

# | X3D Chroma Key

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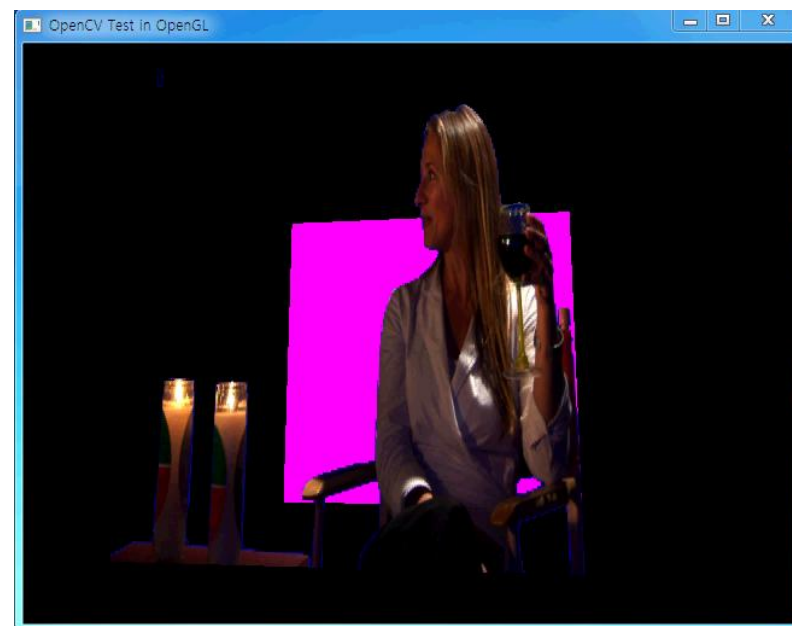
- Original concept: 2D chroma key
  - Chroma key is a special effects / post-production technique for compositing (layering) two images or video streams together based on color hues (chroma range).
  - The technique has been used heavily in many fields to remove a background from the subject of a photo or video (newscasting, motion picture, and videogame industries)
  - A color range in the top layer is made transparent, revealing another image behind. The chroma keying technique is commonly used in video production and post-production.
- 3D chroma key
  - We define 3D chroma key as a 2D chroma key image or video located in a 3D scene.

## Chroma Key Video Example

Video with blue screen  
before chroma key



Extracted video with a 3D scene  
after chroma key



- 3D chroma keying procedure
  - Prepare a video with object motion in front of a blue or green background screen.
  - A chroma difference (range) is extracted as a key value from the blue or green background screen using RGB values.
  - Separate the video object from the background video using the key value.
  - Combine the separated video object with a 3D scene.
- New proposal for 3D chroma keying
  - MovieTexture node should have parameters for chroma key video.
  - Either a 2D chroma key texture node should be defined, or Texture node should have parameters for chroma key image.
  - X3D scene structure should be able to define a geometric or physical location for chroma key image or video.

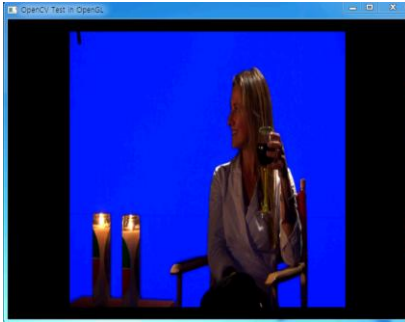
## MovieTexture

```
MovieTexture: X3DTexture2DNode, X3DSoundSourceNode, X3DUrlObject {
  SFString [in,out] description      ""
  SFBool  [in,out] loop              FALSE
  SFNode  [in,out] metadata          NULL [X3DMetadataObject]
  SFTime  [in,out] pauseTime         0   (-∞,∞)
  SFFloat [in,out] pitch              1.0 (0,∞)
  SFTime  [in,out] resumeTime        0   (-∞,∞)
  SFFloat [in,out] speed              1.0 (-∞,∞)
  SFTime  [in,out] startTime          0   (-∞,∞)
  SFTime  [in,out] stopTime           0   (-∞,∞)
  MFString [in,out] url               []  [URI]
  SFTime  [out]   duration_changed
  SFTime  [out]   elapsedTime
  SFBool  [out]   isActive
  SFBool  [out]   isPaused
  SFBool  []      repeatS             TRUE
  SFBool  []      repeatT             TRUE
  SFNode  []      textureProperties NULL [TextureProperties]
}
```

## Chroma Key Parameters

- Additional parameters for MovieTexture Node
  - SFBool [in,out] chromakey FALSE
  - SFColorRGBA [in,out] minChromakeyColor 0 0 0 0 [0,1]
  - SFColorRGBA [in,out] maxChromakeyColor 0 0 0 0 [0,1]
- Chroma key
  - Choose the processing of MovieTexture node with chroma key if TRUE
- Chroma key color
  - Change the color to transparent if chroma key processing is done

- A color range is not necessary when a single unique background color is included

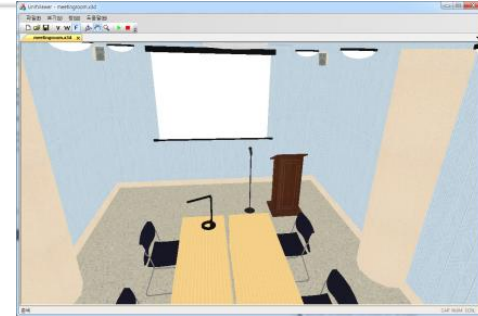
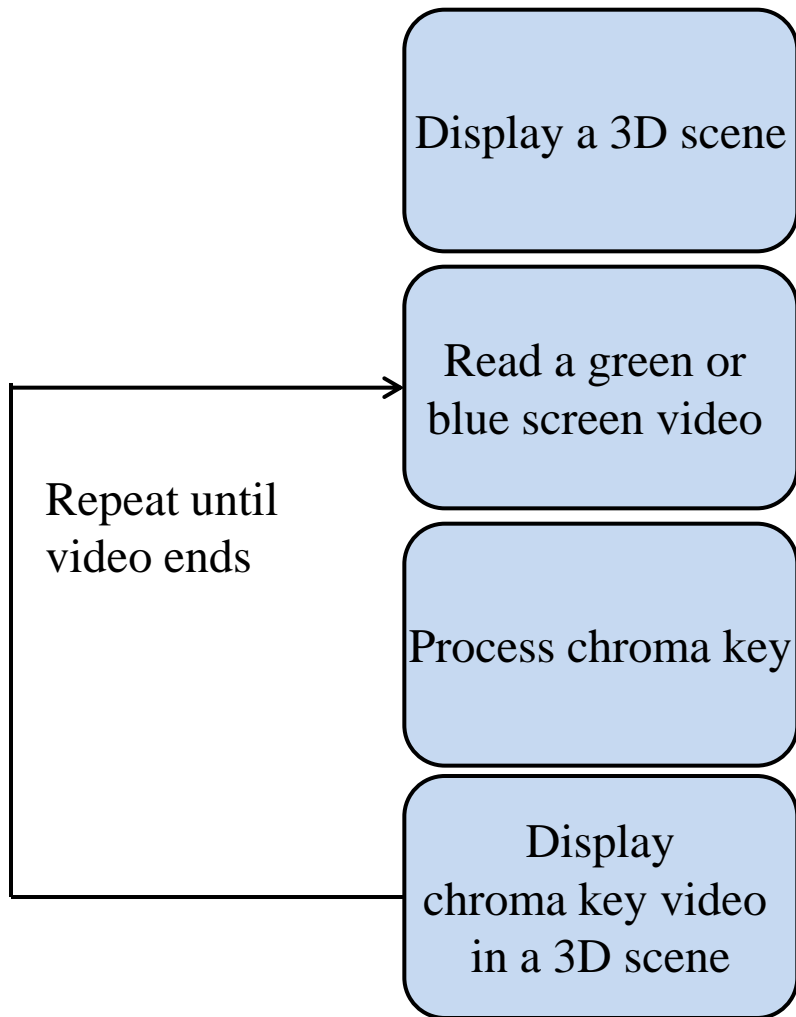


- A color range should be provided when background color is not unique due to the effect of light or other environmental conditions



- Generate RGBA image after transparency processing for a specific color or a color range
- Texture mapping to a rectangle object using alpha blending

## Procedure for X3D Chroma Key Video Generation



```
frame = cvQueryFrame( m_capture );  
...  
...
```

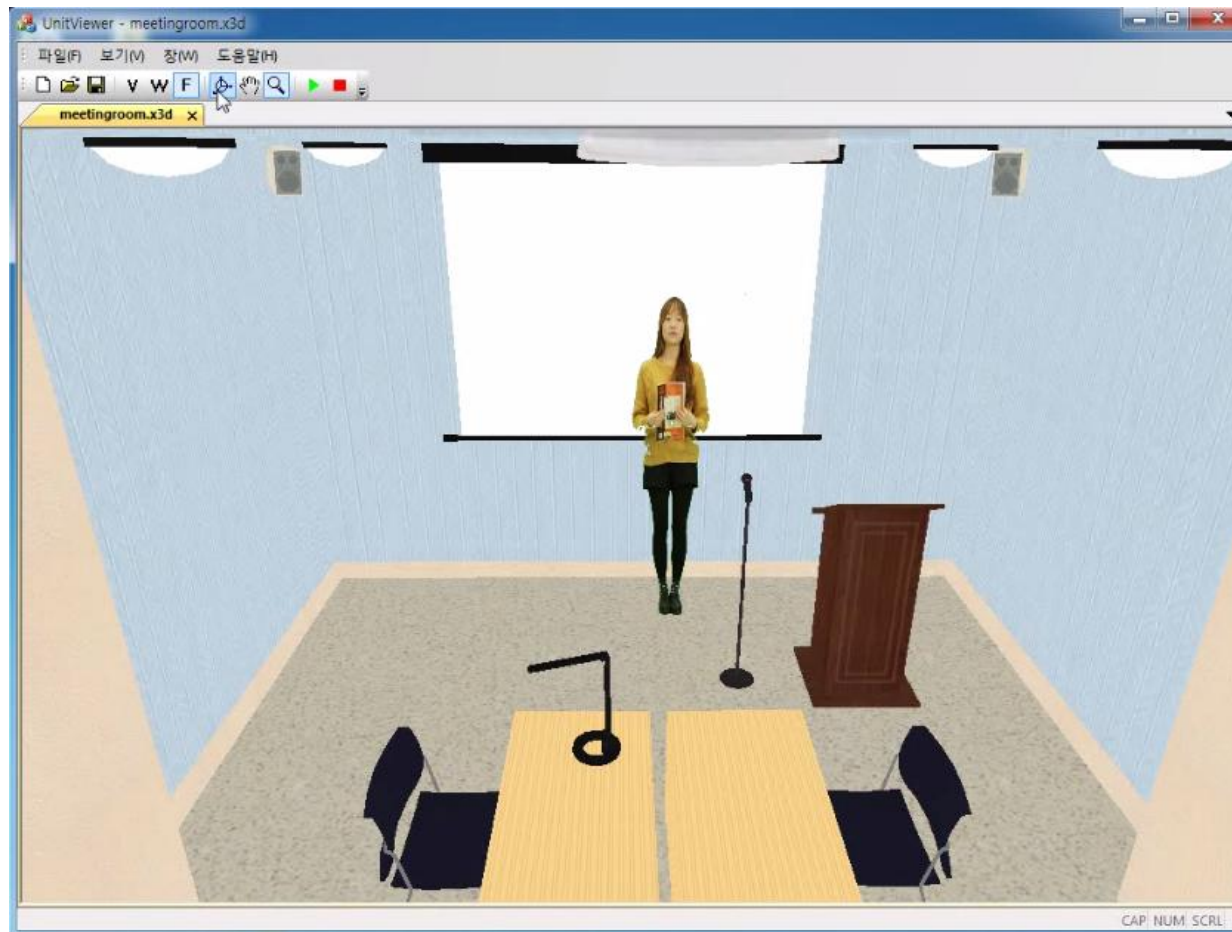
```
if(pData[i + 1] > 127 && pData[i] < 150 &&  
    pData[i + 2] < 150 )  
    pData[i + 3] = 0xFF;
```

```
...  
...
```





## X3D Chroma Key Video Scene



```
<Shape>  
  <IndexedFaceSet>  
    <Coordinate>  
    <TextureCoordinate>  
  </IndexedFaceSet>  
  <Appearance>  
    <MovieTexture>  
  </Appearance>  
</Shape>
```

## Conclusion

- Chroma key image and video definition in X3D
- Updated ImageTexture and MovieTexture nodes
  - Define chroma key parameters for ImageTexture and MovieTexture
- Future work
  - Location of chroma key image and video in X3D
  - Scaling of chroma key image and video in X3D