WHAT IS CLAIMED IS:

1. A high-accuracy AMR positioning system, comprising:

a hybrid odometry generation module configured to receive raw information obtained through multiple sensors on an AMR so as to generate hybrid odometry of the AMR during navigation of the AMR according to a map, wherein the hybrid odometry generation module is configured to perform a phase 1 sensor fusion for determining position information and a phase 2 sensor fusion for determining orientation information to generate the hybrid odometry;

an object recognition module configured to perform machine vision-based object recognition to identify an object from one or more image frames and obtain a corresponding object pose relative to the AMR during the navigation;

a coordinate update module connected with the hybrid odometry generation module and the object recognition module, and configured to receive the object pose from the object recognition module and the hybrid odometry from the hybrid odometry generation module to obtain and update an object coordinate on the map, wherein the object coordinate is updated according to the object pose and the hybrid odometry; and

an odometry correction module connected to the hybrid odometry generation module, the coordinate update module and the object recognition module, and configured to generate a corrected odometry based on the object pose of the object identified as a nearest landmark by the object recognition module.

2. The high-accuracy AMR positioning system according to claim 1, wherein an Iterative Closest Point (ICP) algorithm is used in the phase 1 sensor fusion to generate a primary odometry; and an extended Kalman filter (EKF) algorithm is used in the phase 2 sensor fusion to generate a secondary

odometry.

3. The high-accuracy AMR positioning system according to claim 1, wherein the multiple sensors are chosen from: LiDAR, inertial measurement unit (IMU), and wheel odometer.

4. The high-accuracy AMR positioning system according to claim 1, wherein the object recognition module comprises a pre-trained learning model for performing the machine vision-based object recognition and a mathematical model for distance and orientation estimation.

5. The high-accuracy AMR positioning system according to claim 4, wherein the pre-trained learning model is configured to detect the object and extract relevant features across image frames, and the mathematical model is configured to estimate distance and orientation of the object and transform from an image coordinate system to a robot coordinate system.

6. The high-accuracy AMR positioning system according to claim 5, wherein the object coordinate is labeled as a key landmark on the map according to total traveled paths of the AMR, and label information of the key landmark is stored in a map database.

7. The high-accuracy AMR positioning system according to claim 6, wherein the key landmark with nearest pose relative to the AMR is utilized to generate the corrected odometry.

8. A high-accuracy AMR positioning method, comprising steps of:

a) receiving raw information obtained through multiple sensors on an AMR so as to generate hybrid odometry of the AMR during navigation of the AMR according to a map, wherein a phase 1 sensor fusion is performed for determining position information and a phase 2 sensor fusion is performed for determining orientation information to generate the hybrid odometry;

b) performing machine vision-based object recognition to identify an object from one or more image frames and obtain corresponding object pose relative to the AMR and during the navigation of the AMR;

c) receiving the object pose of the object and the hybrid odometry of the AMR to obtain and update an object coordinate on the map, wherein the object coordinate is updated according to the object pose and the hybrid odometry; and

d) generating a corrected odometry based on the object pose of the object recognized as a nearest landmark by the object recognition module.

9. The high-accuracy AMR positioning method according to claim 8, wherein an Iterative Closest Point (ICP) algorithm is used in the phase 1 sensor fusion to generate a primary odometry; and an extended Kalman filter (EKF) algorithm is used in the phase 2 sensor fusion to generate a secondary odometry.

10. The high-accuracy AMR positioning method according to claim 8, wherein the multiple sensors are chosen from: LiDAR, inertial measurement unit (IMU), and wheel odometer.

11. The high-accuracy AMR positioning method according to claim 8, wherein a pre-trained learning model is used for machine vision-based recognition and a mathematical model is used for distance and orientation estimation.

12. The high-accuracy AMR positioning method according to claim 11, wherein the step (b) comprises steps of:

(b1) detecting the object and extract relevant features across image frames; and

(b2) estimating distance and orientation of the object and transform from an image coordinate system to a robot coordinate system.

13. The high-accuracy AMR positioning method according to claim 12, wherein the step (c) further comprises a step of:

(c1) labeling the object coordinate as a key landmark on the map according to a traveled path of the AMR and recording the label information of the key landmark in a map database.

14. The high-accuracy AMR positioning method according to claim 13, wherein the step (d) further comprises steps of:

(d1) identifying the key landmark along the traveled path with nearest pose relative to the AMR; and

(d2) calculating errors of the hybrid odometry based on the object coordinate of the key landmark to generate the corrected odometry.