

CLAIMS

1. System for protecting against, and detecting,
5 elements/agents harmful/hazardous to the human body present
in the air, comprising a mask-type personal protective
equipment (1) configured to be worn by a user (3) so as cover
at least user's (3) nose and mouth; said mask-type personal
protective equipment (1) comprising:
- 10 • an outer casing (11,12);
- one or more air passages configured to allow the user
(3) to
- inhale air from outside the outer casing (11,12)
 through said air passage(s), and
- 15 - exhale air outside said outer casing (11,12) through
 said air passage(s);
- filtering means housed within the outer casing (11,12)
and configured to filter out one or more elements/agents
harmful/hazardous to the human body present in the air
- 20 passing through said air passage(s);
- ultraviolet illumination means (161) housed within the
outer casing (11,12) and configured to perform a sanitising
and/or sterilising function of the filtering means and the
air passing through said air passage(s) by ultraviolet
- 25 illumination of said filtering means and of the air passing
through said air passage(s); and
- means for detecting harmful/hazardous elements/agents
(162) housed within the outer casing (11,12) and configured
to detect one or more elements/agents harmful/hazardous to
- 30 the human body present in the air passing through the air
passage(s);
- the system for protecting against, and detecting,
elements/agents harmful/hazardous to the human body present
in the air including also electronic processing and
- 35 communication means (2,164) configured to:
- generate monitoring data related to elements/agents
harmful/hazardous to the human body detected by the means

for detecting harmful/hazardous elements/agents (162) in the air passing through the air passage(s); and

- transmit the monitoring data to remote devices/systems.

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2. The system of Claim 1, wherein the filtering means includes at least one HEPA-type filter.

3. The system according to Claim 1 or 2, wherein the
10 filtering means includes at least one HEPA H14 type filter.

4. The system according to any one of Claims 1-3, wherein the ultraviolet illumination means (161) include one or more light emitting diodes that is/are configured to emit
15 ultraviolet light.

5. The system of Claim 4, wherein said light-emitting diode(s) is/are configured to emit ultraviolet light with a wavelength ranging between 100 nm and 280 nm.

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6. The system according to any preceding Claim, wherein the electronic processing and communication means comprise an electronic processing and communication device (2) and an electronic control, processing and communication unit (164),
25 wherein said electronic control, processing and communication unit (164) is:

- integrated into the mask-type personal protective equipment (1);
- coupled to the means for detecting harmful/hazardous
30 elements/agents (162); and
- configured to
 - generate raw monitoring data related to elements/agents harmful/hazardous to the human body detected by the means for detecting
35 harmful/hazardous elements/agents (162) in the air passing through the air passage(s); and
 - transmit the raw monitoring data to the electronic

processing and communication device (2);

wherein said electronic processing and communication device (2) is separate from the mask-type personal protective equipment (1) and is configured to:

- 5 • receive the raw monitoring data from the electronic control, processing and communication unit (164) in a wired or wireless mode;
- process the raw monitoring data received from the electronic control, processing and communication unit (164),
- 10 thereby generating refined monitoring data; and
- transmit the refined monitoring data to remote devices/systems in a wired or wireless mode.

7. The system of Claim 6, further comprising proximity

15 detection means (163) that are configured to perform a function of detection of proximity of other persons, and that are integrated into the mask-type personal protective equipment (1) or into the electronic processing and communication device (2).

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8. The system of Claim 7, wherein the proximity

 detection means (163) are integrated into the mask-type personal protective equipment (1), and wherein the electronic control, processing, and communication unit (164)

25 is:

- also coupled to the proximity detection means (163);
- and
- configured to
- generate tracking data related to other persons
- 30 detected by the proximity detection means (163); and
- transmit said tracking data to the electronic processing and communication device (2);

 wherein said electronic processing and communication device (2) is configured to transmit said tracking data to

35 remote devices/systems in a wired or wireless mode.

9. The system of Claim 7, wherein the proximity

detection means (163) are integrated into the electronic processing and communication device (2) that is configured to:

- generate tracking data related to other persons detected by the proximity detection means (163); and
- 5 • transmit said tracking data to remote devices/systems in a wired or wireless mode.

10 **10.** The system according to any one of Claims 1-5, wherein the electronic processing and communication means are integrated into the mask-type personal protective equipment (1).

15 **11.** The system of Claim 10, further comprising proximity detection means (163) that are configured to perform a function of detection of proximity of other persons, and that are integrated into the mask-type personal protective equipment (1); wherein the electronic processing and communication means are configured to:

- generate tracking data related to other persons detected by the proximity detection means (163); and
- 20 • transmit said tracking data to remote devices/systems in a wired or wireless mode.

25 **12.** The system according to any one of Claims 7-9 or according to Claim 11, wherein the proximity detection means (163) are configured to perform a proximity detection function of other users also equipped with the system for protecting against, and detecting, elements/agents harmful/hazardous to the human body present in the air.

30 **13.** The system according to any preceding Claim, wherein the mask-type personal protective equipment (1) also comprises a battery (17) that is:

- housed within the outer casing (11,12);
- configured to supply power; and
- 35 • rechargeable via a USB port (15) arranged on the outer casing (11).