation (I2I) (with R. Hess)
2008-2010	Canarie	$1,397,758 (7%)	*NEPTUNE: A Platform to Create and Support Ocean Science Virtual Organizations* Network-Enabled Platforms (with B. Pirenne and J. Roston)
2008-2010	Canarie	$2,000,000 (18%)	*Health Services Virtual Organization* Network-Enabled Platforms (with R. Ellaway and 8 others)
2008-2010	NSERC	$196,000 (50%)	**3-D Visualization and gestural interaction with multimodal neurological data* Strategic Projects (with 5 others)
2006-2009	FRQNT	$146,550 (50%)	**Unités agenceables: Reseau d'Environnements Immersifs pour Collaboration à Distance* Recherche en équipes (with X.-W. Sha)
2005-2006	Canarie	$825,000 (50%)	*Undersea Window–High Definition Video Online* Intelligent Infrastructure Program. (with J. Roston)
2005-2006	SAT	$1,276,000 (1%)	*TOT2: Nouveau Territoires de la Création-Diffusion en Réseau* Heritage Canada New Media Research. (M. Savoie, PI)
2004-2006	Canarie	$568,971 (33%)	*Shared Spaces – High Definition Ultra-Videoconferencing* Advanced Applications Program. (with J. Roston)
2003-2004	SAT	$792,082 (1%)	*TOT1: Nouveau Territoires de la Création-Diffusion en Réseau* Heritage Canada New Media Research. (M. Savoie, PI)
2002-2005	IRIS	$573,000 (25%)	**Parallel Distributed Camera Arrays for Intelligent Environments* (with J. Clark, S. Fels, R. Vertegaal)
2002-2005	VRQ	$2,180,000 (20%)	*Real-time Communication Of High-res. Multi-sensory Content via Broadband Networks.* Valorisation-Recherche Quebec (with W. Woszczyk and others)
2001-2002	Canarie	$391,000 (30%)	*Remote Video Sign-Language Interpreting.* Advanced Networking Apps. Services & Technologies. (with J. Roston and others)

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Date	**Source**	**Amount**	**Title/Description**
2000-2002	Canarie	$808,000 (35%)	*McGill Advanced Learnware Project.* Advanced Networking Applications Services and Technologies. (with B. Pennycook)
2000-2003	LUB	$150,000 (50%)	**Distributed Shared Visualization Environment.* Laboratoire universitaire Bell. (with B. Ozell)
2000-2001	Royal Bank	$2,000 (80%)	**Improving Teaching through an Interactive Critiquing System.* Teaching Improvement Fund Award. (with R. Harris and J. Blatter)
1999-2002	CFI	$400,000 (50%)	†*The Shared Reality Environment.* New Opportunities Award. (with J. Clark)
1999-2000	Royal Bank	$10,000 (80%)	**Interactive Web Tools for Critique of Presentation Skills and Evaluation of Student Learning.* TIF (with R. Harris)

*Indicates grants on which I am project leader. †Grant on which I am co-investigator.

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Centre Research Grants

Date	Source	Amount	Title/Description
2022-2026	IILS	$400,000	FRQNT International Institute on Learning Systems, funded jointly by CNRS (France) and FRQNT (Quebec), Pablo Piantanida, PI, $100,000 per annum
2019-2025	FRQNT	$2,160,000	Regroupement Stratégique pour *Systémes cyberphysiques et intelligence machine matérialisée (REPARTI).* (with C. Gosselin and 49 others) $480,000 per annum.
2015	CFI	$4,366,723	Innovation Fund: *Live Expression "in situ": Musical and Audiovisual Performance and Reception* (with M. Wanderley and 9 others)
2014-2020	FRQSC/ FRQNT	$1,800,000	Regroupement Stratégique: *Centre Interdisciplinaire de Recherche en Musique, Médias et Technologie.* (with M. Wanderley and 23 others)
2013-2019	FRQNT	$2,160,000	Regroupement Stratégique pour *l'Étude des Environnements PARTagés Intelligents répartis (REPARTI).* (with D. Laurendeau and 34 others) $359,943 per annum.
2008-2014	FRQSC/ FRQNT	$1,800,000	Regroupement Stratégique: *Centre Interdisciplinaire de Recherche en Musique, Médias et Technologie.* (with S. McAdams and 23 others)
2007-2009	NSERC	$57,630	Major Resources Support: *Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT).* (with S. McAdams and 8 others)
2006-2013	FRQNT	$1,530,000	Regroupement Stratégique pour *l'Étude des Environnements PARTagés Intelligents répartis (REPARTI).* (with D. Laurendeau and 23 others) $100,000 per annum allocated to CIM.
2002-2005	FCAR	$720,000	Regroupement Stratégique: *Réseau Québecois de Recherche en Réalité Artificiellle Distribuée (QUERRAnet).* (with F. Ferrie, R. Bergevin, P. Cohen, and others)
2001	CFI	$6,500,000	Major Facilities Award: *Centre for Integrated Research in Music Media and Technology.* (with W. Woszczyk and 11 others)
2000-2002	FCAR	$113,500	Centre de Recherches. (with F. Ferrie and 17 others)
2000	NSERC	$275,000	*Information Systems in Support of Intelligent Machine Research.* (with F. Ferrie and 17 others)

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Teaching

Courses Taught

Course title and number	Description	Semester
ECSE-618 *Haptics*	Graduate course on haptic information design, co-taught with other instructors across Canada, under the informal designation of HAPTICS 501	Winter 2021–present
ECSE-421 *Embedded Systems*	Undergraduate course dealing with both the theory and practice of design for embedded systems	2018–present
ECSE-526 *Artificial Intelligence*	Graduate level course in artificial intelligence with emphasis on machine learning and autonomous agents	1998–present
*ECSE-683 *Topics in Vision and Robotics*	Graduate level laboratory course for RoboCup projects	Fall 2000 Fall 2002
*ECSE-424/542 *Human-Computer Interaction*†	Undergraduate (424) and graduate (542) course in human-computer interaction with emphasis on new interface paradigms	2000–present
ECSE-487 *Computer Architecture Laboratory*	Undergraduate laboratory course	1999–2018
ECSE-427 *Operating Systems*	Undergraduate course (core for Computer Engineering students)	1998
CSC-270 *Introduction to Modelling and Optimization*	Computer Science undergraduate course, University of Toronto	1993–1994
CEE 1714Y *Digital Systems and Computers*	Continuing Engineering Education course for the Association of Professional Engineers of Ontario	1993–1994
CSC-228 *File Structures and Data Management*	Computer Science undergraduate course, University of Toronto	1992–1995

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Course title and number	**Description**	**Semester**
COSC-3411 *File Structures and Data Management*	Computer Science undergraduate course, York University	1992

*Indicates new course that I created.
†In 2011, a project from this class placed third in the Usability Professionals Association International Student Design Competition. Note that graduate students have also enrolled in this course under the designation of ECSE-681, *Colloquium in Electrical Engineering* or ECSE-689, *Recent Advances in Electrical Engineering*.

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Undergraduate Supervision

ECE Honors Undergraduate Projects (2 semesters)

Name	Year	Research topic
Bu, Bruce	2020	360° Imaging for Navigation Assistance for the Visually Impaired
Akgul, Ahmet	2017-2018	Haptic Wearables
Bashar, Sharhad	2016-2017	Image-based environment description
Wu, Pei Yuan (Richard)	2016	Mixed-Reality Human-Machine Interaction
Gordon, Adam	2011-12	Virtual Presence
Warraich, Shahjahan	2010-11	Natural Interactive Walking
Lin, Nan	2008	Location sensing for mobile apps
Wang, Letao	2007	Interactive Agent
Charlebois, Pierre-Olivier	2004–2005	Sound Objects in a Soundscape
Myer, Sam	2003	Automated Music Transcription
El-Refaei, Sameh	1998–1999	Shared Reality simulator

ECE Undergraduate Design Projects (2 semesters)

Name	Year	Research topic
Hu, David	2023	Vision-guided Navigation Assistance
Gasmi Ilyes	2023	Vision-guided Navigation Assistance
Habelrih Edward	2023	Vision-guided Navigation Assistance
Arabian Ari	2023	Vision-guided Navigation Assistance
Fathi, Saab	2023	Avatar therapy for psychosis
Ham, Sia	2023	Avatar therapy for psychosis
Choi, Myunghoon	2023	Avatar therapy for psychosis
Kruchinski Almeida, Martin	2023	Avatar therapy for psychosis
Kabir, Anika	2023	Chatting with historical figures
Huynh, Vy-Kha	2023	Chatting with historical figures
Solaberrieta, Emilia	2023	Chatting with historical figures
Cui, Bowen	2022-2023	Immersive multimodal CAVE experience
El Haddad, Georges	2022-2023	Immersive multimodal CAVE experience
Fazal, Gohar Saqib	2022-2023	Immersive multimodal CAVE experience
Mahajan, Madhav	2022-2023	Immersive multimodal CAVE experience
Pan, Edwin	2022-2023	Touching faces in VR
Gosman, Mircea	2022-2023	Touching faces in VR
Justin, Legrand	2022	Vision-guided Navigation Assistance
Sen, Wang	2022	Vision-guided Navigation Assistance
Chamberland, Noah	2022	Vision-guided Navigation Assistance
Natchev Keanu	2022	Novel digital representation of sign language

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Name	**Year**	**Research topic**
Arabian Matthias	2022	Novel digital representation of sign language
Destiné, Maxens	2022	Novel digital representation of sign language
Jarvis, Thomas	2022	Natural Dialog Generation for Mental Health
Kong, Norman	2022	Natural Dialog Generation for Mental Health
MacNaughton, Ben	2021-2022	plots data parsing for IMAGE project
Williams, Aidan	2021-2022	plots data parsing for IMAGE project
Nunez, Matteo	2021-2022	Foot-fluid interaction simulation in mobile VR
Comeau, Francis	2021-2022	Foot-fluid interaction simulation in mobile VR
Gure, Kaan	2021-2022	Foot-fluid interaction simulation in mobile VR
Calin, Haluk	2021-2022	ML-based Navigation Assistance
Cano, Victor	2021-2022	ML-based Navigation Assistance
Das Sharma, Kaustav	2021-2022	ML-based Navigation Assistance
Dufault, Louca	2021-2022	ML-based Navigation Assistance
Simard, Felix	2021	detecting benevolent sexism in text
Watson, Tyler	2021	detecting benevolent sexism in text
Porporino, Anthony	2021	detecting benevolent sexism in tex
Bourbeau, Charles	2021	detecting benevolent sexism in text
Ko, Neroli	2020-2021	haptic dance shoes
Zwack, Noah	2020-2021	haptic dance shoes
Zhang, Weijing	2020-2021	haptic dance shoes
Szwimer, Benjamin	2020-2021	visually impaired access to web graphics
Zoltak, Matthew	2020-2021	visually impaired access to web graphics
Itovitch, Ethan	2020-2021	visually impaired access to web graphics
Weiss, Ben	2020-2021	mixed-reality for schizophrenia treatment
Bieber, Nicolas	2020-2021	mixed-reality for schizophrenia treatment
Khan, Marwan	2020-2021	360° imaging for navigation assistance
Johansen, Anthony	2020-2021	360° imaging for navigation assistance
Gurkan, Mert	2020-2021	360° imaging for navigation assistance
Warsi, Osman	2020-2021	360° imaging for navigation assistance
Lague, Ethan	2019-2020	AR firefighter situational awareness tools
Masciotra, Alex	2019-2020	AR firefighter situational awareness tools
Philippon, Thomas	2019-2020	AR firefighter situational awareness tools
Bouchard, Tristan	2019-2020	AR firefighter situational awareness tools
Smith, Babette	2019-2020	AR and 360: camera-mediated future
Smith, Lilith	2019-2020	AR and 360: camera-mediated future
Chen, Jennie	2019-2020	Foot-fluid interaction simulation in mobile VR
Servera, Ryan	2019-2020	Foot-fluid interaction simulation in mobile VR
Wong, Tyrone	2019-2020	Foot-fluid interaction simulation in mobile VR
Bluethner, Lucas	2019-2020	Foot-fluid interaction simulation in mobile VR
Volodina, Yuliya	2019	360° camera scene understanding
Ritch, David	2019	360° camera scene understanding
Lam, Guillaume	2019	360° camera scene understanding
Nasseem, Veronica	2019	360° camera scene understanding

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Name	**Year**	**Research topic**
Amjad, Adeeb Ibne	2019	360° camera supported intersection-crossing
Amarouche, Hakim	2019	360° camera supported intersection-crossing
Tang, James	2019	360° camera supported intersection-crossing
Commodari, Stefano	2019	360° camera supported intersection-crossing
Regimbal, Juliette	2019	Haptic Wearables
Radi, Nusaiba	2019	Haptic Wearables
Berman, Isaac	2018	Vision-based crossing assistance
Mashaal, Stuart	2018	Vision-based crossing assistance
Liu, Shi Yu	2018	Vision-based crossing assistance
Legrand, Augustin	2018	Force Feedback for VR and AR
Fournier, Clément	2018	Force Feedback for VR and AR
Nith, Romain	2018	Force Feedback for VR and AR
Malik, Numan	2017-2018	Variable-Friction Surface Mechanism
Eshaq, Yousef	2017-2018	Variable-Friction Surface Mechanism
Alalawi, Beshr	2017-2018	Variable-Friction Surface Mechanism
Ahmed, Ridwan	2017-2018	Variable-Friction Surface Mechanism
Nichyporuk, Brennan	2017-2018	AI/vision-based Q&A Dialogue
Benseler, Nick	2017-2018	AI/vision-based Q&A Dialogue
Karatzas, Thomas	2017-2018	Wine recommendation engine
Zhilin, Oleg	2017-2018	Wine recommendation engine
Simard-Morissette, Olivier	2017-2018	Wine recommendation engine
Mirfallah Liarestani, N.	2017	Autour
Kim, Yong Beom	2017	Autour
Gibeault-Girard, Gabriel	2017	AR firefighter display
Velastegui, Nicolas	2017	AR firefighter display
V Cama, Carmen Aimee	2017	AR firefighter display
Dermont, Daniel	2016-2017	Haptic shoes
Makriogiorgos, A.	2016-2017	Haptic shoes
Rohlicek, Greg	2015-2016	Mobile telepresence
Carter, Stephen	2015-2016	Mobile telepresence
Zhang, Zhaowei	2015-2016	Haptic shoes
Huynh, Alex	2015-2016	Haptic shoes
Guzman, Juan	2015-2016	Video analytics
Ali, Hassan	2015-2016	Video analytics
Macario, Daniel	2015-2016	Automated event detection
Arané, Yarden	2015-2016	Automated event detection
Leighton, Brett	2015-2016	Automated event detection
Aird, Nicholas	2015-2016	AR firefighter display
Chen, Yuechuan	2015-2016	AR firefighter display
Lei, Simon	2015-2016	AR firefighter display
Mendonca, Justin	2015-2016	Firefighter IPS
Asfour, Justin	2015-2016	Firefighter IPS
Ward, Thomas	2015-2016	Firefighter IPS

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Name	**Year**	**Research topic**
Laramée, Alexandre	2015-2016	Firefighter IPS
Sahib, Shivan	2015-2016	Biosignal wearables
Nath, Saptaparna	2015-2016	Biosignal wearables
Bramson, Shawn	2013–2014	Mobile Telepresence
Larose, Andrew	2013–2014	Mobile Telepresence
Dirik, Alize	2013–2014	Mobile Telepresence
Mansour, Rita	2013–2014	Walking Straight
Elkerdi, Ghalia	2013–2014	Walking Straight
Redel, Josh	2012	Augmented Meeting Collaboration
Savchenko, Eugene	2010	3D interaction

ECE Undergraduate Design Projects (1 semester)

Name	**Year**
Himmelman, Tristan	2009
Ephraim, Theo	2009
Peck, Benjamin†	2008
Mankarios, Daniel	2007
Konstantinidis, Alex	2007
Pufahl, David	2005
Zhu, Ming-Zhang	2005
Chan, Keng Chi	2005
Phan, Andrew	2004
Saifee, Ali-Akber	2004
Shield, Robert	2004
Aubé, Francois	2004
Rudzicz, Frank	2003
Sarikaya, Deniz	2002
Vallianatos, K.	2002
Hassaine, Sofiane	2002
Wyse, Marisa	2001
Bancroft, David	2001

Name	**Year**
Glass, Emily	2001
Asselin, Ramy	2001
Sud, Daniel	2001
Gapakov, Timofei	2001
Rosenblatt, Avi	2001
Pekofsky, Gregory	2001
Kitisa, Anousack	2000
Vial, Thibaut	2000
Bernier, Martin	2000
Agha, Khurram Z.	2000
Bhattacharya S.	2000
Lavery, William	2000
Yeung, Jason	2000
Liao, Yuan Mei	1999
Yee, Amy	1999
Pereira, David	1999
Ciambella, Gary	1999
Kassouf, Nadim	1999
Lee, Garvin	1999

Name	**Year**
Li, (Shao-Gi) Chris	1999
El-Sharif, Osama	1999
Nasereddin, Hazem	1999
Virdi, Gurpratap	1999
Shah, Ali	1999
Djihanian, Sylvie	1999
Moussaoui, Khaled	1999
Dib Youssef	1999
Tam, H.	1999
Gagnon, Gabriel	1999
Tjhin, P.	1999
Luong, Mai	1999
Lau, Sau	1999
Tsai, Wanti	1999
Lerner, Sorin*	1999
Hochstein, Lorin*	1999
Pollack, Jonathan	1998
Nguyen, Bau	1998

*Co-supervised with James Clark
†Co-supervised with Paul Kry

Computer Science Undergraduate Projects (1 semesters)

Nejad, Namdar	2022	Utilizing Context to Improve Accessible Representations of Web Graphics
Li, Dailun	2022	Training and Testing an Open-Source French TTS Model

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Mechanical Engineering Undergraduate Design Projects (2 semesters)

Sadaqa, Abdel-Rahman	2020-2021	Haptic illusions
Waite, Emilie	2020-2021	Haptic illusions
Shi, Rock	2020-2021	Haptic illusions
Fitz-Gerald, Thomas	2020-2021	Haptic illusions
Pollet, Nathan	2020-2021	Multimodal haptic armrest
Uzan, Emanuel	2020-2021	Multimodal haptic armrest
Ruivo Patricia	2020-2021	Multimodal haptic armrest
Abravanel Tal	2020-2021	Multimodal haptic armrest
Fowo, Clovis	2017-2018	Haptic interface for the feet
Robert, Gabrielle	2015-2016	Variable friction shoe
King, Michael	2013-2014	Variable Friction Foot-Ground Contact

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Undergraduate Internships

Name	Year	Research project
Li, Hanzi	2022	(CS Intern) Internet Multimodal Access to Graphical Exploration (IMAGE)
Gutiérrez, Diego Macias	(Mitacs Globalink) Haptic dance shoes	
Cortes, Dafne Peña	(Mitacs Globalink) Internet Multimodal Access to Graphical Exploration (IMAGE)	
Shen, Xing	2022	(ECE Intern) Vision-Guided Navigation Assistance
Dutta, Riana	2022	(NSERC USRA) Internet Multimodal Access to Graphical Exploration (IMAGE)
Pan, Edwin	2022	(SURE Student) Touching Face in VR
Chen, Hongye	2022	(ECE Intern) Internet Multimodal Access to Graphical Exploration (IMAGE)
Behal, Rahul	2021-2022	ML-based Navigation Assistance for the Visually Impaired
Rao Appala, Siddharth	2021	(Mitacs Globalink) Making internet graphics accessible through rich audio and touch
Contreras, Luis F. H.	2021	(Mitacs Globalink) Haptic device for sensory re-education application
Bhayana, Rachit	2021	(NSERC USRA) Conveying Paralinguistic and Non-Verbal Cues in Teleconferencing
Reszetnik, Grace	2021	(NSERC USRA) Avatar therapy for psychosis
Jiang, Cecilia	2021	(NSERC USRA) Avatar therapy for psychosis
Radi, Rakshitha	2021	(ECE Intern) Assistive Technology Project
Marshall, Kenji	2020-21	(ECE Intern) Avatar therapy for psychosis
Pollet, Nathan	2020	(SURE Student) 360° camera imaging
Bu, Bruce	2019	(SURE Student) Haptic Wearables
Chen, Jennie	2019	(SURE Student) Haptic Wearables
Zhang, Yukai	2019	(SURE Student) Haptic Wearables
Ratnakirti, Navneet	2019	(SURE Student) Sweatsponse
Al Taha, Feras	2018-2019	(NSERC USRA) Haptic Wearables
Nunez, Matteo	2018	(SURE Student) Haptic Wearables

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Name	**Year**	**Research project**
Huang, Yixiang	2018	(SURE Student) Non-Intrusive Mobile Experience Sampling
Li, Zihang	2018	(Mitacs Globalink) Enhanced Remote Viewing Capabilities from a Camera Array
Kaoubi, Hadir	2018	(Mitacs Globalink) Autour: "What's around me?"
Ma, Jiantong	2018	Haptic Zoom
Tran, Jessica	2017	Social Media Monitoring
Xing, Emily	2017	Attention Switching Protocols in Family Conversations
Hao, Ju	2017	(Mitacs Globalink research intern) Haptic shoes
Lisus, Daniil	2017	(NSERC USRA) Natural Interactive Walking
Tran, Andrew	2016-2017	Multimodal CAVE integration
Sun, Nan Jin (Kelly)	2016-2017	Multimodal CAVE integration
Liu, Yufei (Kevin)	2016	Flexible graphical display of foot-ground interactions
Kashyap, Sumeha	2016	(Summer Intern from Indian Institute of Technology Guwahati) Walking Straight Project
Hamed-Baghi, Bobak	2016	(SURE Student) Game Interaction for Haptic Shoes
Dubé, Felix	2016	(SURE Student) Haptic Shoes
Yang, Yanzhe	2015	(Mitacs Globalink) Enhanced Remote Viewing Capabilities from a Camera Array
Morency-Trudel, Juan	2015	(NSERC USRA) Spatialized audio for environmental awareness for the visually impaired
Liu, Bei Chen	2015	(SURE Student) Haptic in-sole design and implementation
Liu, Shuxuan (Dennis)	2015	Multimodal CAVE integration
Chaudhary, Yetesh	2014	Communication in Emergency and Crisis Response
Pavlasek, Jana	2014	(NSERC USRA) Natural Interactive Walking
Jiang, Mike	2014	(IAESTE student trainee) Graphics Rendering for Multimodal CAVE
Yin, Guofan	2014	(Mitacs Globalink) Enhanced Remote Viewing Capabilities from a Camera Array
Murgai, Prateek	2014	Acoustic Signal Processing
Sharma, Alok	2013-14	(BITS India Student) rt Emergency Response

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Name	**Year**	**Research project**
Gupta, Sakshi	2013	(SURE Student from Indian Institute of Information Technology, Jabalpur) In-Situ Audio Services
Brais, Robert	2013	(NSERC USRA) Natural Interactive Walking
Gourdy, Oriane	2013	(Grenoble INP Student) 3DUI Interaction
Jain, Nehil	2011-12	(BITS India Student) In-Situ Audio Services
Sutcliffe, Andrew	2011	Haptically Augmented Steering Wheel
Greencorn, Dan	2011	Food Analysis Simulation
Redel, Josh	2011	Open Orchestra
Varenne, Dylan	2011	(Polytech Nice-Sophia), In-Situ Audio Services
Tomiyoshi, Marcio	2011	(ELAP Scholarship Student) Open Orchestra
Beniak, Stephane	2010	(NSERC USRA) Natural Interactive Walking
Salenikovich, Stepan	2010	Natural Interactive Walking
Chaw, Gary	2010	Natural Interactive Walking
Redel, Josh	2010	Health Services Virtual Organization
Smith, Severin	2009-11	Natural Interactive Walking
Rajalingham, Rishi	2009	(NSERC USRA) Natural Interactive Walking
Rener, Farid	2009	(SURE Student) Natural Interactive Walking
Bae, Sung	2009	Optical Tracking for Audio Graffiti
Jathal, Kunal	2007	Haptic and auditory perception in human walking
Lin, Nan*	2006	(NSERC USRA) Interactive navigational control of robotic wheelchair
Reiter, Philippe	2005	(VP USRA Student) Distributed Video Rendering
Ariane Chan-You	2003	Region-of-Interest Control in Videoconferencing
Ariane Chan-You	2002	Videoconferencing Data Reduction
Gupta, Greeshma	2000	(NSERC Student) Automated slide converter
Cote, Christian	2000	(NSERC Student) Video transformations
Ayatizadeh, Negah	2000	Network communication daemons
Swartz, Tanya	2000	Speech-based TV-tuner interface
Cohen, Ouri	2000	Classroom 2000 access control
Yeong, Jason Aw	1999	(Work Study) Previously Asked Questions system

Continued on next page

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Name	**Year**	**Research project**
Agha, Khurram Zubair	1999	(Work Study) URL access tracking
Lim, Weoi Peng	1999	(Work Study) Graffiti board
Agha, Haroon Ali	1999	(Work Study) Classroom 2000 minipres. system
Klinger, Zamir	2000	(NSERC Student) Automated Door Attendant
Hooshangi, Sara	2000	(NSERC Student) Intelligent Classroom
Liao, Yuan Mei	1999	Electronic Classroom control interfaces
Luo, Jiexin	1999	PowerPoint C2000 interface and image libraries
Zhao, Changpeng	1998-99	Seamless PowerPoint upload for Classroom 2000
Lakdawalla, Azeem	1998-99	Real-time conjugate-gradient based head-tracking

*Co-supervised with Joelle Pineau

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Service

University Service

Department Committees

2020-2022	ECE Unit Lab Access Committee
2017-2018	Undergraduate Recruitment Committee, Chair
2017-2020	Search Committee (Software Engineering, Artificial Intelligence)
2017-2018	Tenure Committee
2015-2023	Safety Committee (Chair in 2015-2017)
2014-2016	Grant Application Support Committee
2012-2024	Graduate Committee
2008-2012	Undergraduate Recruitment Committee
2005-2011	Scholarships/Graduate Student Financing Committee
2002	Ad hoc Committee on Computing Infrastructure for ECE/SOCS
2000-2008	College Liaison Comittee
2001-2004	Information Technologies & Undergraduate Lab
2000-2002	Curriculum Committee
2000	Software Engineering subcommittee
2000-2007	Undergraduate Student Advisor

Other University Service

2022-2024	Research Axis Co-lead and Member of CIRMMT Executive Committee
2014-2016	Elected Member of Council, McGill Association of University Teachers
2009-2013	Research Axis Co-lead and Member of CIRMMT Executive Committee
2007-2013	Co-chair, Multimodal Immersive Systems research axis, CIRMMT
2006-2008	Member, CIRMMT Board of Directors
2006	Advisory Committee for Dean of Music
2004	Tomlinson University Science Teaching Project adjudication
2003-2004	Royal Bank Teaching and Learning Innovation Fund adjudication
2003	Groupe de travail sur les normes et standards de la formation en ligne. Conférence des recteurs et des principaux des universités du Québec (CREPUQ), McGill University Representative
2002-2003	SC-IST Workgroup on Research Computing
2000-2003	SC-IST Workgroup on Classroom Design
1999-2004	Engineering Committee on Teaching and Learning
1999	SC-IST McGill Machine Project
1998	Workgroup on Educational Technology

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Fundraising Activities

2002	RoboCup demonstration at McCord museum for Dean's Circle
2002	Corporate fundraising for McGill RoboCup team
2001-2002	Intelligent Classroom promotion with the Engineering Class of '50; helped raise $274,000
2001	Trottier Building research promotion

Other Activities

2007-2010	Promotion of Academic Integrity
2001-2002	Design of new Intelligent Classroom systems for ENGMC 304
1999-2002	Maintenance of the Intelligent Classrooms, training other faculty in use of the technology
1999	Curriculum development of three new courses in software engineering

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Professional Activities

Service to the Community

2023	Sponsorship and Exhibits Co-Chair, 2024 IEEE Haptics Symposium
2019	Government of Canada, Network of Canadian Experts on Virtual Reality
2018	Consulted by Ordre des ingénieurs du Québec regarding the OIQ's position on AI
2018	Invited Member, Fonds de recherche, Chantier sur l'intersectorialité et la créativité
2018	Co-chair, ACM SIGCHI Demonstrations
2017	External member of academic selection committee, École de technologie supérieure
2016	Organizing Committee, IEEE International Workshop on Multimedia Signal Processing, Special Session on Multimodal Interaction with Digital Information in Smart Cities
2016,2019	Selection Committee, Bill Buxton HCI Thesis Award
2016	Digital Media Program Review, York University
2016	Critique of TCPS CORE Tutorial on Research Ethics (Secretariat agreed to remove problematic question associated with the Zimbardo study)
2010-2015	Theme Leader, Enabling Technologies, Graphics Animation and New Media (GRAND) Networks of Centres of Excellence
2010-ongoing	Voting Member, IEEE Communication Society Multimedia Communications Technical Committee (IEEE MMTC)
2009	Organizer and Chair, AES Workshop on Network Technologies for Audio over IP
2008	Tenure Portfolio evaluation, York University
2005-2006	Organizer, AES Tutorial and Workshop on Human Factors in Audio
2004	Founder, AES Technical Committee for Human Factors in Audio Systems
2003	Organizer, Workshop on LAN Delivery of Audio for AES
2002-2003	Comité Scientifique de Robofolies, Centre Science de Montreal
2001	Local Events Organizer, Autonomous Agents Conference, Montreal
2001-2009	Chair, AES Technical Committee for Network Audio Systems
2000-2004	Scientific Organizer, RoboCup Junior, Montreal
2000-2001	Organizing Committee, Robofesta International Robot Games Festival, Japan
1999-2000	Member and Webmaster, Canadian Virtualized Reality Working Group
1998	Co-organizer, AAAI Symposium on Intelligent Environments

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Editorial Service

2021-ongoing	Associate Editor, IEEE Transactions on Haptics
2021	Senior Program Committee, International Conference on Multimodal Interaction
2021	Guest Editor, IEEE Transactions on Haptics (WHC track)
2020-ongoing	Associate Editor, Frontiers in Virtual Reality
2019	Associate Editor, World Haptics Conference
2019	Guest Editor, Multimodal Technologies and Interaction, Special Issue on Multimodal Medical Alarms
2018-2022	Associate Editor, Program Committee member, Haptics Symposium
2013	Guest Editor, Journal of the Audio Engineering Society, Special Issue on Audio Networking
2008-2022	Associate Editor, Journal of the Audio Engineering Society

Journal Referee

2022	IEEE Multimedia
2021	ACM Transactions on Human-Computer Interaction
2020-21	ACM Transactions on Applied Perception
2020	ACM Interactive, Mobile, Wearable and Ubiquitous Technologies
2019	Frontiers in Neurobotics
2018	Peer J–Journal of Life & Environmental Sciences
2017	Sensor Review
2015	Ambient Intelligence and Smart Environments
2010-20	IEEE Transactions on Haptics
2012	International Journal on Acoustics
2011	BMC Medical Informatics and Decision Making
2011	IEEE Software
2010	IEEE Transactions on Affective Computing
2010	IEEE Transactions on Robotics
2010	IEEE Signal Processing Magazine
2009	IEEE Transactions on Robotics
2008	EURASIP Advances in Signal Processing
2008	EURASIP Image and Video Processing
2008-ongoing	Audio Engineering Society
2007	IEEE Transactions on Systems, Man, and Cybernetics
2006	International Journal of Human-Computer Interaction
2006	Springer Virtual Reality
2005	Elsevier: Computers and Education
2005	Elsevier: Image and Vision Computing
2004, 2019	IEEE Pervasive Computing
2000, 2003	Wiley Journal of Robotic Systems
1999	ACM Transactions on Computer-Human Interaction
1999	IEEE Transactions on Robotics and Automation
1998	IEEE Personal Communications

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Conference Review

2020	IEEE Virtual Reality
2018, 2020	ACM SIGCHI User Interface Systems and Techniques
2018	Workshop on Assistive Computer Vision and Robotics
2018	Eurohaptics
2017	International Conference on Auditory Display
2017	Mobile HCI
2017-19	IEEE World Haptics
2016	IEEE International Workshop on Multimedia Signal Processing
2015	ACM Multimedia
2015	INTERACT
2014	ACM SIGGRAPH
2012, 2013	Workshop on Context Based Affect Recognition
2012, 2013	International Society for Presence Research
2012	IEEE Canadian Conference on Electrical and Computer Engineering
2011	AES Conference on Audio Networking
2011	Intelligent Robots and Systems
2011	VRIC Wkshop on Haptics for Telepresence, Teleoperation & Collab. Environments
2009	IEEE Haptics Symposium
2009	International Computer Music Conference
2009	Stereoscopic Displays and Applications
2008-19	ACM SIGCHI Human Factors in Computing
2008	Immersive Medical Telepresence
2006	International Conference on Digital Audio Effects
2006, 2007	IEEE Workshop on Projector-Camera Systems (part of CVPR)
2005-2009	Canadian Conference on Computer and Robot Vision
2004, 2009-14, 2016	Graphics Interface
2003, 2006	Audio Engineering Society
2003	New Interfaces for Musical Expression
2002	RoboCup International Symposium
2002, 2015	IEEE International Conference on Robotics and Automation
2001	ACM UbiComp
2001	IEEE International Conference on Computer Vision

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Grant Review

2017	NSERC Strategic Project Grants
2017	Member of Expert Committee, CFI Innovation Fund
2016	L'Agence Nationale de la Recherche (France)
2011	NSERC Collaborative Research and Training Experience Program (CREATE)
2009, 2011	Mathematics of Information Technology and Complex Systems (MITACS)
2009	NSERC Strategic Networks (Site Visit Chair)
2008, 2015, 2017	Peer review, NSERC Collaborative Research and Development Grants
2007-2008	NSERC Industrial Research Chair (Site Visit)
2007-2020	Research Grants Council, Hong Kong
2005	NSERC Steacie Memorial Fellowship
2002, 2005-2008	Panel member, NSERC/Canada Council, New Media Initiative
2001-2017	Peer review, NSERC Discovery Grants
2001, 2008	Peer review, CFI (Canada Foundation for Innovation)

Participation in Academic Fora

2019	San Diego Opera – Opera Hack, July 27-28
2019	Dagstuhl Seminar on Ubiquitous Computing Education, June 2-7
2010	Participant, NSF/CCC Workshop on Ultra-Large Scale Interaction

Consumer Advocacy

2013	brought successful appeal (2013 QCCA 1670) before Quebec Court of Appeal regarding anti-SLAPP legislation
2013	initiated petition to improve rights of Canadian airline passengers
2010	advocating for reliable public transportation in Montreal
1997-2019	created and maintained passenger rights website

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APPENDIX 2: MATERIALS CONSIDERED IN THE PREPARATION OF THIS DECLARATION

Exhibit No.	Description
EX1001	U.S. Patent No. 10,931,911 ("*'911 Patent*")
EX1002	File History of U.S. Patent No. 10,931,911 (U.S. Application No. 16/248,687) (*'911 Patent File History*)
EX1004	U.S. Patent Application Publication No. 2009/0164034 A1 to Cohen, Pink, and Fujita ("*Cohen*")
EX1005	US Patent No. 6,086,380 ("*Chu*")
EX1006	U.S. Patent Application Publication No. 2003/0164924 A1 to Sherman and Chase ("*Sherman*")
EX1007	US Patent No. 7,324,166 ("*Joslin*")
EX1008	U.S. Patent Application Publication No. 2008/0285859 to Lei and Xu ("*Lei*")
EX1009	US Patent Application Publication No. 2002/0007718 A1 to Corset ("*Corset*")
EX1010	US Patent Application Publication No. 2007/0122786 A1 to Relan, Mishra, and Khare ("*Relan*")
EX1011	WO Publication No. 2009/079560 A1 ("*Gausereide*")
EX1012	US Patent Application Publication No. 2005/0206751 ("*Manico*")
EX1013	U.S. Patent Pub. 2010/0027961 ("*Gentile*")
EX1014	Selected Chapters for The Technology of Video and Audio Streaming, David Austerberry, Focal Press, 2002 ("*Austerberry*")
EX1015	Internet Archive Capture of various web pages from the YouTube website (www.youtube.com) and How Stuff Works website archived from June through August of 2009 ("*YouTube*"), Including Authentication Declaration from the Internet Archive.
EX1016	U.S. Provisional Application No. 61/364,500 ("*'500 Prov. Application*")
EX1017	File History of abandoned U.S. Application No. 12/953,350 (*'350 Application File History*)

Exhibit No.	Description
EX1018	File History of U.S. Patent No. 11,595,612 (U.S. Application No. 17/152,442) (*'612 Patent File History*)
EX1019	U.S. Patent No. 11,595,612 ("*'612 Patent*")
EX1020	Assignment history of U.S. Patent No. 10,931,911 (*'911 Patent Assignment History*)
EX1021	U.S. Patent Pub. 2010/0082768 ("*Edwards*")
EX1022	U.S. Patent Pub. 2010/0223314 ("*Gadel*")
EX1023	U.S. Patent Pub. 2004/0152055 ("*Gliessner*")
EX1024	U.S. Patent Pub. 2008/0144955 ("*Rai*")
EX1025	U.S. Patent 6,128,001 ("*Gonsalves*")
EX1026	U.S. Patent Pub. 2009/0263023 ("*Iwamoto*")
EX1027	U.S. Patent Pub. 2009/0118849 ("*Dery*")
EX1028	U.S. Patent No. 8,539,542 ("*Elhag*")
EX1029	U.S. Patent Pub. 2009/0307207 (*Murray*)
EX1030	U.S. Patent Pub. 2002/0171668 ("*Samra*")
EX1031	U.S. Patent Pub. 2006/0259588 ("*Lerman*")
EX1032	U.S. Patent Pub. 2011/0053688 ("*Crawford*")
EX1033	U.S. Patent Pub. 2008/0219509 ("*White*")
EX1034	U.S. Patent Publication No. 2008/0109306 ("*Maigret*")
EX1035	U.S. Patent No. 6,981,050 ("*Tobias*")
EX1036	U.S. Patent Publication No. 2004/0243817 ("*Hasegawa*")
EX1037	File History of Cohen (EX1004) (U.S. Application No. 12/339,739) (*Cohen Application*)
EX1038	PlayVuu Inc.'s Preliminary Infringement Contentions, served January 20, 2023 (*Infringement Contentions*)
EX1039	Selected Definitions from Collins Dictionary, HarperCollins Publishers, 2010 ("*Collins*")
EX1040	Selected Definitions from Random House Webster's College Dictionary, Random House Reference, 2005 ("*Webster's*")

Exhibit No.	Description
EX1041	Selected Definitions from The New Oxford American Dictionary, Oxford University Press, 2005 ("*Oxford*")
EX1042	Selected Definitions from The American Heritage Dictionary of the English Language, Houghton Mifflin Co., 2006 ("*American Heritage*")
EX1043	Selected Definitions from Microsoft Computer Dictionary, Fifth Edition, Microsoft Press, 2002 ("*Microsoft*")
EX1044	Selected Definitions from Wiley Electrical and Electronics Engineering Dictionary, IEEE Press, 2004 ("*Wiley*")
EX1045	Selected Definitions from Dictionary of Computing, Fifth Edition, S.M.H. Collins, Bloomsbury, 2004 ("*Collins*")
EX1046	Various Papers from 2002-2005 citing *Austerberry* (EX1014)
EX1051	*Defendant Snap Inc.'s Preliminary Claim Constructions and Extrinsic Evidence*, *PlayVuu, Inc. v. Snap, Inc*. 2:22-cv-06019-GW-PD (C.D. CA), filed May 8, 2023
EX1052	*Playvuu's Preliminary Proposed Construction Of Terms*, *PlayVuu, Inc. v. Snap, Inc*. 2:22-cv-06019-GW-PD (C.D. CA), filed May 8, 2023

APPENDIX 3: CHALLENGED CLAIMS

[1a] 1. A method for generating and sharing audio/video content to a social network, comprising:

[1b] initiating a content creation process in response to a request from a user;

[1c] prompting the user to record content;

[1d] prompting the user to select an audio composition from a list of compositions retrieved from a host server,

[1e] presenting the user with a record button;

[1f] presenting the user with a selection of visual media content for use as a background, wherein upon selecting an instance of pre-recorded visual media content from the selection, the user is presented with an interface to selectively edit the instance of pre-recorded visual media content;

[1i] providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording;

[1j] generating recorded content based on the recording session by compositing video captured during the recording session with the instance of pre-recorded visual media content, such that the video captured during the recording session is selectively made transparent to reveal the instance of pre-recorded visual media content;

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[1l] displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition;

[1m] selecting a privacy attribute for the recorded content;

[1n] sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute;

[1o] receiving a request to publish the recorded content;

[1r] in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video; and

[1s] publishing the streamable video by copying the streamable video to a media server.

2. The method of claim 1, further comprising the step of terminating the recording session after a duration of time has elapsed.

3. The method of claim 1, wherein the interface to selectively edit the pre-recorded visual media content comprises an interface to selectively remove an element of the instance of pre-recorded visual media content.

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4. The method of claim 1, further comprising the step of locally saving the streamable video.

5. The method of claim 1, further comprising the step of wherein the step of generating the recorded content is executed by a client device controlled by the user.

6. The method of claim 1, wherein the audio composition comprises pre-recorded audio.

7. The method of claim 1, wherein the preview is stored in temporary memory and re-written to non-transient memory upon receiving a save request from the user.

8[8a]. The method of claim 1, further comprising the steps of:

[8b] displaying a countdown to the recording session based on a user interaction with the record button, wherein the recording session comprises video recording; and

[8c] providing the user an indication of the initiation of the recording session after the countdown to the recording session has counted down.

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9. The method of claim 1, further comprising associating user-defined tags with the streamable video.

[10a] 10. A method for generating and sharing audio/video content to a social network, comprising:

[10b] initiating a content creation process in response to a request from a user;

[10c] prompting the user to record content;

[10d] prompting the user to select an audio composition from a list of compositions retrieved from a host server;

[10e] presenting the user with a record button;

[10g] displaying a countdown to a recording session based on a user interaction with the record button, wherein the recording session comprises video recording;

[10h] providing the user an indication of the initiation of the recording session after the countdown to the recording session has counted down;

[10i] providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording;

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[10j] generating recorded content based on the recording session by compositing video captured during the recording session with a second video recording, such that the video captured during the recording session is selectively made transparent to reveal the second video recording;

[10l] displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition;

[10m] selecting a privacy attribute for the recorded content;

[10n] sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute;

[10p] prompting the user to continue editing the recorded content;

[10q] prompting the user to publish the recorded content;

[10r] in response to a request to publish, processing and encoding individual components of the recorded content to create a streamable video; and

[10s] publishing the streamable video by copying the streamable video to a media server.

[11a] 11. A method for generating and sharing audio/video content to a social network, comprising:

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[11b] initiating a content creation process in response to a request from a user;

[11c] prompting the user to record content;

[11d] prompting the user to select an audio composition from a list of compositions retrieved from a host server;

[11e] presenting the user with a record button;

[11g] displaying a countdown to a recording session based on a user interaction with the record button, wherein the recording session comprises video recording;

[11h] providing the user an indication of the initiation of the recording session after the countdown to the recording session has counted down;

[11i] providing simultaneous aural playback of the audio composition during a recording session, thereby permitting the user to hear the composition during recording;

[11j] generating recorded content based on the recording session;

[11k] detecting user movement in the video captured during the recording session and representing that movement by a trailing light;

[11l] displaying a preview of the recorded content to the user, wherein the preview of the recorded content enables the user to change the timing or latency of the recorded content to relative to the selected audio composition;

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[11m] selecting a privacy attribute for the recorded content;

[11n] sending the recorded content to the host server, wherein the host server is configured to store multimedia content to facilitate access to other users according to the selected privacy attribute;

[11o] receiving a request to publish the recorded content;

[11r] in response to the request to publish, processing and encoding individual components of the recorded content to create a streamable video; and

[11s] publishing the streamable video by copying the streamable video to a media server.

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APPENDIX 4: UNDERSTANDING OF THE LAW

I have applied the following legal principles provided to me by counsel in arriving at the opinions set forth in this Declaration.

Legal Standard for Prior Art

I am not an attorney. I have been informed by attorneys of the relevant legal principles and have applied them to arrive at the opinions set forth in this declaration.

I understand that the petitioner for inter partes review may request the cancelation of one or more claims of a patent based on grounds available under 35 U.S.C. § 102 and 35 U.S.C. § 103 using prior art that consists of patents and printed publications.

Anticipation and Prior Art

I understand that § 102 specifies when a challenged claim is invalid for lacking novelty over the prior art, and that this concept is also known as "anticipation." I understand that a prior art reference anticipates a challenged claim, and thus renders it invalid by anticipation, if all elements of the challenged claim are disclosed in the prior art reference. I understand the disclosure in the prior art reference can be either explicit or inherent, meaning it is necessarily present or implied. I understand that the prior art reference does not have to use the same words as the challenged claim, but all of the requirements of the claim must

be disclosed so that a person of ordinary skill in the art could make and use the claimed subject-matter.

In addition, I understand that § 102 also defines what is available for use as a prior art reference to a challenged claim.

Under pre-AIA § 102(a), a challenged claim is anticipated if it was patented or described in a printed publication in the United States or a foreign country before the challenged claim's date of invention.

Under pre-AIA § 102(b), a challenged claim is anticipated if it was patented or described in a printed publication in the United States or a foreign country more than one year prior to the challenged patent's filing date.

Under pre-AIA § 102(e), a challenged claim is anticipated if it was described in a published patent application that was filed by another in the United States before the challenged claim's date of invention, or was described in a patent granted to another that was filed in the United States before the challenged claim's date of invention.

I understand that a challenged claim's date of invention is presumed to be the challenged patent's filing date. I also understand that the patent owner may establish an earlier invention date and "swear behind" prior art defined by § 102(a) or § 102(e) by proving (with corroborated evidence) the actual date on which the

named inventors conceived of the subject matter of the challenged claim and proving that the inventors were diligent in reducing the subject matter to practice.

I understand that the filing date of a patent is generally the filing date of the application filed in the United States that issued as the patent. However, I understand that a patent may be granted an earlier effective filing date if the patent owner properly claimed priority to an earlier patent application.

I understand that when a challenged claim covers several structures, either generically or as alternatives, the claim is deemed anticipated if any of the structures within the scope of the claim is found in the prior art reference. I understand that when a challenged claim requires selection of an element from a list of alternatives, the prior art teaches the element if one of the alternatives is taught by the prior art.

Legal Standard for Obviousness

I understand that even if a challenged claim is not anticipated, it is still invalid if the differences between the claimed subject matter and the prior art are such that the claimed subject matter would have been obvious to a person of ordinary skill in the pertinent art at the time of the alleged invention.

I understand that obviousness must be determined with respect to the challenged claim as a whole.

I understand that one cannot rely on hindsight in deciding whether a claim is obvious.

I also understand that an obviousness analysis includes the consideration of factors such as (1) the scope and content of the prior art, (2) the differences between the prior art and the challenged claim, (3) the level of ordinary skill in the pertinent art, and (4) "secondary" or "objective" evidence of non-obviousness.

Secondary or objective evidence of non-obviousness includes evidence of: (1) a long felt but unmet need in the prior art that was satisfied by the claimed invention; (2) commercial success or the lack of commercial success of the claimed invention; (3) unexpected results achieved by the claimed invention; (4) praise of the claimed invention by others skilled in the art; (5) taking of licenses under the patent by others; (6) deliberate copying of the claimed invention; and (7) contemporaneous and independent invention by others. However, I understand that there must be a relationship between any secondary evidence of non-obviousness and the claimed invention.

I understand that a challenged claim can be invalid for obviousness over a combination of prior art references if a reason existed (at the time of the alleged invention) that would have prompted a person of ordinary skill in the art to combine elements of the prior art in the manner required by the challenged claim. I understand that this requirement is also referred to as a "motivation to combine,"

"suggestion to combine," or "reason to combine," and that there are several rationales that meet this requirement.

I understand that the prior art references themselves may provide a motivation to combine, but other times simple common sense can link two or more prior art references. I further understand that obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a motivation to combine references may come from market forces.

I understand obviousness to include, for instance, scenarios where known techniques are simply applied to other devices, systems, or processes to improve them in an expected or known way. I also understand that practical and common-sense considerations should be applied in a proper obviousness analysis. For instance, familiar items may have obvious uses beyond their primary purposes.

I understand that the combination of familiar elements according to known methods is obvious when it yields predictable results. For instance, obviousness bars patentability of a predictable variation of a technique even if the technique originated in another field of endeavor. This is because design incentives and other market forces can prompt variations of it, and predictable variations are not the product of innovation, but rather ordinary skill and common sense.

I understand that a particular combination may be obvious if it was obvious to try the combination. For example, when there is a design need or market

pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. This would result in something obvious because the result is the product not of innovation but of ordinary skill and common sense. However, I understand that it may not be obvious to try a combination when it involves unpredictable technologies.

It is further my understanding that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee. Accordingly, I understand that any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

It is my understanding that the Manual of Patent Examining Procedure § 2143 sets forth the following as exemplary rationales that support a conclusion of obviousness:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of known technique to improve similar devices (methods, or products) in the same way;

- Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- Choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;
- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

A person of ordinary skill in the art looking to overcome a problem will often use the teachings of multiple publications together like pieces of a puzzle, even though the prior art does not necessarily fit perfectly together. Therefore, I understand that references for obviousness need not fit perfectly together like puzzle pieces. Instead, I understand that obviousness analysis takes into account inferences, creative steps, common sense, and practical logic and applications that a person of ordinary skill in the art would employ under the circumstances.

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I understand that a claim can be obvious in light of a single reference, if the elements of the challenged claim that are not explicitly or inherently disclosed in the reference can be supplied by the common sense of one of skill in the art.

I understand that obviousness also bars the patentability of applying known or obvious design choices to the prior art. One cannot patent merely substituting one prior art element for another if the substitution can be made with predictable results. Likewise, combining prior art techniques that are interoperable with respect to one another is generally obvious and not patentable.

In order for a claim to be found invalid based upon a modification or combination of the prior art, there must be reasonable expectation that a person of ordinary skill would have successfully modified or combined the prior art to arrive at the claimed arrangement. This does not mean that it must be certain that a person of ordinary skill would have been successful – the law only requires that the person of ordinary skill in the art would have perceived a reasonable expectation of success in modifying or combining the prior art to arrive at the claimed invention.

In sum, my understanding is that obviousness invalidates claims that merely recite combinations of, or obvious variations of, prior art teachings using understanding and knowledge of one of ordinary skill in the art at the time and motivated by the general problem facing the inventor at the time. Under this analysis, the prior art references themselves, or any need or problem known in the

field of endeavor at the time of the invention, can provide a reason for combining the elements of or attempting obvious variations on prior art references in the claimed manner.

Legal Standard for Claim Construction

I understand that before any invalidity analysis can be properly performed, the scope and meaning of the challenged claims must be determined by claim construction.

I understand that a patent may include two types of claims, independent claims and dependent claims. I understand that an independent claim stands alone and includes only the limitations it recites. I understand that a dependent claim depends from an independent claim or another dependent claim. I understand that a dependent claim includes all the limitations that it recites in addition to the limitations recited in the claim (or claims) from which it depends.

In comparing the challenged claims to the prior art, I have carefully considered the patent and its file history in light of the understanding of a person of ordinary skill at the time of the alleged invention.

I understand that to determine how a person of ordinary skill would have understood a claim term, one should look to sources available at the time of the alleged invention that show what a person of ordinary skill in the art would have

understood the disputed claim language to mean. It is my understanding that this may include what is called "intrinsic" evidence as well as "extrinsic" evidence.

I understand that, in construing a claim term, one should primarily rely on intrinsic patent evidence, which includes the words of the claims themselves, the remainder of the patent specification, and the prosecution history. I understand that extrinsic evidence, which is evidence external to the patent and the prosecution history, may also be useful in interpreting patent claims when the intrinsic evidence itself is insufficient. I understand that extrinsic evidence may include principles, concepts, terms, and other resources available to those of ordinary skill in the art at the time of the invention.

I understand that words or terms should be given their ordinary and accepted meaning unless it appears that the inventors were using them to mean something else or something more specific. I understand that to determine whether a term has special meaning, the claims, the patent specification, and the prosecution history are particularly important, and may show that the inventor gave a term a particular definition or intentionally disclaimed, disavowed, or surrendered claim scope.

I understand that the claims of a patent define the scope of the rights conferred by the patent. I understand that because the claims point out and distinctly claim the subject matter which the inventors regard as their invention, claim construction analysis must begin with and is focused on the claim language

itself. I understand that the context of the term within the claim as well as other claims of the patent can inform the meaning of a claim term. For example, because claim terms are normally used consistently throughout the patent, how a term is used in one claim can often inform the meaning of the same term in other claims. Differences among claims or claim terms can also be a useful guide in understanding the meaning of particular claim terms.

I understand that a claim term should be construed not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the entire specification. I understand that because the specification is a primary basis for construing the claims, a correct construction must align with the specification.

I understand that the prosecution history of the patent as well as art incorporated by reference or otherwise cited during the prosecution history are also highly relevant in construing claim terms. For instance, art cited by or incorporated by reference may indicate how the inventor and others of skill in the art at the time of the invention understood certain terms and concepts. Additionally, the prosecution history may show that the inventors disclaimed or disavowed claim scope, or further explained the meaning of a claim term.

With regard to extrinsic evidence, I understand that all evidence external to the patent and prosecution history, including expert and inventor testimony,

dictionaries, and learned treatises, can also be considered. For example, technical dictionaries may indicate how one of skill in the art used or understood the claim terms. However, I understand that extrinsic evidence is considered to be less reliable than intrinsic evidence, and for that reason is generally given less weight than intrinsic evidence.

I understand that in general, a term or phrase found in the introductory words or preamble of the claim, should be construed as a limitation if it recites essential structure or steps, or is necessary to give meaning to the claim. For instance, I understand preamble language may limit claim scope: (i) if dependence on a preamble phrase for antecedent basis indicates a reliance on both the preamble and claim body to define the claimed invention; (ii) if reference to the preamble is necessary to understand limitations or terms in the claim body; or (iii) if the preamble recites additional structure or steps that the specification identifies as important.

On the other hand, I understand that a preamble term or phrase is not limiting where a challenged claim defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention. I understand that to make this determination, one should review the entire patent to gain an understanding of what the inventors claim they invented and intended to encompass in the claims.

I understand that 35 U.S.C. § 112 ¶ 6 created an exception to the general rule of claim construction called a "means plus function" limitation. These types of terms and limitations should be interpreted to cover only the corresponding structure described in the specification, and equivalents thereof. I also understand that a limitation is presumed to be a means plus function limitation if (a) the claim limitation uses the phrase "means for"; (b) the "means for" is modified by functional language; and (c) the phrase "means for" is not modified by sufficient structure for achieving the specified function.

I understand that a structure is considered structurally equivalent to the corresponding structure identified in the specification only if the differences between them are insubstantial. For instance, if the structure performs the same function in substantially the same way to achieve substantially the same result. I further understand that a structural equivalent must have been available at the time of the issuance of the claim.