

## Generating Tags

Run the multiscale.m script to produce tag images.

## General Rules for High Quality and Complete Reconstructions

- Each point on the car needs to be seen from at least 3 viewpoints.
- Adjacent viewpoints should not differ by more than 30 degrees and should not change distance by more than 1.5x. (Points on tags are more robust, see below).
- It is better to translate the camera between viewpoints rather than take many pictures from the same point but in different directions.

## Rules for Tag Placement and Usage

The tags form a reference point skeleton that keeps the model together. Example tag locations for a complete interior and exterior vehicle model are shown on the next page.

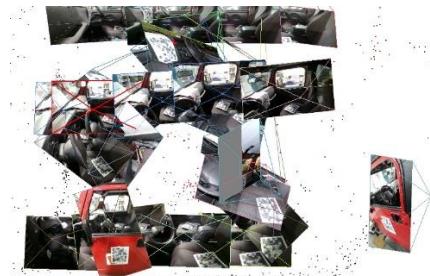
- Each tag should appear in at least 3 pictures from different locations
- Adjacent tags on the vehicle should be clear in at least one picture. This allows the spanning tree to be connected.
- It is okay if two views of a tag are from very different angles and distances as long as the tag is not viewed too much on edge.

### Exterior Reconstruction

- Pictures should be taken from high (head height), middle (waist height), and low (knee height). If a reconstruction that includes the roof is required, pictures may need to be taken from a ladder.

### Interior Reconstruction

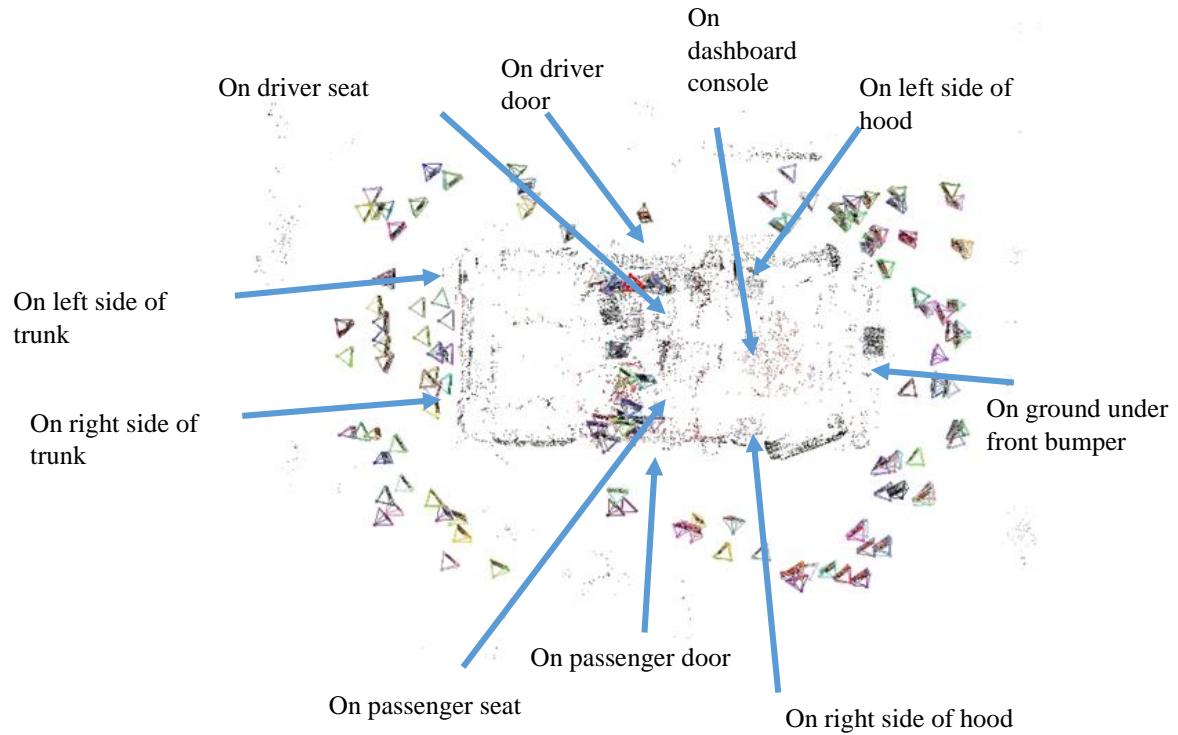
- Pictures should be taken from the driver and passenger side windows as shown below. Do not take pictures from the same viewpoint, the camera image planes should fill the entire window.
- Make sure some pictures include both tags on the seats and the tag on the console.
- At least one picture should include the tag on the door so that the interior model can be joined with the exterior model.



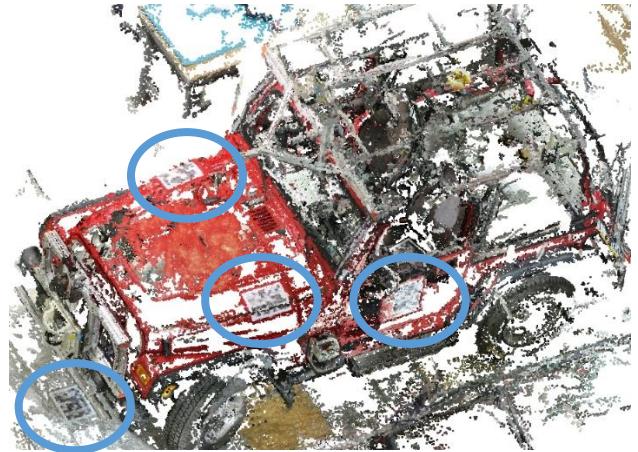
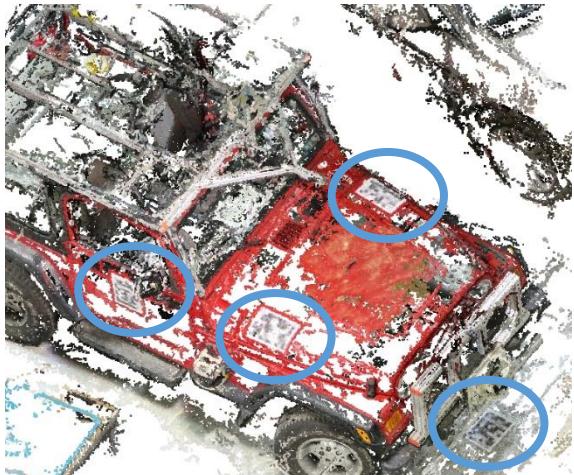
The pictures are taken at relatively the same angle but fill the entire window area.

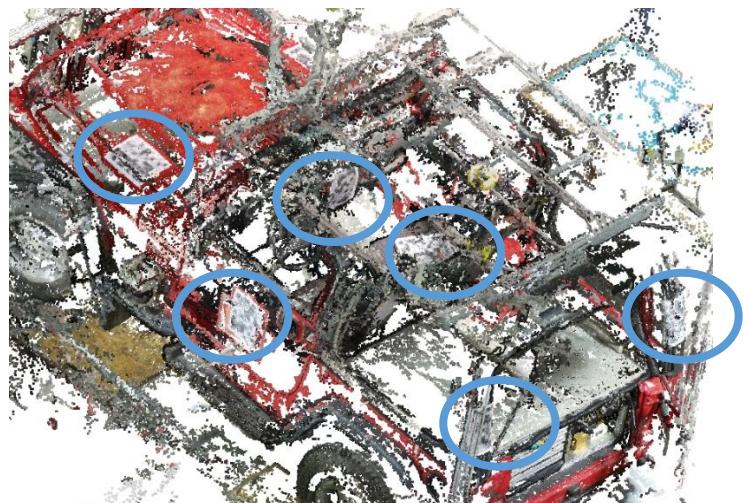
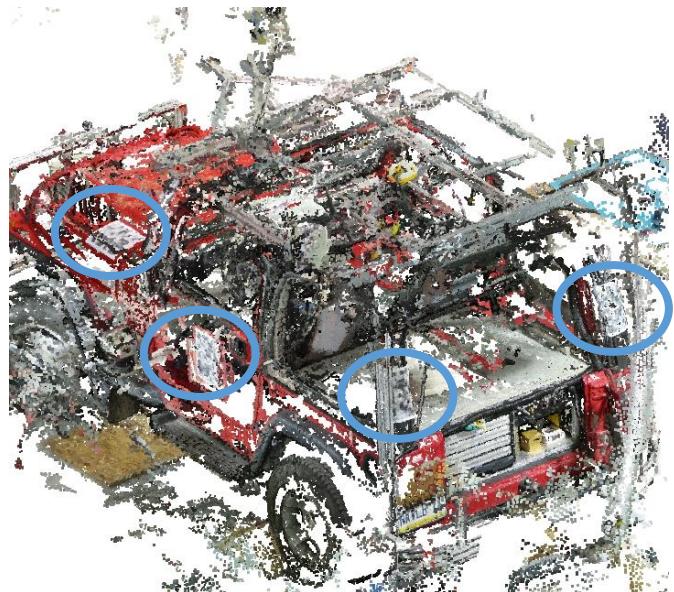
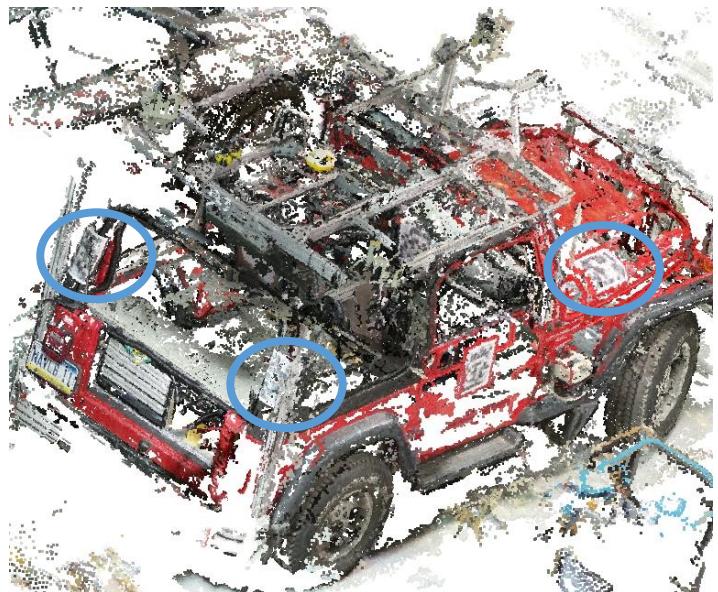
Notice the pictures that include the tag on the door as well as some of the interior tags.

## Example Tag Locations



Tag locations are indicated with blue circles:

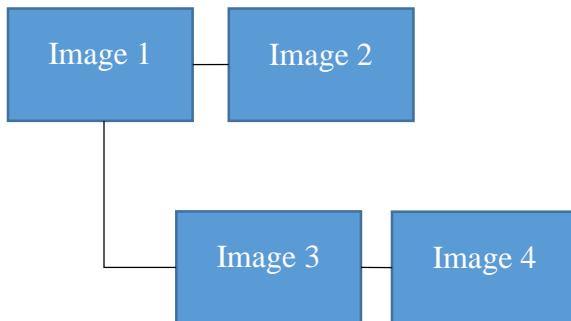




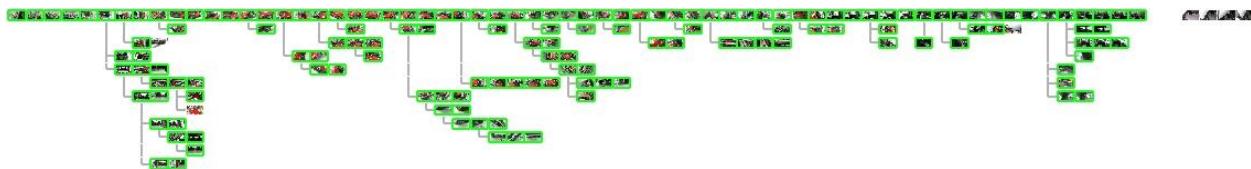
## Using VisualSfM

## Spanning Forest (SfM > Pairwise Matching > Show Spanning Forest)

This tree displays the connections between the images that form the model. Images that are adjacent horizontally and connected with a grey line are strongly connected. Vertical grey lines indicate a divergence in the forest as shown below: Image 1 and Image 2 are strongly connected (have many inlier matches), as are Image 3 and Image 4. Image 1 and Image 3 are also strongly connected, but Image 2 and Image 3 are not (they have few or no inlier matches).



Since we usually want images from all around the vehicle a good spanning forest should look like the one below. Press the up and down arrow keys to highlight the different models in green. Ideally all of the images should be part of the same model, as shown below.



### Inlier Matches (View > Inlier Matches)

Right click a pair of images in the spanning forest and click **View > Inlier Matches**. This view shows the two images next to each other with green lines connecting matched features. An example is shown below. Note how strongly the tag matches between the two images. If the green lines are too dense, use **View > More Options > Show Rand Match** and use the up and down arrow keys to jump between matches. This is useful for checking that the matches are correct.

