RecFusion quick start guide

This guide describes RecFusion 1.2. Further information and the newest version of the software can be obtained from *http://www.recfusion.net*. For questions and feedback you can reach us at *feedback@recfusion.net*.

Installation

For RecFusion to access your sensor a device driver is needed. For the Microsoft Kinect sensor you need to install the *Microsoft Kinect for Windows SDK 1.8* [1]. For the Asus Xtion and the PrimeSense Carmine series of sensors you need to install *OpenNI 2.2* [2]. RecFusion can be installed either before or after the driver installation.

The first time you run RecFusion the license dialog will be shown. If you have a license key enter it here to activate the software. Otherwise you can only use the evaluation version. If the PC on which you want to run RecFusion is not connected to the Internet you can also use the offline activation. Please note that your RecFusion license will be bound to the PC on which it is activated. It is not possible to use RecFusion simultaneously on multiple PCs.

[1] *http://go.microsoft.com/fwlink/?LinkID=323588*

[2*] http://www.openni.org/openni-sdk/*

Scanning

After starting RecFusion you will see the capture view which show the color and depth data from your sensor. On the right hand side a 3D visualization of the depth data is shown. You can navigate in this view using the mouse with a similar interface to standard 3D viewers. The control panel on the left side allows you to change the reconstruction settings.

The scan will contain all objects which are located within the reconstruction volume. This volume is visualized through the cube shown in the 3D visualization. Objects inside the cube are colored green in the depth data. You can modify the size and the location of the reconstruction volume by several means. The size of the volume can be changed through the V*olume Size* tab. Alternatively you can change the size by clicking and dragging the middle mouse button vertically in the depth view. The location of the volume can either be changed by setting the position values in the *Volume Position* tab or by clicking on the *Translate* button. Clicking on *Translate* shows a manipulator in the 3D visualization which you can click and drag with the left mouse button. Another option for moving the volume position is to click and drag in the depth view with the left or right mouse button.

Once you've placed the object you want to scan inside the reconstruction volume you can start the reconstruction by clicking on *Reconstruct*. During the scan you will see the reconstruction view. Instead of the 3D visualization a live view of the current reconstruction result is shown on the right side. Using

the *Show Colors* button on the left you can switch between a colored and an uncolored view of the current reconstruction.

The status indicator on the top left shows the state of the scan. If everything is working fine it will be green. If it is red an error has occurred. Typical error sources are a too fast movement of the sensor or leaving the reconstruction volume. In this case the camera view in the middle will show a blended image consisting of the last known position of the sensor and the current camera image. To resume the scan you have to move the sensor so that the two images are aligned. If the realignment fails and the scan cannot be continued you can cancel it by clicking on *Cancel Reconstruction*. During the scan the frame rate of the sensor and of the reconstruction are shown in the left panel. The reconstruction frame rate should be larger than 10 fps for the scan to work properly. The lower the frame rate the slower you have to move your sensor, since otherwise the object might be lost resulting in a red status indicator. The achievable reconstruction frame rate depends on the volume resolution and on your GPU. To obtain higher frame rates you can try to reduce the volume resolution. Once you are satisfied with the scan result click on *Finish Reconstruction*.

Post-Processing

After the reconstruction has been finished you will see the model view. Here you can view the model, post-process it and save it. The following post-processing functions are available.

Smooth – Smooth the model using the given number of iterations

Decimate – Decimates the number of triangles to the given triangle count. Please note that decimating the model will also reduce the texture resolution since currently the colors are saved per triangle vertices.

Clean – Removes disconnected parts of the object based on their size. All parts smaller than the minimum size and larger than the maximum size will be removed. Parts which will be removed are displayed in red.

Crop – Allows you to move, rotate and scale a cube. All parts of the model outside the cube (colored red) will be removed. To move the cube you have to click and drag on the manipulators in the 3D view.

Align – Rotate the model, e.g. to align it with the ground plane.

Socket – Add a socket to the model. You can specify the diameter, the height and the color of the socket. The socket can be moved by clicking and dragging the manipulator in the 3D view. To remove the socket click on *Remove*.

Fill holes – Fills all holes in the model. A closed mesh is usually required for 3D printing.

Export

By clicking on *Save Mesh* you can save the mesh on disk in the formats PLY, OBJ, VRML or STL. It is also possible to upload the model to the SketchFab website to view it online and share it with other people. In the *Export* settings you can specify the desired dimensions of the exported model. You can also hollow out the model with a given wall thickness. This allows you to reduce the material cost for certain 3D-printing methods. If you try to export a model which has holes the export dialog will notify you. You can then either fill the holes first (e.g. if you want to print the model later) or continue saving the model as it is.

Sequences

Clicking on *Save Sequence* in the capture view allows you to capture the sensor data to a file. You can later load that sensor data using the *Load Sequence* button. If a sequence has been loaded you will see buttons below the views which allow you to navigate inside the sequence. To reconstruct the sequence you have to go to the position from which you want to start the reconstruction by playing and pausing the sequence or by dragging the position slider and then clicking on *Reconstruct.* To play the sequence in reverse once the end is reached check the *Loop* box.

Advanced Settings

Volume type – Choose whether to capture color with your scan

Volume resolution – Set the volume resolution. The higher the resolution the more processing power is needed. If you encounter performance problems try to reduce the resolution first.

Sensor – Configure the sensor properties. If the sensor supports it you can disable the automatic exposure control and automatic white balance. This helps in capturing models with a uniform color appearance. You can also set the maximum depth from the sensor to use in the reconstruction. This can help filtering out unreliable sensor measurements.

Compute unit – Select between CPU and GPU-based reconstruction. The CPU-based reconstruction is not real-time capable and should only be used when reconstructing sequences.

Timer – Select a delay before starting the reconstruction and the duration after which the reconstruction will be automatically terminated.

FAQ

The sensor is not recognized/The sensor image jitters

To use a sensor the correct drivers have to be installed. You need to remove older driver versions (e.g. SensorKinect, OpenNI 1.x, …) before you can install the new drivers. Some sensors have problems functioning on a USB3 port. We therefore recommend using a USB2 port.

The scan fails (red status indicator)

A red status indicator can be caused by several situations. One possibility is that your reconstruction frame rate is too low. It should be above 10-15 fps for the reconstruction to work properly. A low reconstruction frame rate is caused by having too little processing power available on the GPU. You should reduce the volume resolution. Also moving the camera very slowly can help. If all of this does not help you can still try to record a sequence and reconstruct it offline.

Another possibility for reconstruction failures is that the scene you are scanning is mostly composed of planar objects (e.g. table top, walls …). In this case it can be helpful to place additional non-planar objects in the scene to allow the reconstruction algorithm to better locate the camera in the scene. You can later remove the helper objects from the scan in the post-processing stage. You should also always try to keep the camera directed at the reconstruction volume (there should be a lot of green in the depth view). When leaving the reconstruction volume the reconstruction will fail.