Brief description of the work I did at the Computer Graphics Laboratory (LGG), EPFL, Switzerland, as a Summer@EPFL intern from 22nd May 2013 to 23rd August 2013

- Created a point cloud using data from a depth sensor.
- Triangulated the vertices and used smooth shading to create a grayscale mesh which changes in real-time.
- The RGB and depth frames from the sensor were not synchronised and had to be manually synchronised.
- The code for smooth shading was highly inefficient and had to be re-written to use vertex buffer objects.
- Creating the mesh in real-time was very inefficient and caused the application to hang and crash. Multi-threading was implemented to enable a separate worker thread to fetch data from Kinect. Steps were taken to avoid “race conditions”.
- HAAR cascades for palm detection available online, did not produce acceptable results. So, The NiTE library and Kinect sensor were used to generate training data to train our own HAAR cascade for palm detection.
- Subsequently, convex hull was implemented in C++ and OpenCV in order to detect fingertips.
- Finally, information of a rigged hand model was extracted from a FBX file. This was a simpler version of the FBX import feature in software like Maya.
- Apart from the above, the code of several other related projects was tried, which helped us gain further insight into the project.

To conclude, I added a Depth Sensor Mode (Mode Kinect) to Starlab, which is a 3D geometry processing environment, used by LGG for teaching and research. Also, I created several standalone applications to perform different functions, some of which are described above. My code for these applications, will hopefully help aid future research projects on Hand Performance Capture, at LGG.