

## 3D Reconstruction and dimension measurement

Photogrammetry is essential for understanding and conserving aquatic ecosystems, particularly in coral reef research and species preservation. By converting 2D images into 3D models, it enables thorough ecosystem assessment and environmental monitoring. This technology provides vital insights into species behavior, contributing to informed conservation efforts and the sustainable management of aquatic habitats.

### 3D Reconstruction Procedures

In order to reconstruct a 3D model of a specific object, Draven rotates around it while capturing a video that is then saved as a sequence of individual image frames. Subsequently, a Structure From Motion (SfM) algorithm is employed to analyze these image frames, identifying common visual features across the entire sequence. This process enables the estimation of the camera positions and orientations required to create a dense 3D model. The dense model comprises a collection of points representing these common visual features, effectively capturing the intricate details of the object's structure. Finally, to enhance the realism and appearance of the model, a texturing process is applied, effectively adding surface details and colors to produce a complete and visually accurate 3D representation, as specified in Figure 1.

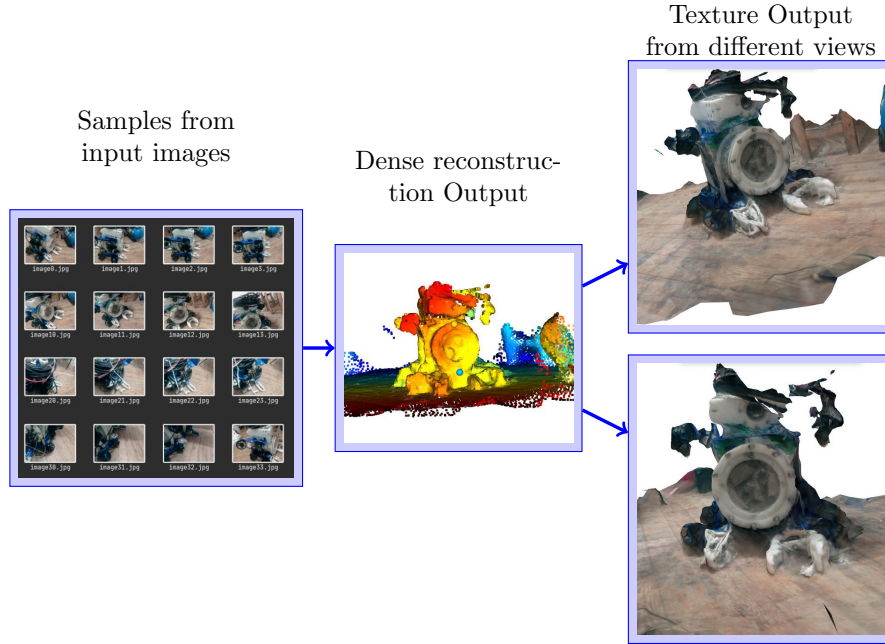


Figure 1: Reconstruction process

## Dimentions measurement procedures

To measure the required dimentions, **Draven** measure a specsified dimation input from user during runtime through a GUI using Streo Camera, then it can be saved as a reference on the 3D model for other dimentions measurement, as specsified in Figure 2.

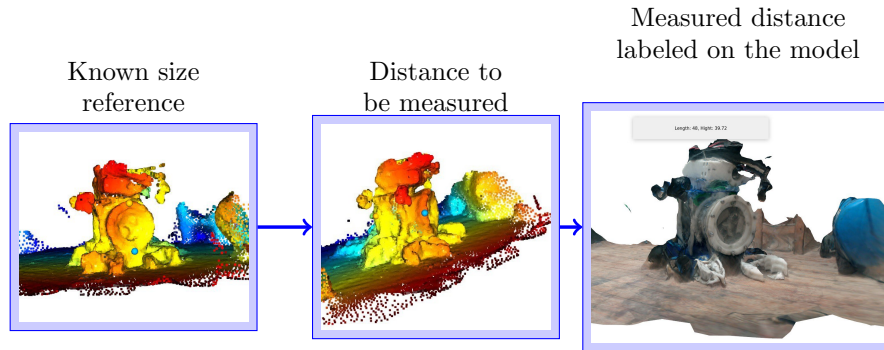


Figure 2: Measuring process