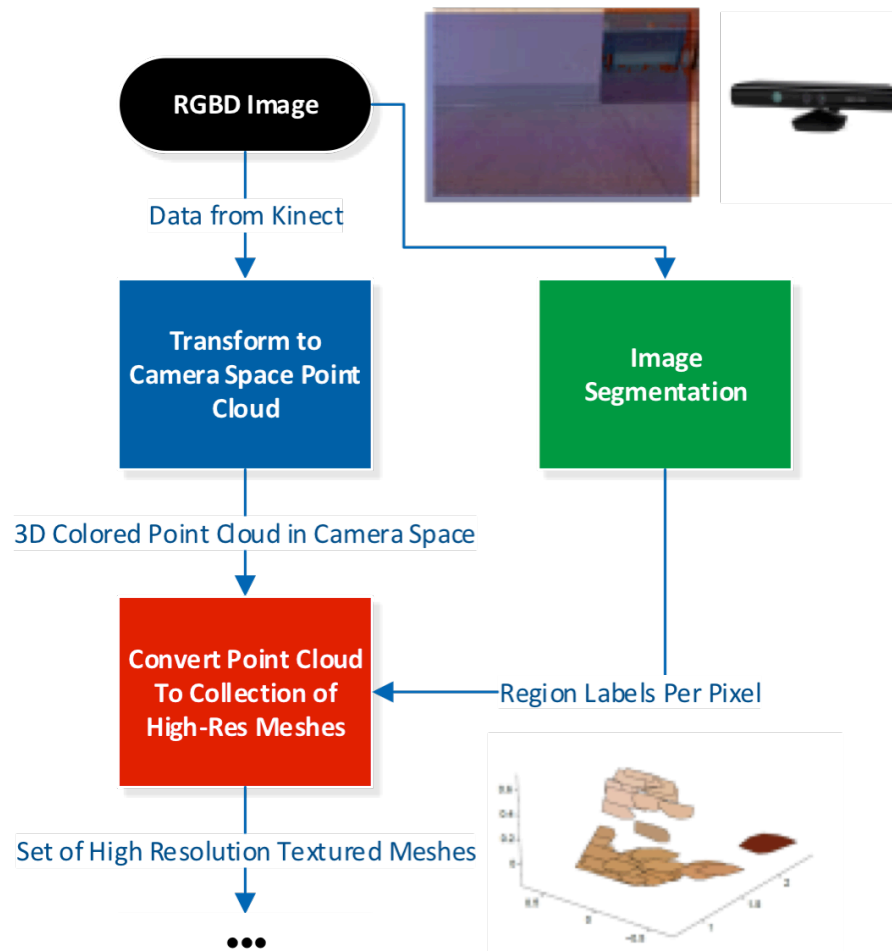


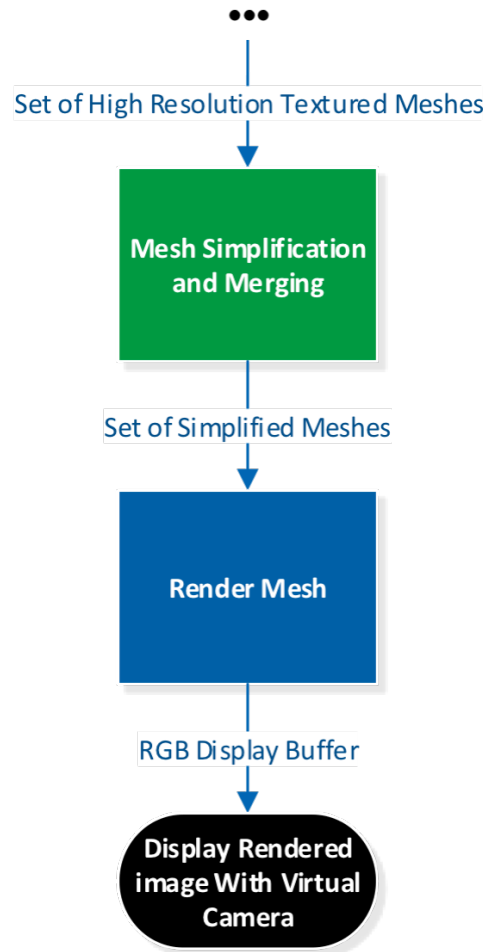
GPU-Accelerated Conversion of RGBD Images to Textured Triangle Meshes

Dalton Banks, Collin Boots

Processing Pipeline (part 1)



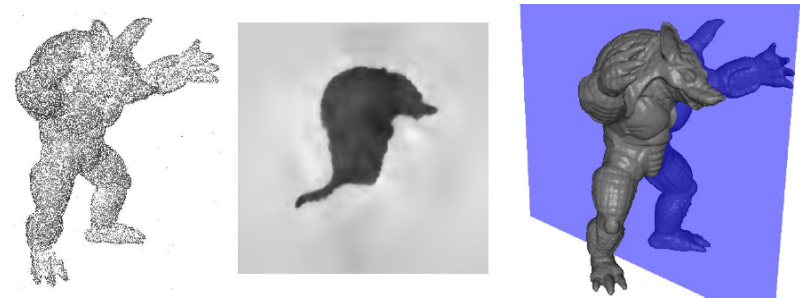
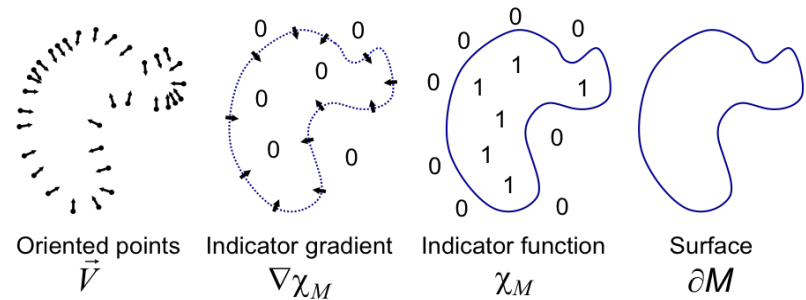
Processing Pipeline (part 2)



Mesh Reconstruction Algorithm

Poisson Surface Reconstruction

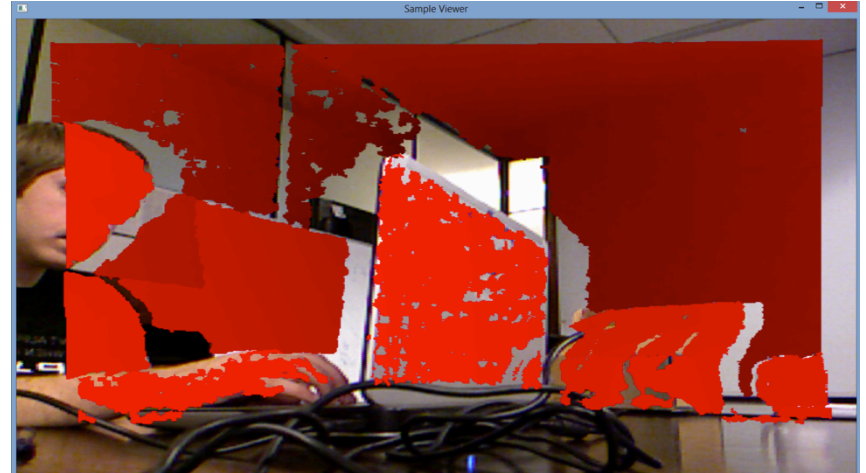
- Approximates surface as boundary of underlying indicator function
- Requires oriented point cloud (i.e. estimation of point normals)
- CPU implementation won SGP Software Award
- Highly parallelizable algorithm



Michael Kazhdan, Matthew Bolitho, and Huges Hoppe. *Poisson Surface Reconstruction*. Eurographics Symposium on Geometry Processing (2006).

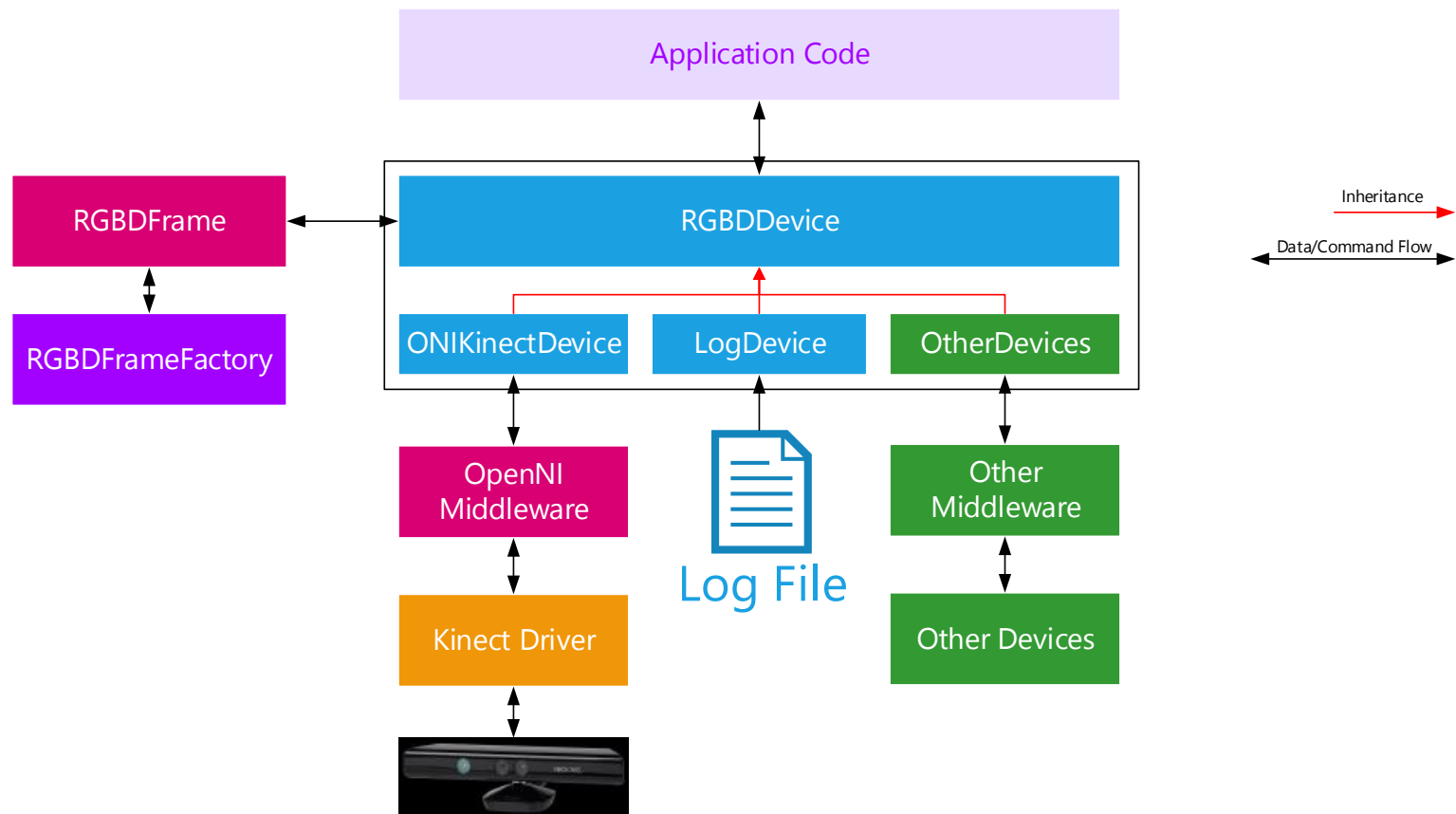
Low-Level Framework

- Capture, synchronize, and optionally save RGB and depth images streaming from RGB-D capture device
- Display and process either live or recorded RGB-D streams



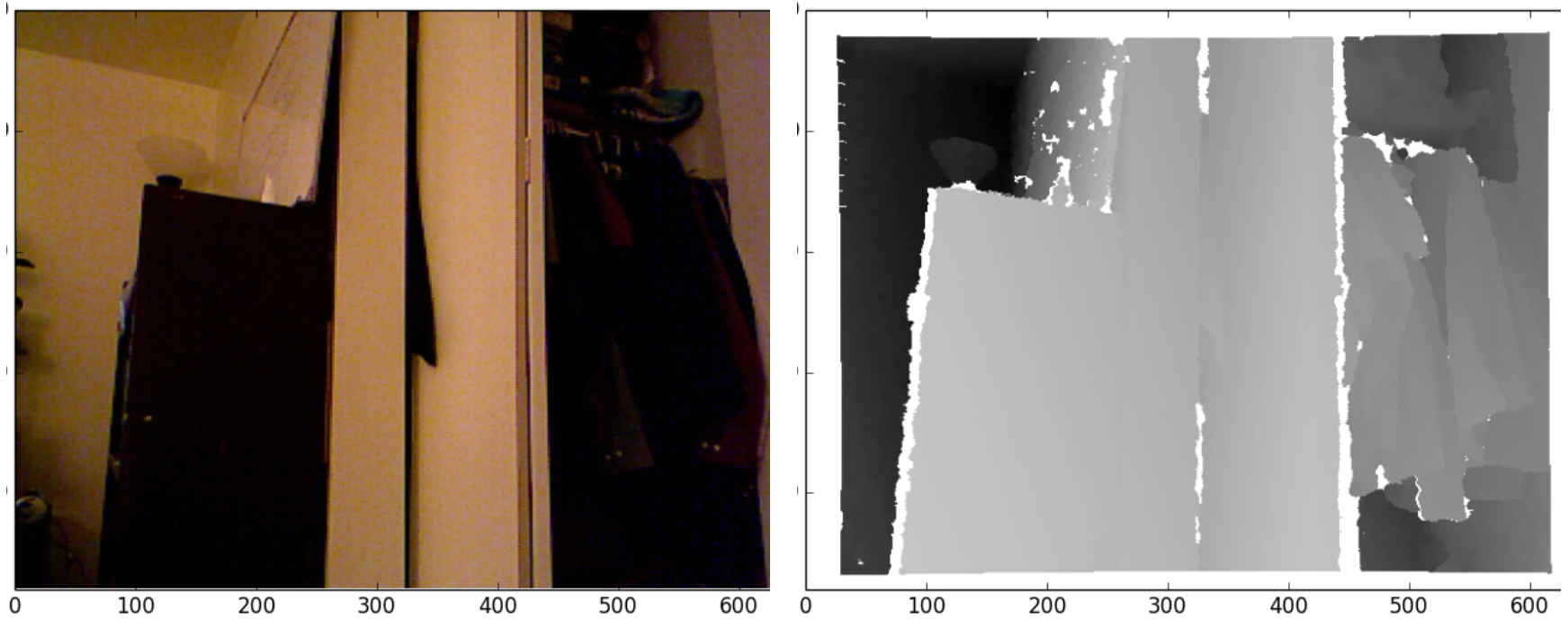
Synchronized RGB and depth streams

Low-Level Framework Architecture



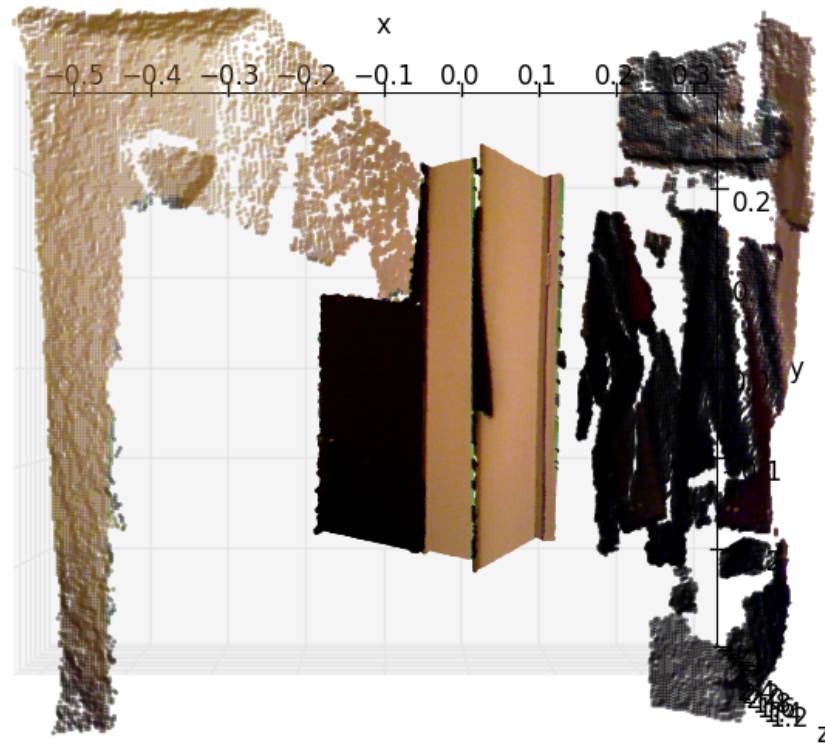
Point Cloud Reconstruction

RGB Image + Depth Image



Point Cloud Reconstruction

Point Cloud



Next Step: Point Normals

- Identify nearest neighbors
 - First pass: XY image window
 - Second pass: 3D radius threshold
- Estimate normal from NN best-fit plane using PCA
- Assign direction using dot-product with camera vector