# DynamicFusion

# Brief

### Decomposes a non-rigidly deforming scene into a latent geometric surface, into a rigid canonical space

### A per frame volumetric warp field that transforms that surface into the live frame

# Overview

### Estimation of the volumetric model-to-frame warp field parameters

### Fusion of the live frame depth map into the canonical space via the estimated warp field

### Adaptation of the warp-field structure to capture newly added geometry

# Dense Nonridged Warp Field

### A volumetric warp-field

##### For each canonical point , transform point from canonical space into live frame

##### We need to estimate the warp function for each new frame

### Dual-quaternion blending DQB

##### Instead use a sparse set of transformations as bases and define the dense volumetric warp function through interpolation

##### Warp function Where

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are then knn nodes to

defines a weight that alters the radius of influence of each node

converts from quaternions back to an transformation matrix

##### The state of warp field at time t is defined by the values of as set of deformation nodes

Position in the canonical frame

Transformation

A ray dial basis weight , controls

Depends on the sampling sparsity of nodes

##### Transformation

##### Given rigid body transformation common to all points in the volume

# Dense Non-Rigid Surface Fusion

### Sample TSDF

##### For each voxel ,

### projective signed distance

##### Where is the pixel into which the voxel center projects

### Update

# Estimate the Warp-field State

### a dense model-to-frame ICP cost

### penalizes non-smooth motion fields