CLAIMS

1. A relay for a near-field communication system comprising:

a flexible substrate; and

an electric circuit on the flexible substrate,

wherein the electric circuit comprises

a hub inductor pattern configured to receive and transmit at least data via electro-magnetic induction;

one or more terminal inductor patterns laterally spaced apart from the hub inductor pattern relative to a surface of the flexible substrate and configured to receive and transmit at least data via electro-magnetic induction; and

a connecting trace between the hub inductor and the one or more terminal inductors for transmitting data from the hub inductor to the one or more terminal inductors and vice versa.

2. The relay of claim 1, wherein the flexible substrate comprises textile.

3. The relay of claim 2, wherein the textile comprises clothing.

4. The relay of any one of claim 1 to 3, wherein the connecting trace is configured to connect two or more of the terminal inductor patterns in series to the hub inductor.

5. The relay of any one of claim 1 to 4, wherein the connecting trace is configured to connect two or more of the terminal inductor patterns in parallel to the hub inductor.

6. The relay of any one of claims 1 to 5, wherein the hub inductor pattern, the one or more terminal inductor patterns and the connecting trace are formed from a conductive thread.

7. The relay of claim 6, wherein the conductive thread is embroidered on the flexible substrate.

8. The relay of claim 7, comprising a textile thread securing the conductive thread on the flexible substrate.

9. The relay of any one of claims 6 to 8, wherein the conductive thread comprises one or more of a group consisting of a bare wire and an encapsulated wire.

10. A near-field communication system comprising one or more relays of any one of the preceding claims.

11. The system of claim 10, further comprising one or more sensors/devices configured to receive and transmit via electro-magnetic induction and disposable within a near-filed communication range of respective ones of the one or more terminal induction patterns.

12. The system of claim 11, wherein the one or more sensors/devices are configured for near-filed communication including data communication and power extraction.

13. The system of claims 10 or 11, wherein the sensors/devices are disposed at clothing and/or skin, or implanted.

14. The system of any one of claim 10 to 13, further comprising at least one reader device configured to receive and transmit via electro-magnetic induction and disposable within a near-filed communication range of one of the hub induction patterns.

15. The system of claim 14, wherein the one or more reader devices are configured for near-filed communication including data communication and power transmission.

16. A method of fabricating a relay for a near-field communication system, comprising the steps of:

providing a flexible substrate; and

providing an electric circuit on the flexible substrate,

wherein the electric circuit comprises

a hub inductor pattern configured to receive and transmit at least data via electro-magnetic induction;

one or more terminal inductor patterns laterally spaced apart from the hub inductor pattern relative to a surface of the flexible substrate and configured to receive and transmit at least data via electro-magnetic induction; and

a connecting trace between the hub inductor and the one or more terminal inductors for transmitting data from the hub inductor to the one or more terminal inductors and vice versa.

17. The method of claim 16, wherein the flexible substrate comprises textile.

18. The method of claim 17, wherein the textile comprises clothing.

19. The method of any one of claim 16 to 18, comprising connecting two or more of the terminal inductor patterns in series to the hub inductor.

20. The method of any one of claim 16 to 19, comprising connecting two or more of the terminal inductor patterns in parallel to the hub inductor.

21. The method of any one of claims 16 to 20, wherein the hub inductor pattern, the one or more terminal inductor patterns and the connecting trace are formed from a conductive thread.

22. The method of claim 21, comprising embroidering the conductive thread on the flexible substrate.

23. The method of claim 22, comprising using a textile thread for securing the conductive thread on the flexible substrate.

24. The method of any one of claims 21 to 23, wherein the conductive thread comprises one or more of a group consisting of a bare wire and an encapsulated wire.

25. The method of any one of claims 16 to 24, further comprising providing one or more sensors/devices configured to receive and transmit via electro-magnetic induction and disposable within a near-filed communication range of respective ones of the one or more terminal induction patterns.

26. The method of claim 25, wherein the one or more sensors/devices are configured for near-filed communication including data communication and power extraction.

27. The method of claims 25 or 26, comprising disposing the sensors/devices at clothing and/or skin, or implanting the sensors/devices.

28. The method of any one of claims 16 to 27, further comprising providing at least one reader device configured to receive and transmit via electro-magnetic induction and disposable within a near-filed communication range of one of the hub induction patterns.

29. The method of claim 28, wherein the one or more reader devices are configured for near-filed communication including data communication and power transmission.