CLAIMS

1. A self-contained respiratory mask including:
   i. a mask body configured to be positioned over at least part of a user's face, the mask body, in use, cooperating with the user's face to define an enclosed space covering at least the user's nostrils and mouth;
   ii. at least one inlet path for entry of air into the enclosed space, the inlet path including an air inlet formed in the mask body and an inlet filter;
   iii. at least one outlet path for exit of air from the enclosed space, the outlet path including an outlet formed in the mask body and a controllable outlet valve;
   iv. a power source;
   v. one or more sensors configured to sense one or more parameters indicative of a breathing cycle of the user; and
   vi. a controller configured to control the outlet valve in accordance with the sensed parameters.

2. A self-contained respiratory mask as claimed in claim 1 wherein each outlet valve includes a valve member having one or more magnetic elements, a valve seat, and an electromagnet configured, when actuated, to create a force acting on the magnetic elements to drive movement of the valve member relative to the valve seat.

3. A self-contained respiratory mask as claimed in claim 1 or claim 2 wherein the controller is arranged to control the outlet valve, to close and hold closed the outlet valve.

4. A self-contained respiratory mask as claimed in any one of claims 1 to 3 wherein the controller is arranged to control the outlet valve, to actively open the outlet valve.

5. A self-contained respiratory mask as claimed in any preceding claim wherein the controller is configured to control timed closure of the outlet valve.

6. A self-contained respiratory mask as claimed in any preceding claim wherein the controller is configured to control timed release or active opening of the outlet valve.

7. A self-contained respiratory mask as claimed in any preceding claim wherein the inlet path further includes an inlet fan and wherein the controller is also configured to control the inlet fan in accordance with the sensed parameters.

8. A self-contained respiratory mask as claimed in any preceding claim wherein the controller is configured to control the outlet valve to: close the outlet valve at a desired point of the breathing cycle; and release and/or open the outlet valve at a further desired point of the breathing cycle.

9. A self-contained respiratory mask as claimed in claim 8 wherein the controller is configured to dynamically update the desired point and/or the further desired point of the breathing cycle.

10. A self-contained respiratory mask as claimed in any preceding claim, wherein the controller is configured to control the outlet valve and/or the inlet fan to open the outlet valve at or before the beginning of the exhalation phase of the user's breathing cycle.

11. A self-contained respiratory mask as claimed in claim 10, wherein the controller is configured to control the outlet valve and/or the inlet fan to open the outlet valve 0.01% to 12%, preferably 0.01% to 5%, of a breathing cycle before the beginning of the exhalation phase of the user's breathing cycle.

12. A self-contained respiratory mask as claimed in any preceding claim wherein the inlet path further includes a one-way inlet valve positioned downstream of the inlet filter, the inlet valve being configured to allow flow through the inlet path into the enclosed space but not out of the enclosed space.

13. A self-contained respiratory mask as claimed in any preceding claim, including a communications interface; wherein the controller is configured to:
    i. receive sensed parameters from the one or more sensors; and
    ii. communicate the received parameters to an external device.

14. A self-contained respiratory mask as claimed in any one of claims 1 to 12, wherein the controller is configured to:
    i. maintain local control data in the memory;
    ii. update the local control data;

iii. receive sensed parameters from the one or more sensors;

iv. control the controllable inlet blower and/or the controllable outlet valve in accordance with the updated local control data and sensed parameters received from the one or more sensors.

15. A self-contained respiratory mask as claimed in claim 14, further including a communications interface, wherein the controller is further configured to: communicate usage data via the communications interface to an external device; receive, from the external device, update instructions based on the communicated usage data; and update the local control data in accordance with the update instructions.

16. A self-contained respiratory mask as claimed in any preceding claim including a front mask portion and a back harness portion separable at a number of connectors, at least one of the connectors providing separable mechanical and electrical connection between the front mask portion and the back harness portion.

17. A self-contained respiratory mask as claimed in any preceding claim, wherein the controller is arranged to implement one of a plurality of active control modes including at least a high power mode in which mask function is prioritized and a low power mode in which power source life is prioritized.

18. A self-contained respiratory mask as claimed in claim 17 wherein the controller is configured to change the control mode based on input from the user.

19. A self-contained respiratory mask as claimed in claim 17 or 18 wherein the controller is configured to change the control mode based on data received from the one or more sensors and/or information on remaining power source charge.

20. A self-contained respiratory mask as claimed in any preceding claim, wherein at least one of the sensors is a physiological sensor positioned within the mask body.