

CLAIMS

1. A computer-implemented method of controlling at least one of a first robot and a second robot to collaborate within a system, the first robot and the second robot being physically separate to one another, the method comprising:
 - 5 receiving sensed data associated with the second robot;
 - determining at least one of a position and an orientation of the second robot using the received sensed data;
 - storing, in a memory, data regarding a structure of an object on which the second robot is to perform an action;
 - 10 determining the action for the second robot using the stored data of the structure of the object and the at least one of the determined position and the determined orientation of the second robot;
 - generating a control signal based on the structure of the object and the at least one of the determined position and the determined orientation; and
 - 15 providing the control signal to the second robot to cause the second robot to perform the determined action to collaborate with the first robot and avoid collisions with other objects.
2. The computer-implemented method as claimed in claim 1, wherein
 - 20 the sensed data is associated with a first end of the second robot, the first end comprising one or more devices for performing the determined action.
3. The computer-implemented method as claimed in claim 1, further comprising controlling a three dimensional scanner to obtain the sensed data.

4. The computer-implemented method as claimed in claim 3, wherein the three dimensional scanner is mounted on the first robot.

5. The computer-implemented method as claimed in claim 3, wherein
5 controlling the three dimensional scanner includes: controlling an emitter to emit electromagnetic waves, the sensed data being received from an electromagnetic wave sensor.

6. The computer-implemented method as claimed in claim 3, wherein
10 controlling the three dimensional scanner includes: controlling an ultrasonic transducer to emit ultrasonic waves, the sensed data being received from the ultrasonic transducer.

7. The computer-implemented method as claimed in claim 1, further
15 comprising controlling a magnetic transmitter arrangement to provide one or more magnetic fields, the second robot being at least partially positioned within the one or more magnetic fields, the sensed data being received from a magnetic field sensor mounted on the second robot.

20 8. The computer-implemented method as claimed in claim 1, wherein the determined action includes movement relative to the system.

9. The computer-implemented method as claimed in claim 1, wherein the determined action includes holding an object within the system to prevent movement of the object within the system.

10. The computer-implemented method as claimed in claim 1, wherein the determined action includes obtaining one or more images of the first robot and/or the system.

5 11. The computer-implemented method as claimed in claim 1, wherein the determined action includes machining an object within the system.

12. The computer-implemented method as claimed in claim 1, further comprising: receiving sensed data associated with the first robot;
10 determining position and/or orientation of the first robot using the received sensed data;
determining an action for the first robot using the determined position and/or orientation of the first robot; and
providing a control signal to the first robot to cause the first robot to perform
15 the determined action to collaborate with the second robot.

13. A non-transitory computer readable storage medium comprising computer readable instructions that, when read by a computer, cause the computer to execute a method of controlling at least one of a first robot and a second robot to
20 collaborate within a system, the first robot and the second robot being physically separate to one another, the method comprising:
receiving sensed data associated with the second robot;
determining at least one of a position and an orientation of the second robot using the received sensed data;

storing, in a memory, data regarding a structure of an object on which the second robot is to perform an action;

determining the action for the second robot using the stored data of the structure of the object and the at least one of the determined position and the
5 determined orientation of the second robot;

generating a control signal based on the structure of the object and the at least one of the determined position and the determined orientation; and

providing the control signal to the second robot to cause the second robot to perform the determined action to collaborate with the first robot and avoid collisions
10 with other objects.

14. An apparatus for controlling at least one of a first robot and a second robot to collaborate within a system, the first robot and the second robot being physically separate to one another, the apparatus comprising a controller configured
15 to:

receive sensed data associated with the second robot;

determine position and/or orientation of the second robot using the received sensed data;

determine an action for the second robot using the determined position and/or
20 orientation of the second robot; and

provide a control signal to the second robot to cause the second robot to perform the determined action to collaborate with the first robot.

15. The apparatus as claimed in claim 14, wherein the controller is
25 configured to:

receiving sensed data associated with the first robot;
determining at least one of a position and an orientation of the first robot using
the received sensed data;
storing, in a memory, data regarding a structure of an object on which the
5 second robot is to perform an action;
determining the action for the first robot using the stored data of the structure
of the object and the at least one of the determined position and the determined
orientation of the first robot;
generating a control signal based on the structure of the object and the at
10 least one of the determined position and the determined orientation; and
providing the control signal to the first robot to cause the first robot to perform
the determined action to collaborate with the second robot and avoid collisions with
other objects.

15 16. The apparatus as claimed in claim 14, further comprising: the first robot
including a first controller and a first actuator; and the second robot including a
second controller and a second actuator.

20 17. The apparatus as claimed in claim 16, wherein the first robot is a
continuum robot having a first base, the first controller and the first actuator being
housed within the first base, and wherein the second robot is a continuum robot
having a second base, the second controller and the second actuator being housed
within the second base, the first base and the second base being movable relative to
one another.

18. The apparatus as claimed in claim 16, wherein the first robot and the second robot each comprise a first end having an interface for interchangeably receiving at least a first device and a second device.

5 19. The apparatus as claimed in claim 18, wherein the first device includes one or more of: imaging apparatus; machining apparatus; clamping apparatus, and the second device includes one or more of: imaging apparatus; machining apparatus; clamping apparatus.