LiveScan3D manual (not finished yet)

LiveScan3D is a system designed for real time 3D reconstruction using multiple Kinect v2 depth sensors simultaneously at real time speed. The produced 3D reconstruction is in the form of a coloured point cloud, with points from all of the Kinects placed in the same coordinate system. Possible use scenarios of the system include:

- capturing an object's 3D structure from multiple viewpoints simultaneously - Figure 1,
- capturing "panoramic" 3D structure of a scene – Figure 2,
- increasing the density of a point cloud captured by a single sensor, by having multiple sensors capture the same scene.

At the moment connecting multiple Kinect v2 devices to a single computer is difficult and only possible under Linux. Also, the number of the devices or capture speed might be low, because of the limitations of the PCI-E bus.

Because of those limitations, in our system each Kinect v2 sensor is connected to a separate computer. Each of those computers is connected to a server which governs all of the sensors. The server allows the user to perform calibration, filtering, synchronized frame capture, and to visualize the acquired point cloud live.

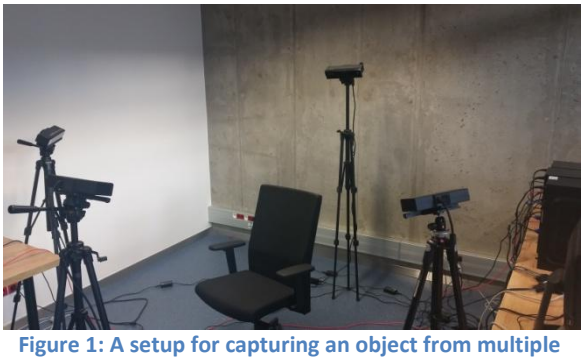


Figure 1: A setup for capturing an object from multiple viewpoints.

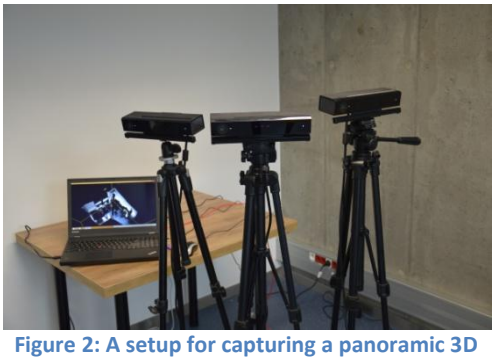


Figure 2: A setup for capturing a panoramic 3D reconstruction.

Step by step configuration

In this tutorial we describe step by step how to configure and run LiveScan3D with Kinect v2 sensors. In order to start you will need to:

- have at least one Kinect v2 sensor,
- download LiveScan3D from http://ztv.ire.pw.edu.pl/mkowalski/ where it is available as a compiled binary and source code,
- download and install the Kinect for Windows SDK 2.0 on each machine you intend to use as a client,
- have all of the computers you will use in the same network,
- print the calibration pattern "calibration0.jpg" on a piece of paper (A4 size should be enough).

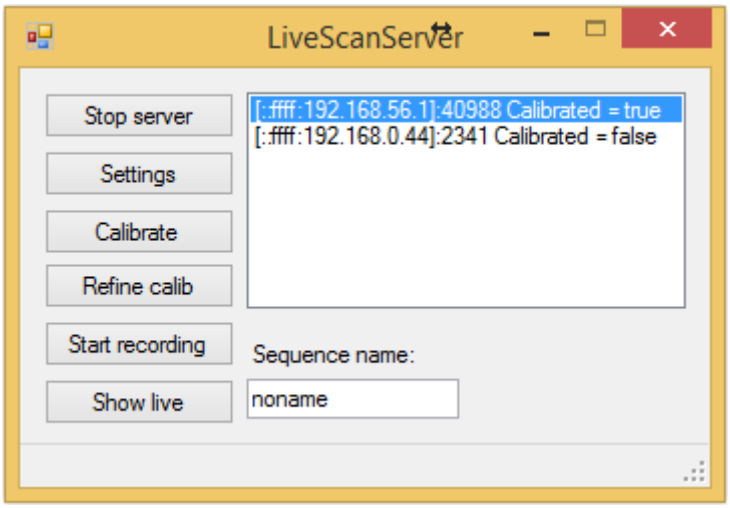
Once you have all of the preliminary steps completed, run the LiveScanClient application on each of your client computers. If everything is working fine, you should see the RGB camera stream of your Kinect inside the application window.

Next, choose a computer that will act as a server (this computer may also be a client at the same time), we recommend that it is the most powerful of the available machines. Run the LiveScanServer on the chosen machine and click “Start server” to begin listening for client connections. Connect each of the clients to the server. If the client is running on the same machine as the server, there is no need for an IP address.

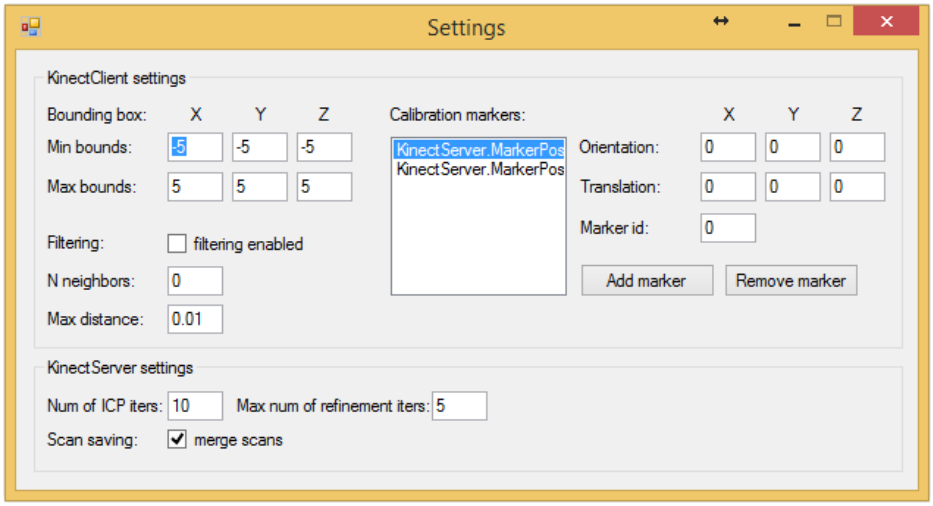
At this point you should have a

LiveScanServer

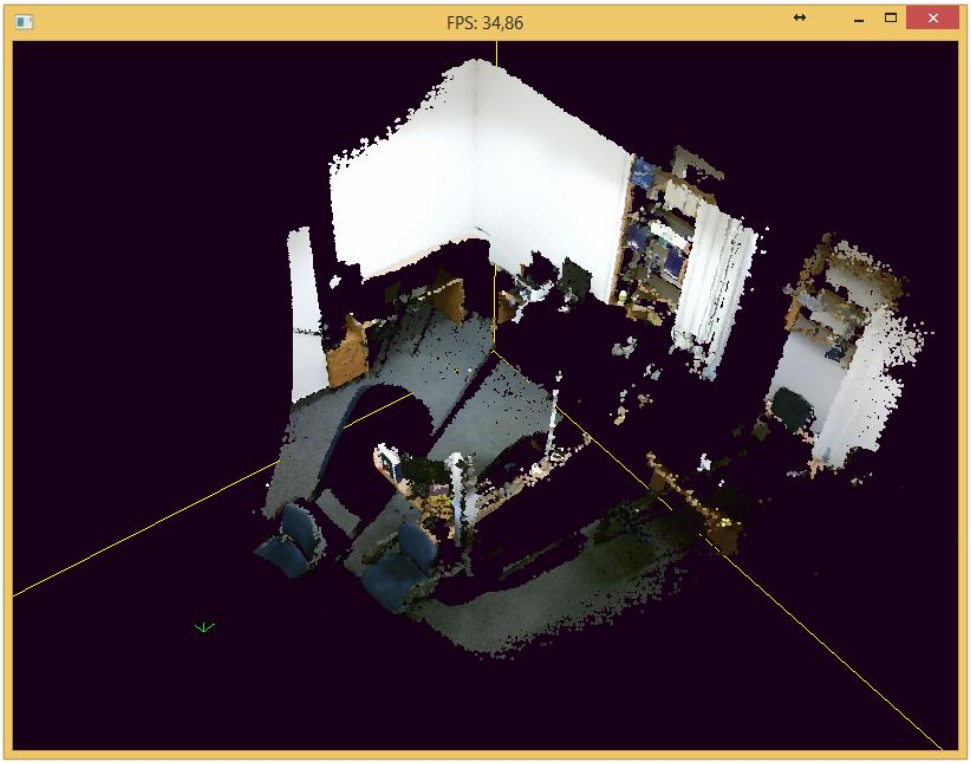
Main window



Setting window



Live view window



LiveScanClient