CLAIMS

1. A system for configuring a robot to interface with equipment to perform a task, the robot comprising a robotic arm, the system comprising:

at least one imaging sensor; and

at least one processor configured to:

obtain at least one image of the equipment captured by the at least one imaging sensor;

determine at least one current position of at least one alignment feature in the at least one captured image, wherein the at least one alignment feature is part of or on the equipment;

determine, using the at least one current position of the at least one alignment feature in the at least one captured image, an alignment difference between a current alignment and a prior alignment of the robot and the equipment; and

configure the robot to interface with the equipment based on the alignment difference.

2. The system of claim 1, wherein the at least one imaging sensor is physically coupled to the robotic arm.

3. The system of claim 2, wherein the at least one processor is configured to:

control position and/or orientation of the at least one imaging sensor so that the at least one alignment feature is in a field of view of the at least one imaging sensor when the at least one imaging sensor is used to capture the at least one image.

4. The system of claim 1 or any other preceding claim, wherein the at least one processor is further configured to:

determine the current alignment based on the prior alignment and the alignment difference; and

configure the robot to interface with the equipment according to the current alignment.

5. The system of claim 1 or any other preceding claim, wherein the at least one processor is configured to determine the alignment difference by:

determining at least one reference position of the at least one alignment feature; and

determining the alignment difference by determining a difference between the at least one reference position of the at least one alignment feature and the at least one current position of the at least one alignment feature.

6. The system of claim 5, wherein:

the at least one alignment feature comprises a first alignment feature and a second alignment feature different from the first alignment feature,

the at least one current position of the at least one alignment feature comprises a first current position of the first alignment feature and a second current position of the second alignment feature, and

the at least one reference position includes a first reference position for the first alignment feature and a second reference position for the second alignment feature, optionally wherein the alignment difference comprises:

a first value determined based on a difference between the first reference position of the first alignment feature and the first current position of the first alignment feature; and

a second value determined based on a difference between the first reference position of the second alignment feature and the second current position of the second alignment feature.

7. The system of claim 1 or any other preceding claim, wherein:

the at least one alignment feature comprises a first alignment feature,

the first alignment feature comprises a visible feature of the equipment, and

the at least one processor is configured to determine the at least one current position of the at least one alignment feature in the at least one captured image by detecting the visible feature of the equipment in the at least one captured image,

optionally wherein the visible feature is a component of the equipment, an edge of the equipment, or a corner of the equipment.

8. A method for configuring a robot to interface with equipment to perform a task using at least one imaging sensor, the robot comprising a robotic arm, the method comprising:

using at least one processor to perform:

obtaining at least one image of the equipment captured by the at least one imaging sensor;

determining at least one current position of at least one alignment feature in the at least one captured image, wherein the at least one alignment feature is part of or on the equipment;

determining, using the at least one current position of the at least one alignment feature in the at least one captured image, an alignment difference between a current alignment and a prior alignment of the robot and the equipment; and

configuring the robot to interface with the equipment based on the alignment difference.

9. The method of claim8, further comprising:

prior to the at least one imaging sensor capturing the at least one image, initially aligning the robot with the equipment using one or more mechanical devices and/or one or more sensors,

wherein initially aligning the robot with the equipment comprises mating a robot platform configured to support the robot with an equipment platform configured to support the equipment, the mating performed using the one or more mechanical devices;

after causing the robotic arm to interface with the equipment,

undocking the robot from the equipment;

after the undocking, using the robot to perform one or more other tasks with other equipment;

after using the robot to perform one or more other tasks, again initially aligning the robot to the equipment using the one or more mechanical devices and/or the one or more sensors;

after again initially aligning the robot to the equipment, using the at least one processor to perform:

obtaining at least one second image of the equipment captured by the at least one imaging sensor;

determining at least one second current position of the at least one alignment feature in the at least one captured image;

determining, using the at least one second current position of the at least one alignment feature in the at least one captured image, a second alignment difference between a second current alignment of the robot and the equipment with respect to a second prior alignment of the robot and the equipment;

configuring the robot to interface with the equipment based on the second alignment difference; and

following the configuring, causing the robotic arm to interface with the equipment to perform one or more actions in furtherance of the task.

10. The method of claim 8 or 9, further comprising, by the at least one processor:

determining the current alignment based on the prior alignment and the alignment difference; and

configuring the robot to interface with the equipment according to the current alignment.

11. The method of any one of claims 8-10, wherein determining the alignment difference comprises:

determining at least one reference position of the at least one alignment feature; and

determining the alignment difference by determining a difference between the at least one reference position of the at least one alignment feature and the at least one current position of the at least one alignment feature.

12. The method of claim 11, wherein:

the at least one alignment feature comprises a first alignment feature and a second alignment feature different from the first alignment feature,

the at least one current position of the at least one alignment feature comprises a first current position of the first alignment feature and a second current position of the second alignment feature, and

the at least one reference position includes a first reference position for the first alignment feature and a second reference position for the second alignment feature, optionally wherein the alignment difference comprises:

a first value determined based on a difference between the first reference position of the first alignment feature and the first current position of the first alignment feature; and

a second value determined based on a difference between the first reference position of the second alignment feature and the second current position of the second alignment feature.

13. The method of any one of claims 8-12, wherein:

the at least one alignment feature comprises a first alignment feature,

the first alignment feature comprises a visible feature of the equipment, and

determining the at least one current position of the at least one alignment feature in the at least one captured image comprises detecting the visible feature of the equipment in the at least one captured image.

14. The method of claim 13, wherein the visible feature is a component of the equipment, an edge of the equipment or a corner of the equipment.

15. At least one non-transitory computer-readable medium storing processor-executable instructions that, when executed by at least one computer hardware processor, cause the at least one computer hardware processor to execute the method of any of claims 8-14.