**­­­CyberDH 3D Viewer**

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This open source 3D viewer displays X3D files (instructions on how to convert to X3D included) online and may be hooked to online repositories with javascript. Features include clipping planes, point view, a measurement tool, an overhead moveable light and a headlight, and annotations.

**Known Bugs**

The viewer has been tested on a Mac with Chrome 49, Safari 9, Firefox 44, and Android.

In Firefox and Android, if the image textures are over 4096x4096 on any of the individual, models will load but texture will not.

Fix: You may have an option for texture size when exporting from your stitching application. If not you can reduce the size of the picture to 4096x4096 in an image editing program.

X3D files over 10mb will fail to load in Safari.

Fix: Convert to X3D using binary geometry (see Convert to X3D section).

Because it is usually not possible to control what browsers users employs, consider the above fixes as necessary for all models, e.g. all models must be below 10mb or use binary geometry when converting to X3D.

**IDEAL WORKFLOW (for Omeka option, see below)**

1. **Acquire 3D object**
2. **Put viewer online**
3. **Export 3D object**
4. **Convert to X3D**
5. **Create metadata**
6. **Put item and metadata online**
7. **Acquire 3D object**
   1. If using a scanner to acquire your 3D object, make note of the unit of measurement for use in the metadata.
   2. If using photogrammetry measure at least one dimension of the object (height, width or depth) for use in the metadata. Measurements of the 3D model will only be as accurate as this measurement.
8. **Put the Viewer Online**
   1. Upload the 3D-viewer directory to your webserver.
9. **Exporting Your 3D Object**
   1. Export as .obj (preferred) or .stl. Make sure your object is oriented correctly. For most purposes the y-axis should be up (this may be an option in your export). If not use an editor like blender orient the object correctly. This will be important for accurate measurements.
   2. If possible, use an external texture file – there may be some sidecar files (.mtl and images such as .jpg or .bmp). The .obj and eventual X3D files may be renamed but the sidecar filenames must not be changed.
   3. Keep texture files no more than 4096x4096 pixels. If your stitching software does not allow this open the file in an image editing program and resize it.
10. **Convert to .X3D**
    1. Download/install Instant Player (<http://www.instantreality.org/downloads/>).
    2. In the instant player bin directory\* convert to X3D using the following commands:

mkdir exampleDirectory

./aopt -i example.obj -f PrimitiveSet:creaseAngle:4 -V -G "exampleDirectory/:sacp" -x exampleDirectory/exampleResult.x3d

* 1. Move any image texture file(s) into exampleDirectory.

\* On macs this can be difficult to find. It’s in /Applications/Instant Player.app/Contents/MacOS/aopt.

1. **Create Metadata**
   1. Create a uniquely named .json file (for instance example.json).
   2. Under a "Metadata" key input whatever metadata you like.\* For example:

{

"Metadata":

[{

"File": "example.X3D",

"Title": "example",

"Creator": "Adam Hochstetter" ,

"Height": "10",

"measurementUnits":"m"

}]

}

\* The keys “height”, “width”, “depth” and “measurementUnits” are reserved for creating accurate measurements. If the object has been scanned only measurementUnits are necessary. If the object has been acquired through photogrammetry at least one dimension of measure is required for accurate measurement.

1. **Put online**
   1. Upload exampleDirectory to the 3D-viewer items directory.
   2. Upload the metadata files to the 3D-viewer metadata directory.
   3. Starting on line 20 of index.html change the values to reflect the names of your files.

**IDEAL WORKFLOW FOR USE WITH OMEKA**

1. Follow the above workflow through step 4.
2. Collect your metadata and put it into a csv.\*

\*The fields “height”, “width”, “depth” and “measurementUnits” are used to create accurate measurements. If the object has been scanned only measurementUnits are necessary. If the object has been acquired through photogrammetry at least one dimension of measure is required for accurate measurement.

1. Download Archive Repertory <https://github.com/Daniel-KM/ArchiveRepertory>.
2. If using binary geometry, after line 938 of ArchiveRepertoryPlugin.php insert a new line and add the following code:

case 'Plus':

return $this->\_convertSpacesToPlus($string);

Starting on line 1006 of ArchiveRepertoryPlugin.php add the following code:

private function \_convertSpacesToPlus($string)

{ return preg\_replace('/\s+/', '+', $string);  }

After line 97 of archive-repertory-config-form.php add the following line of code:

'Plus' => \_\_('Convert spaces to plus signs'),

Displaying the X3D files compressed using binary geometry requires that the support files (.bin and image textures) remain consistently named and in the same hierarchical structure. Files with a ‘+’ in their name often have this character changed to a space on upload. The exact change (if any) to your filenames may be different depending on your server environment. If it does not substitute a ‘+’ with an empty space some alterations to this code will be required. This requires a basic knowledge of regular expressions.

1. Upload the Archive Repertory directory to the plugins directory in Omeka.
2. Configure Archive Repertory to replace spaces with plus signs.
3. Download and install the csv import plugin for Omeka.
4. Upload the modified berlin theme to your Omeka themes directory and under the appearance tab use it.
5. Under the settings tab find and click on the security tab. Either check “Disable File Upload Validation” or add “x3d,bin,bin+4,bin+8” to the list of allowed extensions and “application/octet-stream,application/xml” to the list of allowed file types.\*
6. Upload exampleDirectory somewhere.
7. Create a .csv with all your objects and their metadata. Each object should have a field that contains a link to all the object’s files separated by a semicolon.
8. Import your .csv into Omeka making sure that that the files box is checked for the relevant field.

\*Do not use periods or spaces in either input box.

**Features**

***Annotations***

Annotations may be created inside objects using the clip plane.

Currently there is a limit of 9 annotations per item.

Annotation creation:

**Independent viewer**

In the bottom left hand corner of the screen is an anonymous checkbox. Checking the box brings enables annotation mode. The object will be reset to its original position and the navigation buttons will disappear. The option “New annotation” will appear on the right menu. Use this to add annotations to the object. Once an annotation has been created an “Annotation text” box will appear. Either plain text or html may be entered. Once submitted the annotations will be written to the object’s .json metadata file (this must preexist). They can be edited or deleted by directly altering that file.

**Omeka**

New annotations must be created manually in Omeka. You will need to add a metadata element titled ‘xyz’ and a metadata element titled ‘Annotation text’ to whatever item type(s) you’re using. To create an annotation put the desired xyz coordinates (the measurement tool is a good way to find these) in the xyz element and the desired text in the Annotation text element. Every xyz must have a corresponding Annotation text element.

***Measurements***

The default X3D measurement unit is meters.