

Claims

1. A toolable multifunction robotic hand comprising:

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a base structure or support section; that is interchangeable and operatively connected to the external command interface through a standardised and polarised interface;

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at least five interchangeable finger units that are hermetically sealed and operatively connected through snap-on polarised connectors to the support section of the robotic hand;

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intelligently controlling said multifunction robotic hand through a communication interface using a plurality of commands to manipulate the mechanical movements of said fingers;

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a set of sensors such as pressure sensors, temperature sensor or displacement sensor selectively integrated at the tips of the robotic finger units, depending upon the tasks to be executed;

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a thumb finger unit operatively connected to the support section to aid in gripping the object;

a first or index finger unit operatively connected to the support section such that it is selectively rotatable with respect to the support section about its vertical axis;

a second or middle finger unit operatively connected to the support section such that it functions as a cleaning unit;

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a third or ring finger unit operatively connected to the support section such that it functions as a pick and place mechanism to move objects;

a fourth or little finger unit operatively connected to the support section such that it functions as a bidirectional rotating tool;

5 a bi-directional motor integrated with an encoder and operatively mounted on the palm or support section of the robotic hand to enable certain tasks to be accomplished that require rotary movements;

10 at least five interchangeable finger units that are operatively connected to the support section to selectively operate and thereby execute multiple tasks; said finger units being configured such that the task assigned to each one of them are independently controllable through a plurality of commands received from standardised interface.

15 2. A toolable multifunction robotic hand of claim 1, wherein the thumb finger unit is suitably integrated with a pressure sensor within the rubber pad to enable feedback and control of the gripping force of the object.

20 3. A toolable multifunction robotic hand of claim 1, wherein the index finger unit is mounted with a cleaning brush on one side of the finger tip and a rubber pad with a solution dispensing hole on the opposite side of the finger tip.

4. A toolable multifunction robotic hand of claim 1, wherein the middle finger unit is functionally mounted with a rubber pad on the finger tip in conjunction with a de-ionised air dispenser.

25 5. A toolable multifunction robotic hand of claim 4, wherein rubber pad is suitably integrated with a temperature sensor to control the temperature of the dispensed air.

30 6. A toolable multifunction robotic hand of claim 1, wherein the ring finger unit is functionally mounted with a suction cup to pick up objects from a predetermined location and place them at a different location.

7. A toolable multifunction robotic hand of claim 1, wherein the little finger unit is functionally integrated with an encoder coupled bi-directional motor, to aid in removing the foil covering of a sealed package to expose the object within.
- 5 8. A toolable multifunction robotic hand of claim 7, wherein positional information from the encoder integrated to the bi-directional motor, is utilised to start and end a predetermined operation that involves di-directional rotation, while engaging a work piece.
- 10 9. A toolable multifunction robotic hand of claim 1, wherein the bi-directional motor operatively mounted on the support section of the robotic hand is operatively integrated with a rotary gripper that is programmable to dynamically exert a gripping force around the object, irrespective of its diameter or profile to execute a predetermined Rotary task.
- 15 10. A toolable multifunction robotic hand comprising:
- a base structure or support section; that is interchangeable and operatively connected to the external command interface through a standardised and polarised interface;
- 20 at least five interchangeable finger units that are hermetically sealed and operatively connected through snap-on polarised connectors to the support section of the robotic hand;
- 25 intelligently controlling said multifunction robotic hand through a communication interface using a plurality of commands to manipulate the mechanical movements of said fingers;
- a set of sensors such as pressure sensors, temperature sensor or displacement sensor
- 30 selectively integrated at the tips of the robotic finger units, depending upon the tasks to be executed;

a thumb finger unit operatively connected to the support section to aid in gripping the object;

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a first or index finger unit operatively connected to the support section to aid in gripping the object;

a second or middle finger unit operatively connected to the support section to aid in gripping the object;

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a third or ring finger unit operatively connected to the support section to aid in gripping the object;

a fourth or little finger unit operatively connected to the support section to aid in gripping the object;

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a high resolution camera and operatively mounted on the palm or support section of the robotic hand to enable certain tasks such locating, aligning and inspection an object, to be accomplished;

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11. A toolable multifunction robotic hand of claim 10, wherein the support section of the robotic hand, comprises a pedestal operatively integrated with vacuum to enable holding an object in place for the purpose of inspection.

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12. A method for removing a sealed cover of a container held by at least two fingers of a multifunction robot hand, the method comprising:

locating the position of blister foil covering the container using the intelligent camera mounted on the support section of the robot hand;

moving the finger unit integrated with the motor to suitably engage with the blister foil;

moving said finger unit towards a predetermined position while simultaneously energising the motor to rotate in a direction that peels the blister foil from the container;

5 stopping the movement of said finger unit reaches the predetermined position wherein the blister foil has been completely removed, exposing the object held in the container; and

the said finger unit moved to another position to dispose the blister foil.

10 13. A method as in claim 12, wherein the container is suitably positioned by finger units of the robotic hand with optimum gripping force with the aid of pressure sensors integrated in the rubber pads positioned at the fingertips.

14. A method for engaging a container held by at least two fingers of a multifunction robot hand to loosen or tighten the cap of a container, the method comprising:

15 locating the position of container cap using the intelligent camera mounted on the support section of the robot hand;

moving the other multifunction robot hand to align its rotary gripper suitably mounted on the support section to engage with the container cap;

20 energising the rotary gripper and bi-directional motor in a direction to loosen or tighten the container cap; and

repositioning the container to begin the next process step.

15. A method as in claim 14, wherein the rotary gripper is coupled with a bi-directional motor suitably integrated with an encoder for positional feedback.