Voxon Developers Kit

Welcome to the Voxon Developers Kit, the **official pathway for developing content for Voxon's volumetric technology.** Inside the Developers Kit are a range of tools, documents and examples for developing volumetric media and software.

The Voxon Developers Kit aims to:

1. Introduce our volumetric technology and the core concepts of using our volumetric software for development purposes.

2. Allow developers to compile their own VX apps.

3. Inform media creators how to produce content for our displays and understand how to use advanced media types such as DICOM imaging and VoxieOS animation sequences.

4. Make it accessible for 3rd party software to integrate with our technology.

5. Be an easy package to install with a logical layout.

It is developed for a range of skill sets - beginner, professional and in-between.

Our goals for the Voxon Developers Kit are as follows:

- **to be easy**, **empowering** and **effective**
- **to be extendable -** users can use the examples provided to build upon their vision.
- **To be enabling -** users can see the potential for volumetric experiences and be inspired.

The latest version of the Developers Kit is always hosted on our GitHub page

https://github.com/Voxon-Photonics/Content-Developers-Kit

Installing the Developers Kit

To install the Developers Kit either run the *Voxon Installer* obtained from our website **www.voxon.co**, or sideload from downloading the files from our GitHub. We recommend installing the Developers Kit to **C:\Voxon**, look under the C:\Voxon\System\Setup' for instructions on how to set Path and Registry settings. This will ensure your system is set up properly.

System requirements: The Voxon Developers Kit requires Windows 10. Any machine that can run Windows 10 should be able to run the Voxon Runtime.

Directory and file structure for the Developers Kit

When viewing the Developers Kit with a file explorer, you'll notice there are four main folders. Here is a brief description of the contents of each folder.

Developers Kit – Holds all the directories for VX app development, media creation, software integration and Voxon plugins.

Media – Example media to render on our volumetric display (or via the simulator).

Software – VX applications which can be executed on our volumetric display (or via the simulator).

System – Holds the Voxon Runtime files and other critical files to run and create VX applications.
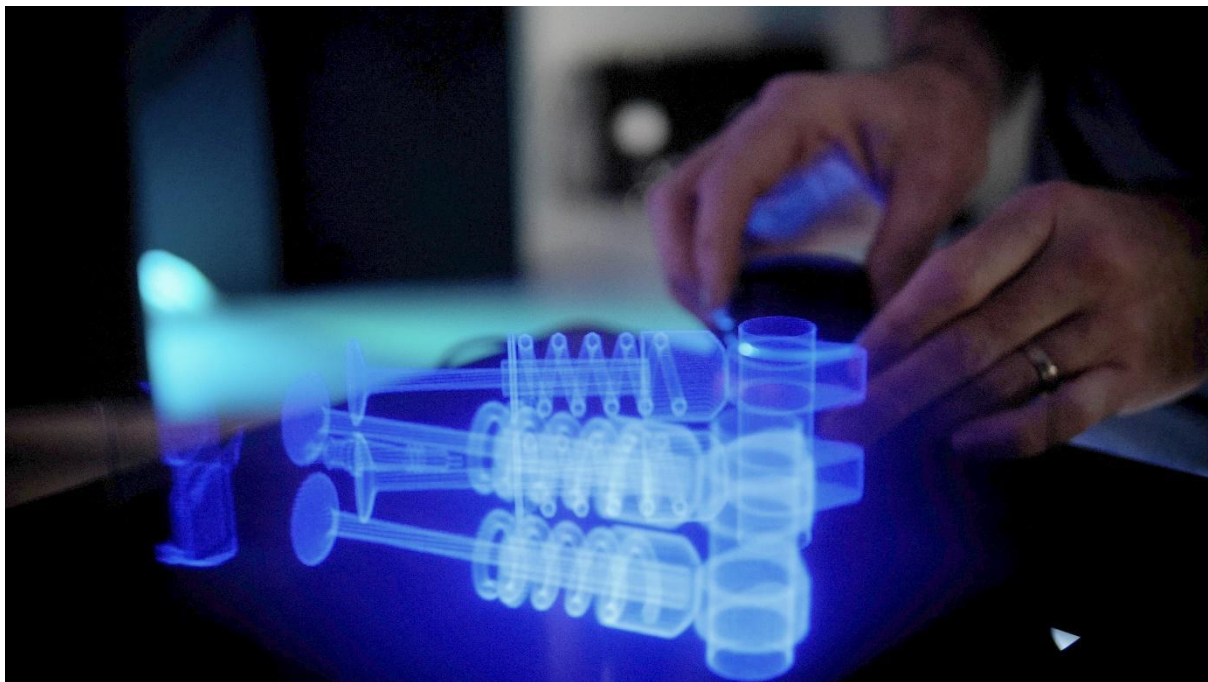

Figure 1 Voxon's volumetric technology displaying some media.

Using the Developers Kit

The Developers Kit is merely a collection of software libraries, tools, guides and examples. It is made for a wide user base and thus the user can just learn the aspects that appeal to them. Using the Developers Kit, a user can:

1) Create their own VX applications.

2) Integrate third party applications with Voxon's volumetric technology through the VXConnect API.
3) Create media for our volumetric display.
4) Experience volumetric imaging on their computer via the software simulator.

We encourage you to explore the contents of the Developers Kit and see what interests you.

Introduction to the VX1 – Our Volumetric Computer Hardware

Figure 2 Voxon's VX1 volumetric computer.

The VX1 represents the dawn of volumetric imaging. It is a versatile device capable of rendering 3D images within an 180 x 180 x 80 mm volume. Objects, animations, games or complex data are instantly brought to life within the volume, creating a physical presence viewable from any angle by any number of people.

It is as accessible as any standard computer, with an easy to use graphical user interface. Ongoing application development and support for many common 3D file types, the VX1 puts volumetric computing at your fingertips.

The VX1 is a platform for volumetric applications. We encourage all users to develop their own software, media, or integrate out volumetric technology into their workflow.

How a VX1 Volumetric Display Works

The VX1 is a swept surface volumetric display and achieves its visualisation through a mixture of engineering and the persistence of vision. A VX1's three-dimensional volume

consists of 192 two-dimensional slices stacked on top of one another. As the reciprocating surface sweeps through the volume it positions each slice in its own space and time. The human eye blends these slices together resulting in a physical 3D image viewable from any perspective.

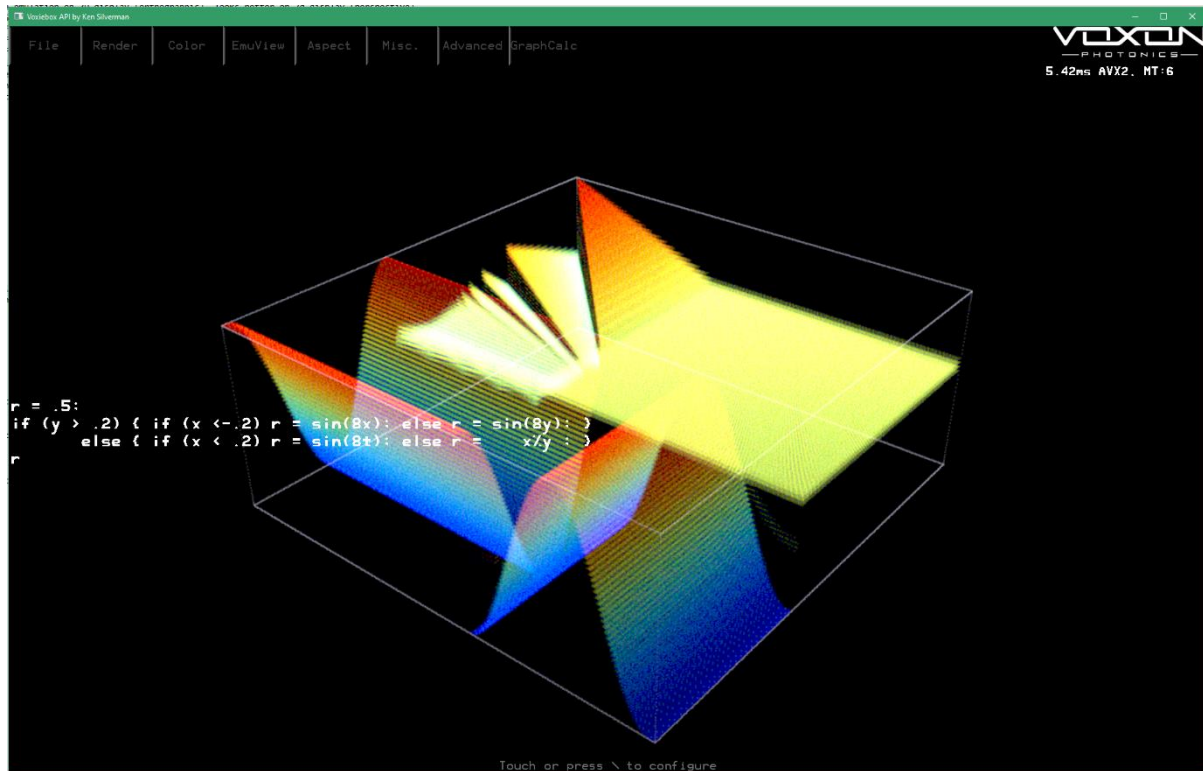# Running The Voxon Simulator / Emulator

Figure 3 Voxon's volumetric simulator being run on a standard Windows 10 machine.

While VX applications are intended to be used on Voxon's volumetric hardware, all Voxon VX apps can run on a Windows machine via the software simulator. The simulator provides an easy workflow for development. All VX apps require access to the *voxiebox.dll* to run. Upon execution, If hardware is detected the application will render onto the volumetric display, otherwise it will execute in simulation mode.

When using the simulator a few noteworthy features and tips:

- When using the simulator the '/' key (located underneath backspace) brings up the menu.

- Disabling the 'Exclusive Mouse' option in the Misc tab and then saving the changes (located under the 'File' menu) will allow you to see your mouse cursor and use it for other applications.

- The 'EmuView' tab changes the viewpoint of the display.

- With most programs pressing the '[' and ']' keys will rotate the display holding right Ctrl or right Shift while rotating the display will transform the display in other directions.

- Under the 'Misc' tab is an option called 'show stats' which gives you a VPS reading (volumes per second) this is the volumetric equivalent to FPS (frames per second)

Included Software

Within the Developers Kit are some VX apps which can be run with the simulator on your development machine. These applications are located under the 'Software' directory. A brief description are as follows:

VoxieOS - 3D media browser which can view many common 3D data types such as OBJ, .STL, .PLY, .KV6, .MOL, .FBX, DICOM, .JPG, .PNG (including heightmap). Can also play 3D model animations.

GraphCalc - Graph calculator that visualises mathematical formulas.

DemView - Views the topography of our planet. Requires internet connection to download from mapping servers.

VoxieDemo - A collection of various demos of volumetric applications and functions of the voxiebox API. The C source code is provided.

KniView and Knife - Depth camera capture and playback software requires a compatible depth camera to record.

Voxatron - a port of a popular voxel based game engine by Lexaloffle.

Filming the VX1

As you may have noticed, capturing video footage of the VX1 is difficult. This is because the VX1 runs at a lower refresh rate compared to most displays. To capture the full image of a VX1 with a camera, the camera needs to capture at 15 frames per second. Not many cameras can do this. All our demo videos of the VX1 have been captured in this way.

To record video/film flicker free and as a solid image. The video/film frame rate needs to be set to 15 fps. Check your camera settings to see if your camera supports 15 fps.

Filmic Pro is a filming app for Android and iPhone devices that can capture at 15 fps.

When capturing, to achieve the best results we recommend the following:

- The image and the VX1's projector are in focus. The projector should be focused to the centre of the display. This means however, that the top and bottom most slices of the display will be slightly out of focus with respect to the centre.

- The VX1 display settings have been optimised for the best capture. (suitable colour mode / gamma / density / aspect)

- Having some ambient light in the room.

- Experiment with angles.

- Having some objects which are recognisable in the background or foreground helps with scale and context. Having people looking at the display helps in this way too.

- People in the shot using the technology adds excitement to the image.