of an object. FIG. **11** shows an original stereo reconstruction derived from these images, and as can be seen it is very noisy. In the noise elimination stage, points in the foreground and background, as well as those reconstructed from mismatched pairs are removed. The result is given in the image of FIG. **12**. It can be seen that holes are enlarged in some areas on the point set after the noise elimination. This problem is introduced by the 3D spatial filtering, where neighborhood support is used to eliminate the isolated points. Obviously, there should be a tradeoff between the cleanliness and the completeness of the point set from a single reconstruction. We emphasize the former in the noise elimination phase and leave the latter to be handled in the registration stage, where point sets from multiple reconstructions are merged together. The image of FIG. **13** shows an overlay of four unregistered clusters of stereo reconstruction points, and the image of FIG. **14** is the point set after these four clusters are registered with the ICP method. The final result of the registration stage is a complete sample point set of the target object, and with fewer holes on it as can be seen. The geometric model extracted from the registered point set is shown in the image of FIG. **16**, and the image of the real object, captured from a similar front viewpoint, is shown in the image of FIG. **15**. Note that the upper part of the inner hole is poorly reconstructed, probably due missing data from the original images.

References

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Wherefore, what is claimed is:

1. A computer-implemented process for modeling an object, comprising the actions of:

capturing images of the object that collectively depict all the object's surfaces which are to be modeled;

deriving a 3D reconstruction of a portion of the object's surfaces from each of a plurality of sets of one or more of the images, said 3D reconstructions comprising a plurality of point locations corresponding to points on the object's surfaces;

registering each 3D reconstruction to a common coordinate system to produce an overall 3D reconstruction of the object's surfaces;

extracting a surface representation of the object from the overall 3D reconstruction; and

creating a texture map for the surface representation of the object using the previously captured images of the object.

2. The process of claim **1**, further comprising performing a noise reduction procedure prior to performing the action of registering the 3D reconstructions, said noise reduction comprising, for each 3D reconstruction, the actions of:

(a) calculating a mean distance of the points making up a 3D reconstruction, from the origin of a 3D coordinate system associated with a camera used to capture the images employed in computing the reconstruction, in each of the three orthogonal directions;

(b) calculating a variance of the points making up the 3D reconstruction in each of the orthogonal directions based on the mean computed for the respective direction;

(c) eliminating points existing outside a region that extends the same distance both ways from the computed mean in each orthogonal direction to a total distance that is a prescribed multiple of the computed variance for that direction;

(d) repeating process actions (a) through (c);

(e) determining if the newly computed mean and variance in each orthogonal direction has changed more than a prescribed limit for each when compared to the corresponding mean and variance computed during the preceding iteration;

(f) repeating process actions (a) through (c), and (e), whenever the newly computed mean and variance in any orthogonal direction has changed more than the prescribed limits for that direction when compared to the corresponding mean and variance computed during the preceding iteration.

3. The process of claim **1**, further comprising performing a noise reduction procedure prior to performing the action of registering the 3D reconstructions, said noise reduction comprising, for each 3D reconstruction, the actions of:

dividing a 3D space containing all the reconstruction points associated with a 3D reconstruction into voxels;

ascertaining which voxels contain at least one reconstruction point; and

for each reconstruction point,

identifying the voxel containing the reconstruction point,

identifying a prescribed number of voxels neighboring the previously identified voxel,

counting the number of reconstruction points contained within all the identified voxels,

determining whether the number of points counted exceeds a prescribed limit, and

eliminating the reconstruction point from the 3D reconstruction whenever the number of points counted does not exceed the prescribed limit.

4. The process of claim **1**, wherein the process action of extracting a surface representation of the object from the overall 3D reconstruction, comprises the actions of:

dividing a 3D space containing all the reconstruction points associated with the overall 3D reconstruction into voxels;

ascertaining which voxels contain at least one reconstruction point;

for each voxel containing at least one reconstruction point,

identifying a prescribed number of voxels neighboring the voxel,

computing a plane that best fits the reconstruction points contained within the voxel and the identified neighboring voxels to define a plane representing the surface of the object being modeled in the voxel; and

extracting a triangular-mesh representation of the surface of the object being modeled based on the planes defined for each voxel containing reconstruction points.

5. The process of claim **4**, wherein the process action of computing a plane that best fits the reconstruction points contained within a voxel and its neighboring voxels, comprises the actions of:

computing the centroid of the reconstruction points contained within the voxel and its previously identified neighboring voxels;