CLAIMS

1. A delivery assembly, comprising:

a prosthetic valve comprising a plurality of intersecting struts, and

a delivery apparatus comprising:

a handle;

a delivery shaft extending distally from the handle; and

a flex sensing assembly, comprising:

at least one flex sensor coupled to at least one of the plurality of struts; and

a control unit in communication with the at least one flex sensor,

wherein the prosthetic valve is movable between a radially compressed configuration and a radially expanded configuration, and

wherein, responsive to an output of the at least one flex sensor, the control unit is configured to generate a signal indicative of a diameter of the prosthetic valve.

2. The delivery assembly of claim 1, wherein the at least one flex sensor comprises a non-bending portion and a bending portion configured to flex relative to the non-bending portion.

3. The delivery assembly of any one of claims 1 to 2, wherein the prosthetic valve further comprises at least one actuator assembly,

wherein the delivery apparatus further comprises an actuation member releasably coupled to the at least one actuator assembly, and

wherein the prosthetic valve is expandable from the radially compressed state to the radially expanded state upon actuating the at least one actuator assembly by the at least one actuation member.

4. The delivery assembly of claim 2, wherein the prosthetic valve further comprises at least one actuator assembly,

wherein the delivery apparatus further comprises an actuation member releasably coupled to the at least one actuator assembly,

wherein the prosthetic valve is expandable from the radially compressed state to the radially expanded state upon actuating the at least one actuator assembly by the at least one actuation member, and

wherein the non-bending portion of the at least one flex sensor is coupled to the at least one actuator assembly.

5. The delivery assembly of any one of claims 1 to 4, further comprising at least one communication channel, a first end of the at least one communication channel coupled to the at least one flex sensor and a second end of the at least one communication channel extending towards the handle,

wherein the at least one communication channel is retractable from the prosthetic valve.

6. The delivery assembly of claim 5, wherein the flex sensing assembly further comprises a sensor shaft extending distally from the handle, and

wherein at least a portion of the at least one communication channel extends through the sensor shaft.

7. The delivery assembly of claim 5 or 6, further comprising:

at least one sensor housing attached to a strut; and

at least one detachable shaft extending distally from the handle, and detachably coupled to the sensor housing,

wherein the at least one flex sensor is locally attached to the at least one sensor housing;

wherein at least a portion of the at least one communication channel extends through the at least one detachable shaft;

wherein the communication channel is detachably coupled to the at least one flex sensor;

wherein the detachable shaft is configured isolate the at least one communication channel from ambient flow, when the detachable shaft is coupled to the sensor housing; and

wherein the at least one communication channel is axially movable relative to the at least one detachable shaft, when the at least one communication channel is detached from the at least one sensor.

8. The delivery assembly of claim 7, wherein the at least one communication channel is detachable from the at least one flex sensor upon application of a pull force on the at least one communication channel, and wherein the magnitude of the pull force is higher than a predetermined threshold magnitude.

9. The delivery assembly of claim 7 or 8, wherein the sensor housing comprises a sensor housing proximal threaded end, and wherein the detachable shaft comprises a detachable shaft distal threaded end, configured to engage with the sensor housing proximal threaded end.

10. The delivery assembly of claim 5 or 6, wherein the at least one flex sensor is an optic flex sensor configured to generate an optic signal, the at least one communication channel being at least one optic conductor, and

wherein the at least one optic conductor is detachably optically coupled to the at least one optic flex sensor.

11. The delivery assembly of any one of claims 1 to 10, wherein the at least one flex sensor is coupled to the strut via at least one coupling member.

12. The delivery assembly of claim 11, wherein the at least one coupling member comprises at least one of: a suture, a band, a tube, and/or a sleeve, and wherein the at least one flex sensor is slidable relative to the at least one coupling member upon application of a force exceeding the frictional force applied by the at least one coupling member on the at least one flex sensor.

13. The delivery assembly of any one of claims 1 to 10, wherein the strut to which the at least one flex sensor is coupled, comprises at least two strut apertures through which the at least one flex sensor extends.

14. The delivery assembly of any one of claims 1 to 13, wherein the at least one flex sensor comprises a variable resistance element, configured to vary its electrical resistivity in response to the extent of bending applied thereto.

15. The delivery assembly of claim 14, wherein the variable resistance element comprises a strain gauge.

16. The delivery assembly of claim 14, wherein the variable resistance element comprises a conductive material layer.

17. The delivery assembly of any one of claims 1 to 13, wherein the at least one flex sensor is an optic flex sensor configured to generate an optic signal.

18. The delivery assembly of claim 17, wherein the at least one optic flex sensor comprises a plurality of axially spaced Fiber Bragg Gratings.

19. The delivery assembly of claim 17 or 18, further comprising at least one optic conductor detachably optically coupled to the at least one optic flex sensor.

20. The delivery assembly of any one of claims 1 to 19, wherein the flex sensing assembly further comprises at least one flexible distal extension, attached to and extending distally from the at least one flex sensor.

21. The delivery assembly of claim 20, wherein the at least one flexible distal extension is resiliently curved sideways.

22. The delivery assembly of claim 20 or 21, wherein the at least one flexible distal extension comprises:

a first flexible distal extension comprising a first distal loop, wherein the first flexible distal extension is attached to and extends distally from the first flex sensor; and

a second flexible distal extension comprising a second distal loop, wherein the second flexible distal extension is attached to and extends distally from the second flex sensor,

wherein the flex sensing assembly further comprises a flexible elongate member extending distally from the handle and through the first distal loop and the second distal loop, and

wherein the flexible elongate member is configured to couple the first flexible distal extension with the second flexible distal extension when extending through the first distal loop and the second distal loop, and to allow separation thereof upon being pulled therefrom.

23. The delivery assembly of any one of claims 1 to 22, wherein at least one of the at least one flex sensors is coupled to at least two intersecting struts.

24. The delivery assembly of any one of claims 1 to 22, wherein the at least one flex sensor comprises a first flex sensor coupled to a first strut, and a second flex sensor coupled to the second strut, wherein the at least one communication channel comprises a first communication channel coupled to the first flex sensor, and a second communication channel coupled to the

second flex sensor, and wherein the first strut and the second strut are intersecting with each other.

25. The delivery assembly of any one of claims 1 to 2 or 5 to 24, further comprising:

an inflatable balloon, the inflatable balloon positioned within the prosthetic valve;

a reservoir containing a predetermined volume of inflation fluid;

a pump in fluid communication with the reservoir; and

a fluid flow channel, a distal end of the fluid flow channel in fluid communication with an opening of the inflatable balloon and a proximal end of the fluid flow channel in fluid communication with the pump,

wherein, movement of the prosthetic valve between the radially compressed configured to the radially expanded configuration is responsive to an inflation of the inflatable balloon, and

wherein the pump is configured to generate flow of the inflation fluid into the inflatable balloon via the fluid flow channel.

26. The delivery assembly of claim 25, further comprising a pressure sensor configured to measure pressure of the inflation fluid,

wherein, responsive to the measured pressure of the inflation fluid, the pump is further configured to adjust the generated flow of the inflation fluid.

27. The delivery assembly of claim 26, wherein the pressure sensor is positioned within the inflation fluid.