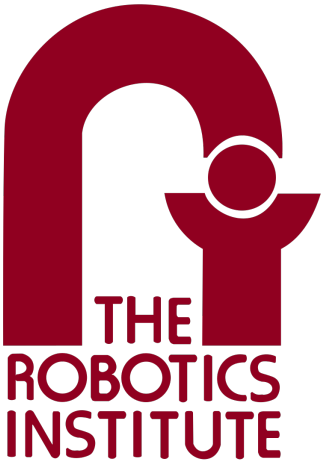
Reading Assignment 2



KinectFusion / NeRF

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1 KinectFusion

KinectFusion is a real-time dense surface mapping and tracking algorithm that reconstructs a 3D environment. At every frame, algorithm performs 4 major steps: 1. Surface Measurement: Uses a raw depth map to obtain a vertex and normal map of 3D points. 2. Pose Estimation: Predict what surface the camera "should" see. Match the vertex and normal map to this predicted surface. 3. Update Reconstruction: Integrate surface measurement into volumetric grid. 4. Surface Prediction: Ray-cast to obtain surface.

2 NeRF

The NeRF (Neural Radiance Field) algorithm synthesizes novel views of a 3D scene using a fully-connected non-convolutional deep network. The network takes the spatial location (x, y, z) and viewing direction (θ, ϕ) as input and outputs the volume density/opacity σ and color (r, g, b). The network comprises of 8 fully-connected ReLU layers to output volume density σ and a feature vector. This vector plus the viewing direction is then passed on to a final fully-connected ReLU layer to output view-dependent RGB color.