## CLAIMS

1. A method for performing localization of a robot device comprising:
Sub-dividing an environment of the robot device into a plurality of voxels;
Assigning a hash value to each voxel;
Assigning, to each hash value, a list of map points of a map of the environment of the robot device which are located in the voxel to which the hash value is assigned;
At every iteration of multiple iterations of localization
- Acquiring an observation via a point cloud indicating object surface points in the environment relative to the robot device; and
- Determining, for each candidate configuration of a plurality of candidate configurations of the robot device within the environment, for each point of the point cloud, the hash of voxel to which the point would belong if the robot device were at the candidate configuration, linearly searching through the list of the map points assigned to the determined voxel for the map point nearest to the point of the point cloud and evaluating the candidate configuration based on the distance of the point of the point cloud to the map point of the list nearest to the point of the point cloud.

2. The method of claim 1, comprising performing localization of the robot device using Monte-Carlo Localization, wherein each candidate configuration corresponds to a particle and the method comprises weighing each particle according to the evaluation of the candidate configuration.

3. The method of claim 1 or 2, comprising determining the distance of the point of the point cloud to the map point of the list nearest to the point of the point cloud for each point of the point cloud and comprising evaluating the candidate configuration based on a combination of the determined distances.

4. The method of any one of claims 1 to 3, wherein each candidate configuration comprises a candidate position.

5. The method of any one of claims 1 to 4, wherein each candidate configuration comprises a candidate orientation.

6. The method of any one of claims 1 to 5, wherein the environment is a 3D environment and the map is a 3D map.

7. The method of any one of claims 1 to 6, wherein the observation is acquired from sensor data obtained by a sensor of the robot device.

8. The method of any one of claims 1 to 7, wherein the sensor data comprises lidar sensor data and/or radar sensor data.

9. The method of any one of claims 1 to 8, comprising determining a configuration of the robot device from the evaluated candidate configurations.

10. A method for controlling a robot device comprising performing localization of the robot device according to claim 9 and controlling the robot device according to the determined configuration.

11. A robot control system comprising one or more sensors, a memory and a processing unit configured to perform the method of any one of claims 1 to 10.

12. A computer program element comprising program instructions, which, when executed by one or more processors, cause the one or more processors to perform the method of any one of claims 1 to 10.

13. A computer-readable medium comprising program instructions, which, when executed by one or more processors, cause the one or more processors to perform the method of any one of claims 1 to 10.