

CLAIMS

What is claimed is:

1. A surgical arm assembly insertable into a cavity of a patient, the surgical arm assembly for use in performing an in vivo surgical action and comprising:

an end-effector assembly, the end-effector assembly having:

a first instrument assembly having:

a first instrument for performing a surgical action;

a first instrument driven portion configurable to be driven in such a way as to move the first instrument relative to a first axis; and

a first instrument insulative portion providable between the first instrument and the first instrument driven portion, the first instrument insulative portion configurable to electrically isolate the first instrument from at least the first instrument driven portion when the first instrument insulative portion is provided between the first instrument and the first instrument driven portion;

a second instrument assembly having:

a second instrument for performing a surgical action;

a second instrument driven portion configurable to be driven in such a way as to move the second instrument relative to the first axis; and

a second instrument insulative portion providable between the second instrument and the second instrument driven portion, the second instrument insulative portion configurable to electrically isolate the second instrument from at least the second instrument driven portion when the second instrument insulative portion is provided between the second instrument and the second instrument driven portion; and

a wrist assembly, the wrist assembly having a proximal end and a distal end separate from the proximal end of the wrist assembly, the distal end of the wrist assembly including a wrist driven portion, the wrist driven portion including a gear, the proximal end of the wrist assembly including a first wrist connector portion, wherein the wrist driven portion is configurable to collectively move the first instrument and second instrument relative to a second axis when the gear of the wrist driven portion is in contact with and driven by a third drive portion, the second axis different from the first axis; and

an arm assembly securable to and unsecurable from the end-effector assembly, the arm assembly having:

a first drive portion, the first drive portion configurable to perform the driving of the first instrument driven portion when the arm assembly is secured to the end-effector assembly;

a second drive portion, the second drive portion configurable to perform the driving of the second instrument driven portion when the arm assembly is secured to the end-effector assembly;

the third drive portion, the third drive portion configurable to be in contact with and drive the gear of the wrist driven portion of the end-effector assembly so as to collectively move the first instrument and the second instrument relative the second axis when the arm assembly is secured to the end-effector assembly; and

a second wrist connector portion at a distal end of the arm assembly, the second wrist connector portion configurable to connect to the first wrist connector portion of the wrist assembly to secure the end effector assembly to the arm assembly, the second wrist connector portion configurable to disconnect from the first wrist connector portion of the wrist assembly to unsecure the end effector assembly from the arm assembly.

2. The surgical arm assembly of claim 1, wherein the first instrument is configurable to further receive a first electric current applied from an energy source so as to perform the actions of an electrosurgical instrument; and

wherein when the first instrument receives the first electric current, the first instrument insulative portion is configurable to electrically isolate the first electric current received by the first instrument from passing through the end-effector assembly to the second instrument.

3. The surgical arm assembly of claim 2, wherein one or more of the following apply:
the first instrument and second instrument are configurable to cooperate to form a monopolar electrical surgical instrument; and

the first instrument and second instrument are configurable to cooperate to form a bipolar electrical surgical instrument.

4. The surgical arm assembly of claim 1,

wherein the surgical arm assembly is in communication with a user interface;

wherein the surgical arm assembly is configurable to provide a haptic feedback response to the user interface when one or more of the following occur:

a movement of the first instrument and/or a movement of the second instrument encounters a resistance;

a driving of the first instrument by the first instrument driven portion and/or a driving of the second instrument by the second instrument driven portion encounters a resistance;

a driving of the first instrument driven portion by the first instrument drive portion and/or a driving of the second instrument driven portion by the second instrument drive portion encounters a resistance;

a driving of the first instrument by the third drive portion and/or a driving of the

second instrument by the third drive portion encounters a resistance; and

a driving of the wrist driven portion by the third drive portion encounters a resistance.

5. The surgical arm assembly of claim 1,

wherein the first instrument and the second instrument are configurable to move independently from one another relative to the first axis; and

wherein the first axis and the second axis are orthogonal to one another.

6. The surgical arm assembly of claim 1,

wherein the first instrument comprises an opening, the opening of the first instrument operable to house at least a portion of the first instrument insulative portion;

wherein the second instrument comprises an opening, the opening of the second instrument operable to house at least a portion of the second instrument insulative portion; and

wherein the first axis is formed through a center of the openings of the first instrument and second instrument.

7. The surgical arm assembly of claim 1,

wherein the movement of the first instrument relative to the first axis includes a rotation of the first instrument relative to the first axis;

wherein the movement of the second instrument relative to the first axis includes a rotation of the second instrument relative to the first axis; and

wherein the movement of the first instrument and second instrument relative to the second axis is a collective rotation of the first instrument and second instrument relative to the second axis.

8. The surgical arm assembly of claim 1,

wherein the first instrument driven portion includes a gear assembly and the first drive portion includes a gear assembly, the gear assembly of the first instrument driven portion configurable to be driven by the gear assembly of the first drive portion so as to move the first instrument relative to the first axis when: (i) the first wrist connector portion of the wrist assembly is connected to the second wrist connector portion of the arm assembly and (ii) the gear assembly of the first drive portion is rotated.

9. The surgical arm assembly of claim 1,

wherein the third drive portion includes a gear assembly, and

wherein the gear of the wrist driven portion is configurable to be driven by the gear assembly of the third drive portion so as to collectively move the first instrument and second instrument relative to the second axis when: (i) the first wrist connector portion of the wrist assembly is connected to the second wrist connector portion of the arm assembly and (ii) the gear assembly of the third drive portion is rotated.