Voxel

It's a word -- 'Voxel' means 'volumetric pixel'. Here are exhaustive instructions on how to build with Voxel.

(For a quick get-started tutorial, watch the YouTube videos).

Build with blocks

With the '+' tool selected, tap on the screen to create blocks. Tap on an existing block to select it-- a wireframe box highlights the selected block. Tap any side of the selected block to attach another block.

Getting around

Slide two fingers across the screen to rotate the view.

The model will rotate around the center of your view.

You can also place one finger on the selected block and slide. This will rotate the model around the selected block itself. Thus you have a way to rotate with either one or two fingers.

There's a third way to rotate -- with the JOYSTICK.

Slide your finger around on the JOYSTICK to turn the model.

JOYSTICK

Tap the joystick to zoom out.

You can tap again to reset the rotation.

Slide one fingers across the screen to pan, or move, the view in one direction.

Of course , you can PINCH two fingers together to shrink the view and SPREAD them apart to grow it.

To zoom, HOLD one finger in place. Initially it will zoom in, but once you see the zoom icon appear, drag your finger down to reverse direction.

The Grid

Now let's meet your friend THE GRID. The grid is a screen that floats out in space. It centers on the currently selected block, if there is one.

GRID

Tap the GRID icon to make it visible. As you rotate the view, the grid will automatically re-orient to face you.

With the '+' tool selected, you can tap and draw blocks onto the grid. Also, when you use the paint bucket tool described later, you can fill within the gridded plane.

The color-filled square shows the CURRENT COLOR. Tap it to show the palette. From here you can select a new current color.

Hold your finger on a color to modify it. You can even make translucent colors!

Drag palette colors to copy them from one position to another.

If you have a selected block, you can select its color from 'Pick Selected' box.

Oh yeah and how do you REMOVE or DELETE blocks?

Tap the PLUS ICON ...

You'll see a toolbar pop out, like this:

Tap the MINUS ICON. The toolbar main icon will now show the minus sign also.

Now wherever you tap, you will delete blocks instead of creating them. Be careful!

Hey you know what though, you don't need to be TOO careful, because there's an UNDO button! Just press this and you go back in time, reversing each and every glaring mistake you've made.

Voxel has other tools -- the HAND, PAINT-BRUSH , FILL BUCKET, DOUBLE - DRAW, SELECT BOX, and LIGHT tools.

Use the HAND tool to move blocks individually. Slide your finger on the selected block to move it.

This tool is invaluable when doing keyframe animation, described later in this manual.

Use the PAINTBRUSH to recolor any blocks you have already placed. Just tap a block to paint it with the currently selected color. You can drag your finger to paint more than one block with a single swipe of your finger.

The BUCKET performs a “flood fill”. Tap on a block to change the color of it and all connected blocks of the same color.

Tap on empty space with the bucket and the fill will extend within the grid plane out to any boundary defined by other blocks. NOTE: The fill takes place only within the GRID. You should probably turn on the grid in order to see where the fill will take place. Also note that the fill automatically stops at the grid edges, to keep it from running off to infinity!

The Eighth Tool

On the Options screen you can choose which of the following tools appears in the last slot of the tool bar. The EYEDROPPER is good when you are painting -- enable DOUBLE-DRAW for faster building.

The EYEDROPPER is only active until you tap a voxel. It selects that voxel’s color and then the previous tool is reselected. You can also use the ‘Pick Selected’ box on the palette to do this. (Choose between this tool and the DOUBLE-DRAW tool on the Options screen.)

Use the DOUBLE-DRAW tool to build more quickly. It allows you to add to blocks without selecting them first. Wherever you tap, blocks will be created! (For this reason the selected-block one-finger rotate does not work in this mode.)

The SELECT BOX tool allows you to select a portion of your model. You can select an entire volume of space or just specific voxels. The selection can be moved, rotated, or flipped. It can also be cut or copied into a buffer and then pasted back many times.

Make a selection

There are two tools for defining a selection -- the ARROW and the EYEDROPPER.

The ARROW is used to select box-shaped volumes.

With the arrow tool selected, tap on a block and drag your finger. A moving 'marching ants' box will appear surrounding any voxels you touch within the current rotation plane. (Display the grid to see the plane.)

You can move the entire box by dragging any of its faces. The box will move along the grid's rotation plane.

You can modify the selected-box dimensions by dragging inward and outward from an edge. The edge will move along the grid's rotation plane.

You can select your ENTIRE model (within the current layer -- see next section) by DOUBLE-TAPPING with the arrow tool selected
.

The EYEDROPPER is used to select specific voxels or patches of color.

With the eyedropper selected, tap on single voxels to select them. Tap and slide your finger to select multiple voxels. Tap a selected voxel again to deselect it.

You can also select entire connected patches of color by DOUBLE-TAPPING a voxel. Any connected voxels of the same color will be selected!

box selected - now what?

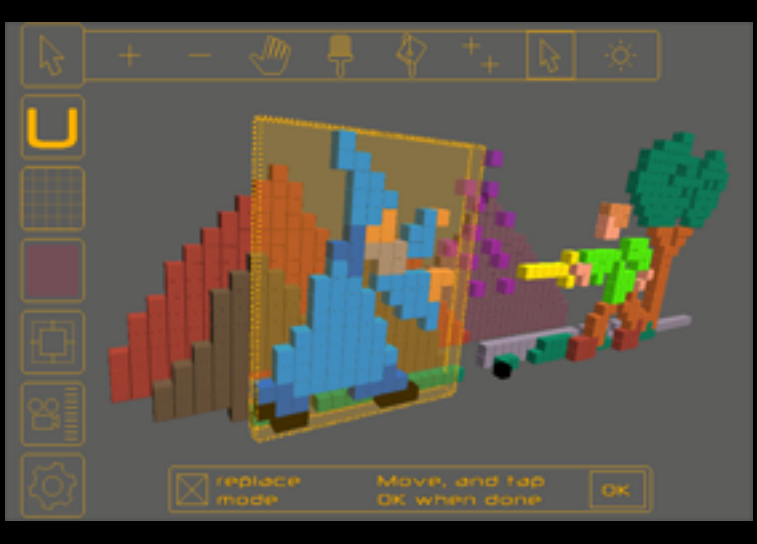
When you have the selection that you want, choose a function from the SELECT BOX TOOLBAR:

(Initially PASTE is disabled until you employ CUT or COPY.)

Cut, Copy and Paste

Tap CUT to remove the selected volume from the model. The volume is now stored in an offscreen clipboard and can be re-applied to the model using PASTE. COPY stores the volume in the clipboard but leaves the original intact.

Move, Rot, and Flip



When you select the toobar options MOVE, ROT, or FLIP, the selected area will fill with a translucent color. Then you can swipe your finger on the box to perform the function.

For example, use the ROT function to rotate your selection by 90 degrees. Swipe in the direction you want to rotate. Be aware that rotation always happens around the current rotation plane, so you may need to display the grid to make sense of things.

The 'replace mode' box determines what happens when your modified selection voxels overlap with the existing model. Check this box if you want the new selection to overwrite the existing pixels. Leave it unchecked if you don't want to disturb any old voxels!

Tap OK when you are ready to finalize your changes. (Remember, you can always UNDO them afterward!)

Light tool

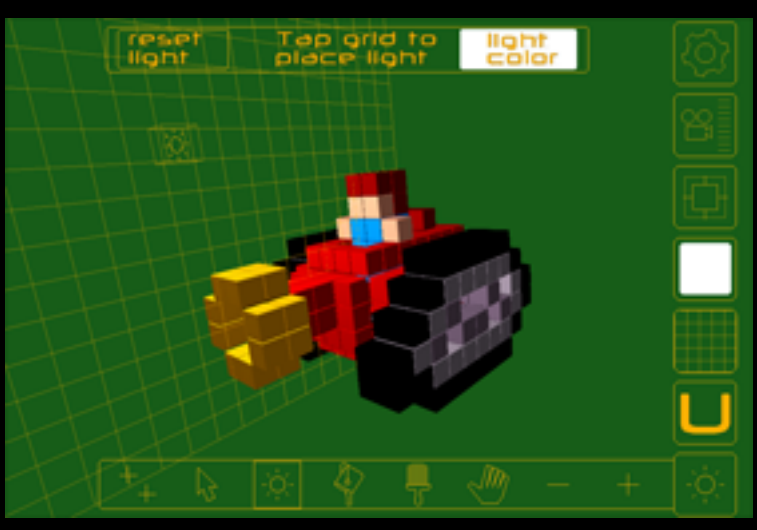
Use the LIGHT TOOL to adjust Voxel's light source.

With the light tool selected, you can place the light in your scene simply by tapping on the displayed grid. Or tap on a block to place the light within it.

Usually Voxel's light source moves with the camera -- as if you were shining a flashlight onto the model as it revolved. However, when you place the light yourself, it is anchored to the model. In this way you can mimic a sun or streetlight in your scene.

Use the 'reset light' button to reset the light settings to their defaults.

You can also use the 'Reset view and lights' button on the Options screen to restore the light to its default settings.



You can also change the light color. Just tap the 'light color' box in the light tool bar to change the color.

(The specular shine seen reflected at some angles like a spotlight can be changed with the "Reflection color" switch on the Options screen. It can match the light color or the currently selected color.)

Zoom / Joystick

What's left? This thing. Simply tapping this button will zoom back your view to encompass the entire model.

It behaves as a joystick if you drag your finger on it.

The joystick will ROTATE or MOVE the model, depending on the 'Joystick function' switch on the Options screen.

||| Home View |||

You can set a 'home view' by holding down three fingers for a second. After that, whenever you TAP three fingers, you will return to that view.

This can be useful if you want to do stop-motion animation, or if you just have a favorite view of your model!

ADVANCED TOPICS:
Camera and Layers

Proud owners of the FULL VERSION of Voxel have access to the MOVIE TOOL and LAYERS. Together they allow you to do more advanced things with Voxel. The MOVIE TOOL allows you to make cool animated movies with your models. LAYERS allow you to separate your model into sections, perhaps for use as characters in animation.

Both the camera view and the voxels themselves can be animated. In the case of the camera, you place 'keyframes' along a timeline. Each keyframe records the position of the camera at a point in the timeline. When you play the movie, the camera will move smoothly between the keyframes. You make and adjust keyframes using the tools described below.

When you animate voxels themselves, you separate your model into smaller pieces. These are called 'layers'. A layer is a group of blocks which can change. They consist of one or more 'sprite keyframes' -- each keyframe is a totally separate little model. You can think of sprite keyframes as like the different poses in tradional stop-motion animation -- 'claymation' for example. Movement is created by building each separate pose or frame of the animation.

Your finished movies can be uploaded to the Voxel Gallery, where the world can see them. Additionally, you can export your movie as a sequence of numbered images -- they can be saved to the device or wirelessly to Dropbox!

(More advanced users may want to export the models in a traditional geometry format like OBJ for further processing with desktop programs such as *Blender*. Developers can export the voxel shape data for use in games and other applications.)

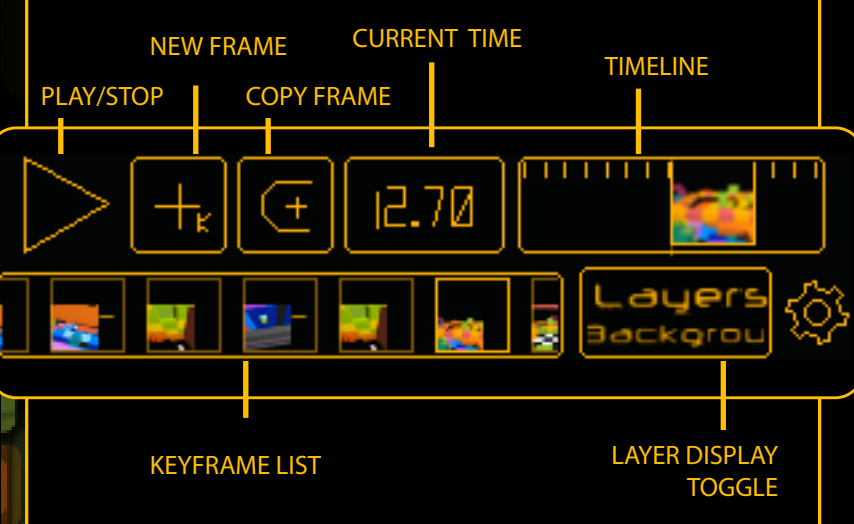
Animate the camera (starring the Background layer)

The movie tools are simple to use, but there is a lot of functionality packed into a small space. Luckily, the tools work pretty much the same whether you are working with the camera or with sprites on layers.

Let's learn about moving the camera first. Camera moves are made by setting specific camera views at different points in time. Each camera position is called a KEYFRAME. As the movie plays, the camera travels smoothly between all of the keyframes you have set.

If you want the camera to travel quickly from one point to another, you put two keyframes close together on the timeline. Spread them farther apart to make the camera move more slowly. To make an abrupt 'cut' from one view to an entirely new view, place two keyframes against each other. After you place keyframes, you can always adjust them to your liking.

Here are the controls you will use to set and manipulate keyframes:



In this image, you can tell you are working with the camera (as opposed to sprite layers) because the LAYER DISPLAY TOGGLE scrolls the current layer name: "Background".

The LAYER DISPLAY TOGGLE button always shows the name of the current layer. Tapping it will open and close the layers panel, described in the next section.

This is the PLAY/STOP button. Use it to stop and start playing the current movie. Stopping will return you to time 0:00. (If you want to stop the movie where it is, use the flashing pause symbol that appears over the timeline as during playback.)

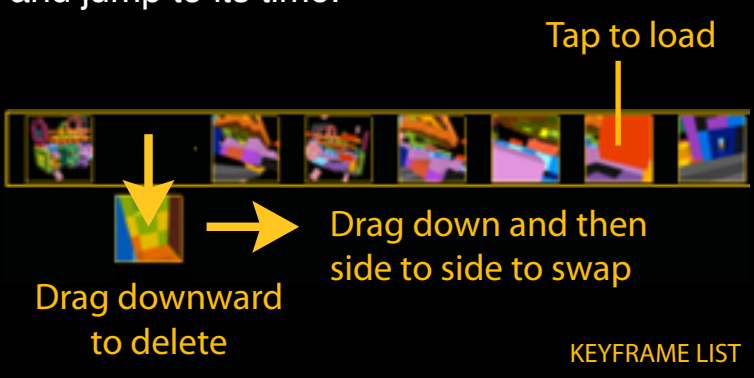
Use the '+' button on the movie toolbar to make new keyframes. In camera mode, pressing it will save the current view. (On non-background layers, this button will create a new blank frame.) Either way, a little thumbnail image of the keyframe will appear in the thumbnail bar.

Pressing the '+' when you are already on a keyframe will cause a new keyframe to be created AFTER the current one. This is how you make animation -- place one new keyframe after another on the timeline, forming a sequence of views that the camera will travel between.

If there is already a keyframe following the current one, the new keyframe will be placed halfway between them. If not, Voxel will try to space the new keyframe using the same distance as between the previous two keyframes.

NOTE: To REPLACE a keyframe, select it by tapping it in the KEYFRAME LIST, then HOLD your finger on the '+' button.

The KEYFRAME LIST is used to select, reorder, and delete keyframes. Tap a thumbnail in the thumbnail bar to load that keyframe and jump to its time.



If you have more keyframes than will fit onscreen, slide a thumbnail left or right to scroll the keyframe list.

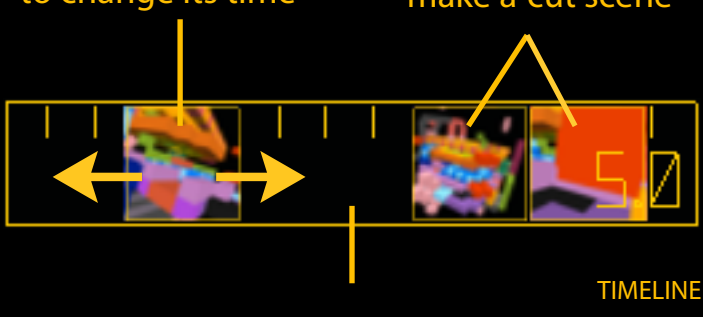
If you want to remove a keyframe, slide it downward, out of the thumbnail bar and lift your finger.

To swap one keyframe with another, drag the keyframe down as if you were going to remove it, then slide left or right. You will see it swapping places with the other keyframes.

The current time is always displayed in this box . You can tap it to travel to a specific time value.

The larger tick-marked box is the TIMELINE. Use it to scroll the current time and to change the timing for a keyframe.

Put your finger on a keyframe image and slide left or right to change the time for that keyframe.



Placing two frames next to each other will result in an abrupt 'cut' in the animation. Use this feature to make multiple scenes.

Place your finger in the empty ruled region of this box and slide back and forth to change the current time without altering any keyframes.

When this area is shaded, you can move this keyframe AND all other keyframes to its right!

TIP! If you tap and hold a keyframe before sliding it, you'll hear a 'pop'. Sliding will now change the time of not just the current keyframe, but all that follow it as well. This feature makes it simple to add or subtract time at a certain point in the timeline.

Layers and Sprite Animation

Once you understand how keyframing works with the camera, you are ready to tackle some cool SPRITE animation!

In computer animation, a “sprite” usually refers to a small character animation which moves across a background. Sprites may consist of multiple animation frames -- similar to the frames of a film. Most old-timey videogame characters use sprite animation.

Voxel allows you to make sprite animations in three dimensions! You simply create a separate layer for each character you want to animate.

Let’s begin. Take a deep breath.

Ready?

---

layer controls

This unholy mess of controls is what you get when you tap the LAYER DISPLAY TOGGLE, first mentioned in the previous section. Don’t be frightened -- it only gets worse!

New sprite layer (created by tapping ‘Add Layer)

LAYER DISPLAY TOGGLE

Background layer (holds your main model and can only be used for camera animation)

Above we see our original Background layer and a NEW layer called “Layer 1”. This was created by tapping the “Add Layer” button.

Tap the ‘Add Layer’ button to create new layers.

Any new blocks you create will be placed in Layer 1, since it is the selected layer.

To simplify the display, you can control the visibility of each layer -- a box ( ) on the left side of the layer list indicates visibility. Tap the box to toggle the layer’s visibility on and off. You do this for each layer.

Please note that the CURRENT layer will always appear completely solid, since it is assumed that you will be working on that layer.

The next symbol controls LOOPING. Turn this on if you want the layer’s animation to loop when it reaches the end. Otherwise it will just stop.

NOTE: When the Background layer is selected, this looping switch controls the movement of the camera. Use this to create looping movies.

The ONIONSKIN control allows you to see ‘ghost’ images of the previous (and optionally next) frame for the layer. This is overlaid on the model half-transparently. It allows you to compare animation frames and can make it easier to figure out how to move your characters.

This onionskin setting shows only the previous frame, in original colors.

This onionskin setting shows the previous AND next frames. The previous frame is tinted blue, and the next frame is tinted red.

This setting means onionskin is turned off for this layer.

---

layer settings

To the right of the LAYER DISPLAY TOGGLE is a gear. Tap this gear to open a menu with various layer options.

ADJUST TIMING

Use this option to evenly space the keyframes by a specified time value. This can apply to all layers or just the current one.

You can also shrink or stretch the entire timeline for the current layer. If you have spaced your keyframes too far apart, for example, the animation will appear too slow. Rather than reposition each keyframe by hand, you can scale all the keyframe times by some value. For example, scaling by 0.5 will make the timeline half as long -- meaning it will play twice as fast.

RENAME LAYER

Use this option to change a layer’s name. (You can also just double-tap the layer name in the list to rename it.)

DUPLICATE LAYER

Use this optionn to make an exact copy of the current layer.

TRANSFORM LAYER

This is a speciality option you can use to offset and/or scale a layer. This option is primarily for experimenting with 3D printing -- for example, when you want to make a box lid with an inset lip that fits within a box body. Email us for more information about this.

GHOST LAYERS

This option does not apply to just one layer. Rather, it determines how other layers are displayed when you are working. With this option checked, any layers besides the current one will appear half-transparent. This can help determine which blocks are on the current layer.

layer (sprite) animation

You've already learned how keyframing and the timeline work for the camera. Well, good news -- they work the same exact way for sprite layers! The 'Add Frame' button, the 'Copy Frame' button, the timeline and keyframe bars all function as they do for the Background layer, when you are animating the camera.

With sprite layers, however, you are not creating camera views. Instead you are creating new sprite frames -- usually character poses for stop motion.

We will look at a simple example. For a full demonstration, you should check out the Animation Tutorial videos, accessible from Voxel's Help screen!

In this screen, we have created a layer called "Man" and made a tiny character:

Now we tap the 'C+' button to make a new frame which is a copy of the first one. Then we close the layer tools and use the HAND tool to slide the figures arms and legs upward. We use the '-' tool to remove one orange block.

When we reopen the layer tools, it looks like this:

In this image our second keyframe has been moved earlier so that the gap between the two keyframes is very small. You can do this to perform really fast animation. If we were to create more frames, the new ones would retain this small spacing.

Press PLAY, as they say, and you will see the little figure doing jumping jacks! The animation loops because the 'Man' layer's loop switch is on. If we were to turn it off, the man would jump into the air and stay there!

Each layer has its own set of keyframes, so you can make movies with many different characters, each one "doin' they thing'.

Thus, by using multiple layers and the ability to place keyframes anywhere along the timeline, you can create some quite complex and even lengthy movies!

OK Orson Welles, get to it!

Voxel animations work with the Voxel Gallery! Animated files appear in the Gallery browser with this movie camera symbol.

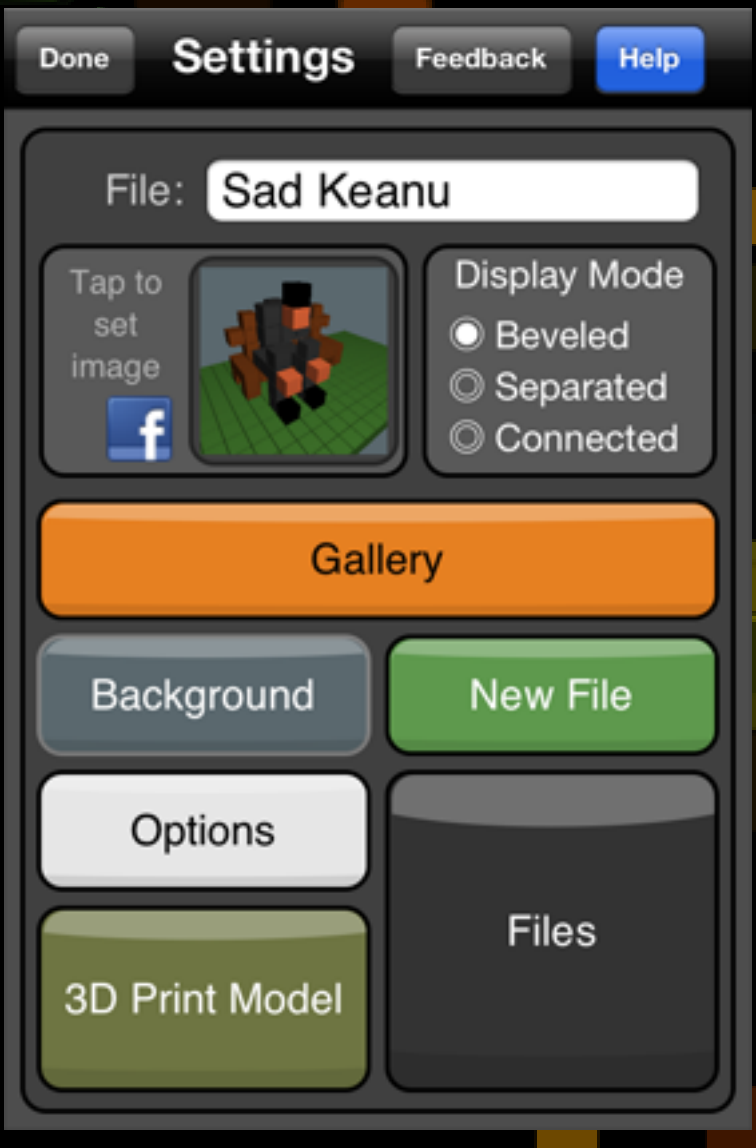
In addition to exhibiting your movies in the Voxel Gallery, you can export them to use on the web or however you want!

Animations are saved as sequentially numbered PNG files. Save them online to your DropBox account or locally to the device, where you can retrieve them through iTunes File Sharing.

See the Files->Export section of this manual for more information.

Settings

This is Voxel's Settings screen:



The DISPLAY MODE controls how the blocks in your model appear. The default, "Beveled", shows each block as a distinct cube with rounded edges. With many blocks, however, this can become slow. "Separated" dispenses with the beveled edged, thereby speeding up the display. Finally, "Connected" shows your model with no space at all between the blocks.

(NOTE: If you want to use your model in 3DS Max or other rendering programs, you may want to use 'Connected'. Your model will be exported seamlessly with fused vertices.)

Tap 'Help' to watch the YouTube tutorial, read this manual, or visit the Voxel Web Site.

Tap 'New File' to make a new file.
(this box is only available in the Full Version)

The 'Thumbnail', 'Files', 'Voxel Gallery', and 'Options' button screens are described below.

Thumbnails and Facebook

The THUMBNAIL box allows you to take pictures of your model. These are used for your file icon in the Gallery and to send images to Facebook.

Within the Snapshot screen, you can pose your model and then snap pictures of it. Login to Facebook using the button at the upper right of the screen.

You can post to your own account -- but you can also post to the Voxel page, so that other users can see your work.

Of course they can also see the full models themselves when you upload them to the Gallery (see below). Uploading to the Gallery also automatically posts to the Voxel page too. Make sure you 'Like' Voxel on Facebook so you can see when other people save to the Gallery!

Files

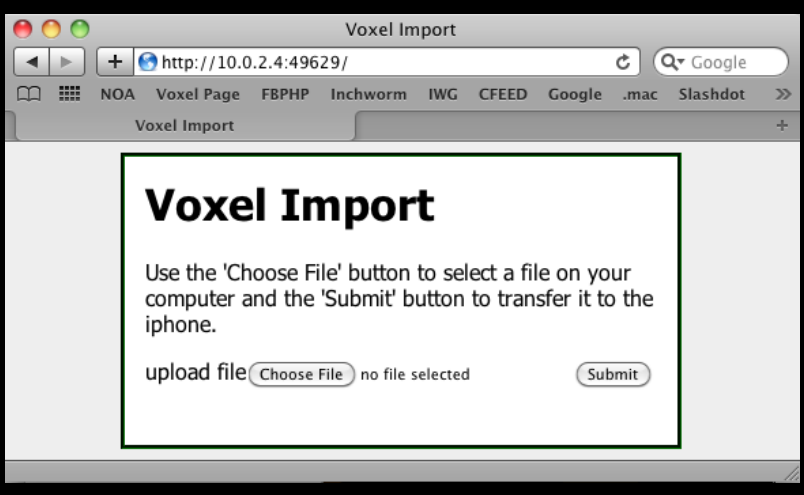
In the full version, you can keep a library of many different Voxel files. Make your own, or download some from the Gallery (described in the next section).

Here's a detail of the FILES screen:
It is pretty self-explanatory. Load a new file by tapping its name. You can scroll the list if you have a lot of files.

"Import" allows you to bring files back into Voxel. You can import files via Dropbox -- or Voxel can import wirelessly from a nearby PC on the same network.

The Import Files screen sets up a wireless web server on your device, to which you can connect from another computer on the same wireless network.

Type the 'http' address that appears into the URL box of your computer's browser. You'll get a page that allows you to import files, like this:



From this screen you can load Voxel (.vox) files that have been previously exported from Voxel. You can also load 3MP files from the Windows program Paint3D.

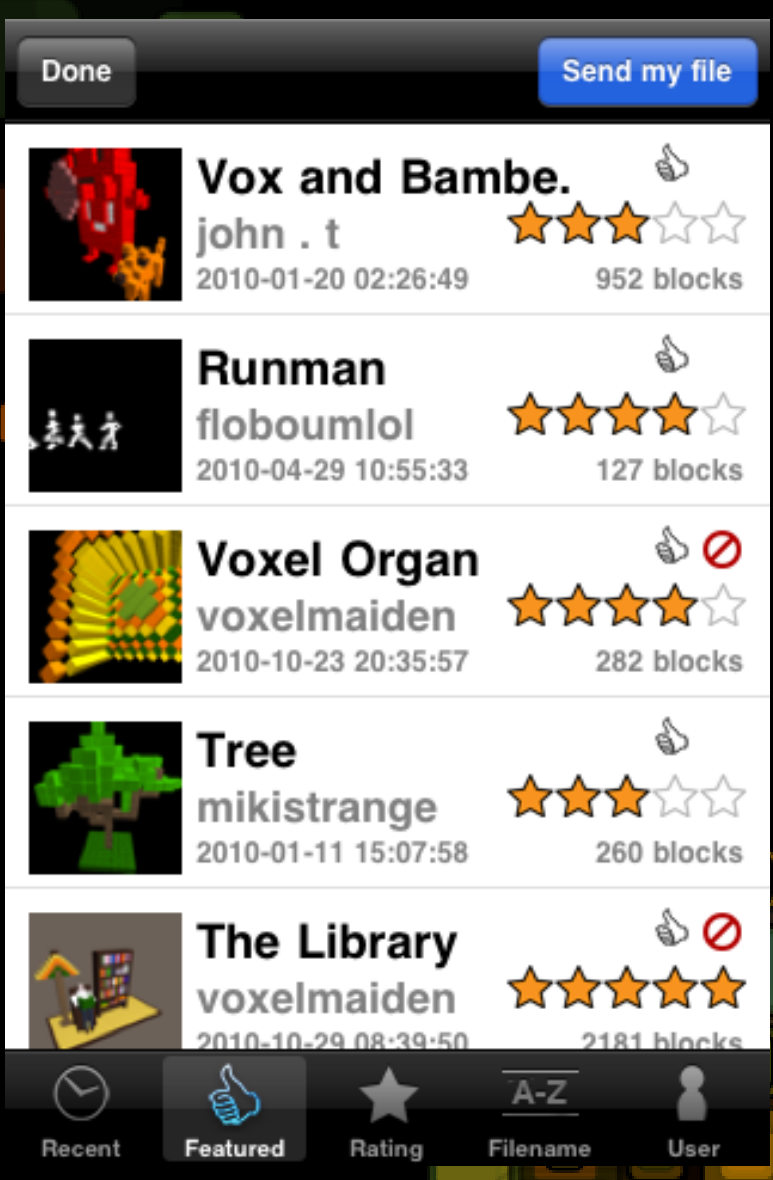
Additionally you can import small PNG image files. Imported images are turned into a flat wall of voxels, which you can then modify like any other Voxel model!

See the "Exporting Files" section for information on the various ways to get models and animation out of Voxel.

Voxel Gallery

The Voxel Gallery is the online database of Voxel user files. You can save files to it, load them back, check out and rate what other people have made with Voxel. If the creator of a file allows it, you can even download other people's files and use them yourself.

Here's the main gallery screen.



After a short wait, you should see a list of recent files. Use the tabs at the bottom to change between different ways of viewing the database.

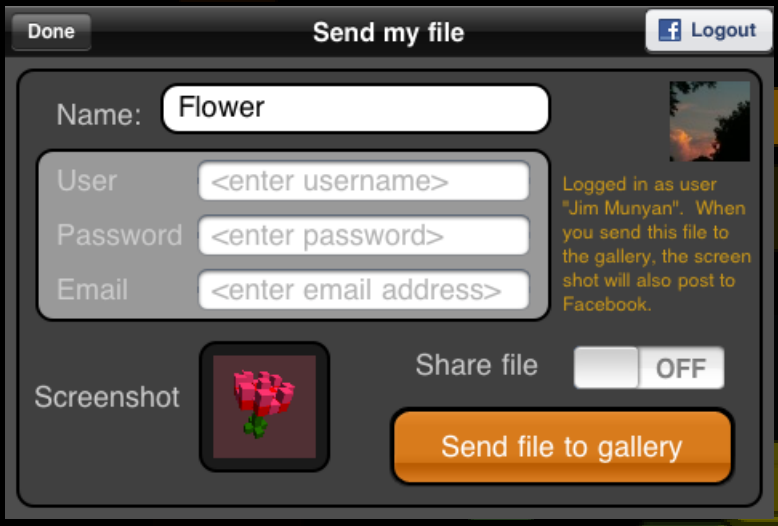
The little red circle means the owner has marked the file as private. You cannot save and edit the file. The thumbs up next to it means that it's been selected by Flat Black Films as 'featured.'

You can tap on a file to view it full screen.

The little button at the top right will flip the screen, showing controls to rate, delete (if you made the file), or download the file (if permitted by its creator). Your rating is sent to the database to be included with everyone else's ratings.

Saving to the Gallery

If you have the full version of Voxel, you'll see the blue 'Send my file' button at the top right of the Gallery browser. Press that button to summon this screen.



To save files to the Gallery, you need to register for a Voxel account. Enter a username, password, and contact email address -- it will only be used to send you a forgotten password or for emergency Voxel announcements.

Set the 'Share file' switch to ON if you want other people to be able to download and make copies of your file. If it is set to OFF, then users will be able to view your model in Voxel but not save it.

Also, if you're logged into Facebook, a post will be made to the Voxel Facebook page when you save to the Gallery. If you 'like' Voxel on Facebook, you'll be able to see when other people add models to the Gallery!

3D Printing

Now you can order 3D printed versions of your models directly from Voxel! Voxel connects to the 3D printing service Sculpteo.

Simply select the "3D Print Model" button on the Settings screen. You will see this screen:

Be aware that 3D printing is still somewhat expensive. Also, not every Voxel model is possible to print. The model must be a single connected structure -- no free-floating parts, or cubes that meet only on one edge. Common sense should tell you whether or not a model is printable.

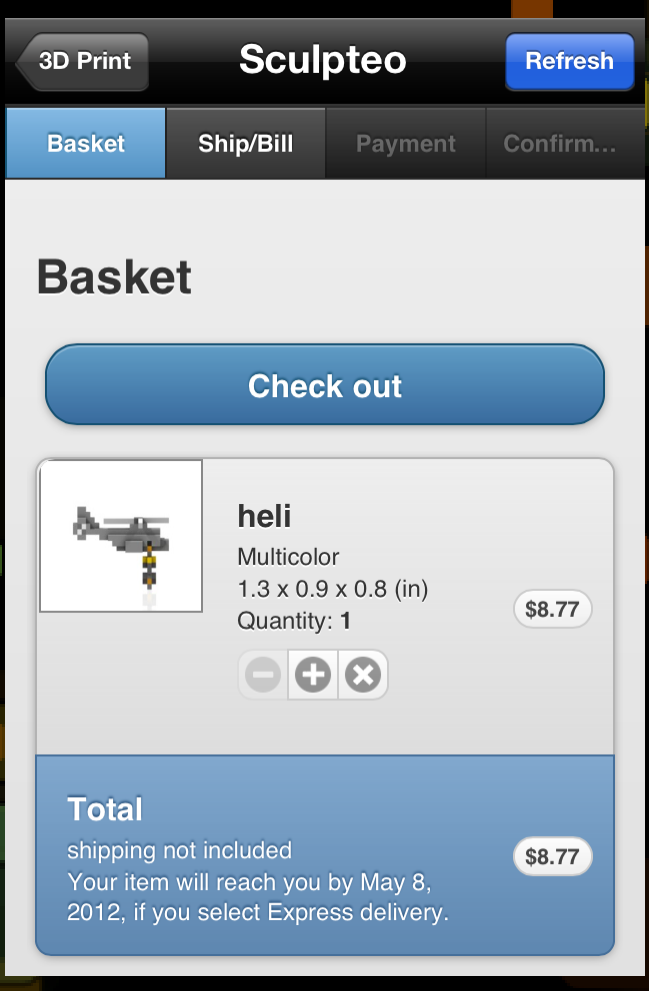
You will receive a warning dialog box if Voxel finds that the model cannot be printed. Press the 'Show Me' button on the box to select the area of your model that is not connected to the rest.

For materials, you can choose 'Multicolor' or 'White'. Choose Multicolor to print your models in full color plastic -- the colors will match your model. Choose White for an all-white model made from smoother plastic.

The 'Bevel Size' box is enabled when your model is in 'Beveled' display mode on the Settings screen. Choose this option if you want each block in your model to appear distinct. Otherwise the model will appear as a flat continously connnected surface. Choose 'Less' if you just want the divisions between blocks to appear as slight grooves. Choose 'More' if you want them to look more like separate rounded blocks.

Choose 'Order Print' to upload your design and go to the Sculpteo site. There you will see the price for your model.

Note: Within one session, you can order prints of several models to save on shipping costs!



Once you have a size and price you like, simply fill out your order details and your model will be sent to you!

Exporting Files

Voxel has several ways for you to export versions of your models. Use the File Screen "Export" button to bring up a list of export options.

Voxel file Use this option to email a copy of your Voxel model file. You or another use can then use the Import feature to bring the model into another copy of Voxel. (This is an older feature. It would be easier nowadays to just save the model to the Voxel Gallery and download it to the other device.)

Movie frames Use this option to generate a numbered sequences of image frames for your keyframed animation. You can choose to save to a DropBox account or locally to the device.

The DropBox account is usually a better choice, since frame sequences can consume a large amount of storage space. However, if you do save to the device, you can retrieve and then delete the frames through iTunes file sharing. Exported movies are stored locally in the Voxel app's "_movie_export" folder.

When exporting a movie, you are given the chance to specify a framerate and start/end frames for the sequence. By default, the frame range shows you the full sequence for your animation. You may want to modify the range if you only want to export a section of your animation, or if an earlier export was interrupted.

OBJ / MTL files Use this option to generate an OBJ / MTL file pair for your model. This is an industry standard file format that can be imported into programs like Maya and 3DS Max. This file can also be retrieved through iTunes file sharing, via the 'exported' folder.

When using this format, you are asked to choose a grouping option. The "Normal (model / sprites)" option will export your entire model as one OBJ group. Any sprites are saved as separate groups, with this naming convention: s_spritenumber_spriteframe.

The "Every Voxel a group" option will export every single Voxel as its own group. This could be used to do time-lapse or voxel-manipulating animations in other programs.

Binvox This format does not include color, but it can be used to export and import models from Minecraft.

3MP file Use this option to export a file in the format used by the Windows application Paint3D. Voxel can also import files in this format.

PNG slice If you have selected a portion of your model that is only a single-voxel thick, you can export an image of that slice! This option allows you to do it.

Screenshot Finally, use this option to simply email a screenshot of your model, uncluttered by the control panel interface.

Options

Finally, here are the Options. These are things you can change to tweak the operation of the app. Experiment with them if you like.

“Title Screen” controls whether the Voxel logo screen appears when you launch Voxel.

“Accelerometer tilt” turns on and off the rotation that happens when you tilt your device.

“Sticky toolbar” controls whether the toolbar remains open, or if it closes automatically after each selection.

“Auto-cam” enables and disables Voxel’s system for automatically placing the center of rotation.

“Joystick function” controls whether the joystick icon moves or rotates when you slide it with your finger.

“Eighth tool” determines whether the EYE-DROPPPER or DOUBLE-DRAW tool is shown at the end of the toolbar.

“One-finger rotation” reverses the pan-and-rotate operations, between one finger and two fingers.

“Lighting” allows you to turn off the lighting and shading applied to the model. Use this if you want to work with exact colors and don’t care about shading.

With “Reflection color” on, the light that shines on your model is the same color as the current color. Otherwise it matches the light color.

“Orthographic view” will turn off 3D perspective, so that your model appears without any fore-shortening. It is kind of freaky!

The “Sound Effects” lets you disable Voxel’s sound effects, if that’s what you want.

“Show Axes w/Grid” will display little XYZ axes in the corner of the main display.

The “Reset View and Lights” button moves the camera and light back to their default positions.

The “Reset Hints” button re-enables any tutorial hint windows that have been shown and dis-missed.

The “Interface Color” button lets you change Voxel’s default yellow controls to another color.

Please send any comments, questions, etc to:

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