

CLAIMS

1. A transferring robot, comprising: a master control and processing unit, a pick-and-place mechanism, and a marker detection unit, wherein a body of the robot runs on a plane of a storage region, the storage region is provided with an inventory bracket for storing an inventory container, and the marker detection unit is arranged on the pick-and-place mechanism, and wherein

the master control and processing unit is configured to: according to target deposit-removal position information of a target inventory container, control the robot body to move to a first horizontal position and control the pick-and-place mechanism to move to a first height position;

the marker detection unit comprises a marker detection device and / or an edge detection device, the marker detection device is configured to: detect by the marker detection device, in a case that the robot body and the pick-and-place mechanism stop moving, a target storage position marker provided at a target storage position in a view field comprising a target inventory bracket, or detect by the edge detection device, in a case that the robot body and the pick-and-place mechanism stop moving, at least two target container edges of a target inventory container in a view field comprising a target inventory bracket; and

the master control and processing unit is further configured to: calibrate a position of the pick-and-place mechanism according to a position of the target storage position marker, and deposit a carried target inventory container at the target storage position on the target inventory bracket in a case that the calibration is completed; or calibrate a position of the pick-and-place mechanism according to positions of the at least two target container edges; and remove the stored target inventory container from a target storage position on the target inventory bracket in a case that the calibration is completed.

2. The transferring robot according to claim 1, wherein for controlling the robot body to move to the first horizontal position according to the target deposit-removal position information of the target inventory container, the master control and processing unit is configured to:

acquire a navigation path of the robot on the plane of the storage region according to a horizontal position coordinate indicated by the target deposit-removal position information;

and

control, based on the navigation path, the robot to travel to a first horizontal position aligned with the horizontal position indicated by the target deposit-removal position information.

5 3. The transferring robot according to claim 2, wherein for controlling the robot to travel based on the navigation path, the master control and processing unit is further configured to:

determine a horizontal position of the robot body on the plane of the storage region and a traveling direction of the robot body in real time; and

10 correct, based on the horizontal position and the traveling direction determined in real time, a traveling deviation of the robot body on the plane of the storage region.

4. The transferring robot according to any one of claims 1 to 3, wherein

the robot body is further provided with a lifting mechanism;

the master control and processing unit is further configured to control the lifting mechanism to lift the height of the pick-and-place mechanism; and

15 the master control and processing unit is further configured to detect a height of the pick-and-place mechanism relative to the plane of the storage region in real time, and stop the lifting when the pick-and-place mechanism is lifted to the first height position.

5. The transferring robot according to claim 4, wherein the master control and processing unit is further configured to:

20 while controlling the robot body to move to the first horizontal position of the plane of the storage region, control the lifting mechanism for the pick-and-place mechanism to lift the height of the pick-and-place mechanism of the robot relative to the plane of the storage region; or

25 after controlling the robot body to move to the first horizontal position of the plane of the storage region and stop moving, control the lifting mechanism for the pick-and-place mechanism to lift the height of the pick-and-place mechanism of the robot relative to the plane of the storage region.

6. The transferring robot according to claim 4 or 5, wherein the master control and processing unit is further configured to:

detect, by a wire-pull encoder or a position detection sensor, the height of the pick-and-place mechanism relative to the plane of the storage region in real time; and

if it is detected that the height of the pick-and-place mechanism relative to the plane of the storage region where the robot runs reaches the first height position, control the lifting
5 mechanism for the pick-and-place mechanism to stop lifting, wherein the first height position is determined based on a height position coordinate indicated by the target deposit-removal position information and a preset height deviation.

7. The transferring robot according to any one of claims 1 to 6, wherein the marker
10 detection device is arranged at a lower end of a fork holding assembly of the pick-and-place mechanism, and the target storage position marker at a distance from the marker detection device being less than a predetermined distance is in a detection view field of the marker detection device;

the edge detection device is arranged at an upper end of a fork holding assembly of the pick-and-place mechanism, and the target container edge of the target inventory container at a
15 distance from the edge detection device being less than a predetermined distance is in a detection view field of the edge detection device.

8. The transferring robot according to any one of claims 1 to 7, wherein

the master control and processing unit is further configured to determine a relative
20 position deviation between a marker center of the target storage position marker and a preset position of the pick-and-place mechanism, or determine a relative position deviation between a container center of the at least two target container edges and a preset position of the pick-and-place mechanism, wherein the relative position deviation comprises a horizontal position deviation and/or a height position deviation; and

the master control and processing unit is further configured to: if the relative position
25 deviation does not meet a preset deviation condition,

control the robot body to move from the first horizontal position to a second horizontal position, to drive a horizontal position adjustment of the pick-and-place mechanism of the robot; and/or

control the pick-and-place mechanism of the robot to move from the first height
30 position to a second height position, so that a relative position deviation between the marker

center and the preset position of the pick-and-place mechanism after the movement meets the preset deviation condition.

9. The transferring robot according to claim 7, wherein

the fork holding assembly of the pick-and-place mechanism comprises a first fork component and a second fork component, the first fork component is provided with a first infrared sensor, the second fork component is provided with a second infrared sensor, and the first fork component has a same retractable direction as the second fork component;

the master control and processing unit is further configured to: after the pick-and-place mechanism of the robot moves to the first height position, control the robot body to move near a position aligned with the target inventory container; and

the master control and processing unit is further configured to: control the pick-and-place mechanism to be aligned with the target inventory container according to a change of a signal acquired by the first infrared sensor and a change of a signal acquired by the second infrared sensor during the movement of the robot body.

10. The transferring robot according to claim 9, wherein the edge detection device is configured to acquire at least three container edges from at least three sides of the target inventory container facing a side of the target inventory container, or acquire a complete container edge of the target inventory container.

11. A transferring method based on a robot, wherein the robot comprises a robot body and a pick-and-place mechanism, the robot body runs on a plane of a storage region, and the storage region is provided with an inventory bracket for storing an inventory container, and wherein the method comprises:

controlling the robot body to move to a first horizontal position and controlling the pick-and-place mechanism to move to a first height position according to target deposit-removal position information of a target inventory container;

detecting, by a marker detection device, a target storage position marker provided at a target storage position in a view field comprising a target inventory bracket in a case that the robot body and the pick-and-place mechanism stop moving, or detecting, by an edge detection device, at least two target container edges of the target inventory container in a view field comprising a target inventory bracket in a case that the robot body and the pick-and-place

mechanism stop moving;

calibrating a position of the pick-and-place mechanism according to a position of the target storage position marker or positions of the at least two target container edges; and

depositing a carried target inventory container at the target storage position on the target
5 inventory bracket in a case that the calibration is completed or removing the stored target inventory container from a target storage position on the target inventory bracket.

12. The method according to claim 11, wherein controlling the robot body to move to the first horizontal position according to the target deposit-removal position information of the target inventory container comprises:

10 acquiring a navigation path of the robot on the plane of the storage region according to the horizontal position coordinate indicated by the target deposit-removal position information; and

controlling, based on the navigation path, the robot to travel to a first horizontal position aligned with the horizontal position indicated by the target deposit-removal position
15 information, wherein,

determining a horizontal position of the robot body on the plane of the storage region and a traveling direction of the robot body in real time in a process of controlling the robot to travel based on the navigation path; and

correcting, based on the horizontal position and the traveling direction determined in real
20 time, a traveling deviation of the robot body on the plane of the storage region.

13. The method according to any one of claims 11 to 12, wherein controlling the pick-and-place mechanism to move to the first height position comprises:

controlling the lifting mechanism for the pick-and-place mechanism to lift the height of the pick-and-place mechanism; and

25 detecting a height of the pick-and-place mechanism relative to the plane of the storage region in real time, and stopping the lifting when the pick-and-place mechanism is lifted to the first height position.

14. The method according to claim 13, wherein controlling the robot body to move to the first horizontal position and controlling the pick-and-place mechanism to move to the first

height position according to the target deposit-removal position information of the target inventory container comprises:

while controlling the robot body to move to the first horizontal position of the plane of the storage region, controlling the lifting mechanism for the pick-and-place mechanism to lift the height of the pick-and-place mechanism of the robot relative to the plane of the storage region; or

after controlling the robot body to move to the first horizontal position of the plane of the storage region and stop moving, controlling the lifting mechanism for the pick-and-place mechanism to lift the height of the pick-and-place mechanism of the robot relative to the plane of the storage region.

15. The method according to claim 13 or 14, wherein the controlling the pick-and-place mechanism to move to the first height position comprises:

detecting, by a wire-pull encoder or a position detection sensor, the height of the pick-and-place mechanism relative to the plane of the storage region in real time; and

controlling the lifting mechanism for the pick-and-place mechanism to stop lifting if it is detected that the height of the pick-and-place mechanism relative to the plane of the storage region where the robot runs reaches the first height position, wherein, the first height position is determined based on a height position coordinate indicated by the target deposit-removal position information and a preset height deviation.

16. The method according to any one of claims 11 to 15, wherein the marker detection device is arranged at a lower end of a fork holding assembly of the pick-and-place mechanism, and the target storage position marker at a distance from the marker detection device being less than a predetermined distance is in a detection view field of the marker detection device;

the edge detection device is arranged at an upper end of a fork holding assembly of the pick-and-place mechanism, and the target container edge of the target inventory container at a distance from the edge detection device being less than a predetermined distance is in a detection view field of the edge detection device.

17. The method according to any one of claims 11 to 16, wherein calibrating a position of the pick-and-place mechanism according to a position of the target storage position marker or positions of the at least two target container edges comprises:

determining a relative position deviation between a marker center of the target storage position marker and a preset position of the pick-and-place mechanism, or determining a container center of the target inventory container according to the positions of the at least two target container edges, determining a relative position deviation between the container center and a preset position of the pick-and-place mechanism, wherein the relative position deviation comprises a horizontal position deviation and/or a height position deviation; and

if the relative position deviation does not meet a preset deviation condition,

controlling the robot body to move from the first horizontal position to a second horizontal position, to drive a horizontal position adjustment of the pick-and-place mechanism of the robot; and/or

controlling the pick-and-place mechanism of the robot to move from the first height position to a second height position, so that a relative position deviation between the marker center and the preset position of the pick-and-place mechanism after the movement meets the preset deviation condition.

18. The method according to any one of claims 11 to 17, further comprising:

after the pick-and-place mechanism of the robot moves to the first height position, controlling the robot body to move near a position aligned with the target inventory container; and

controlling the pick-and-place mechanism to be aligned with the target inventory container according to a change of a signal acquired by a first infrared sensor provided on the pick-and-place mechanism and a change of a signal acquired by a second infrared sensor provided on the pick-and-place mechanism during the movement of the robot body, wherein

the first infrared sensor is mounted on a first fork component of a fork holding assembly of the pick-and-place mechanism, and the second infrared sensor is mounted on a second fork component of the fork holding assembly of the pick-and-place mechanism.

19. A computer-readable storage medium having instructions stored thereon, wherein instructions, when executed by a processor, implement the steps of the method of any one of claims 11-18.

20. A computer program product having a computer software code, and the computer

software code is used to realize the method of any one of claims 11-18 when it is run by a processor.