SUMMARY

[0006] ~~According to a first aspect of the present invention,~~Herein disclosed is a device for controlling a manual surface maintenance machine is presented. The device comprises at least one attachment means for coupling the device to at least one component of the manual surface maintenance machine, at least one control coupling means for electrically and mechanically coupling the device to a plurality of components of the manual surface maintenance machine, the plurality of components comprising at least one mechanical component and at least one electrical component, wherein the mechanical component includes apparatus control mechanisms, velocity control mechanisms and steering control mechanisms, wherein the at least one electrical component includes an energy storage device, velocity control means, and mechanical component on-off circuits, and a control means, the control means comprising at least one processor and at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, provide control signals to the at least one mechanical component and the at least one electrical component of the manual surface maintenance machine, for controlling the manual surface maintenance machine to perform the steps of a first mode, the steps of the first mode comprising moving to a first location amongst a plurality of locations, performing at least one operation, while moving to the first location and at the first location, moving to a next location amongst a

plurality of locations, and performing at least one operation, while moving to the next location and at the next location.

[0006a] According to a first aspect, there is provided a detachable device for converting a manual surface maintenance machine to an automatic surface maintenance machine, the device comprising: at least one attachment means for mechanically attaching the device to the manual surface maintenance machine; at least one mechanical control coupling means for mechanically coupling the device to at least one mechanical component, the at least one mechanical component comprising apparatus control mechanisms, velocity control mechanisms and steering control mechanisms; at least one electrical control coupling means for electrically coupling the device to at least one electrical component, the at least one electrical component comprising an energy storage device, velocity control means, and mechanical component on-off circuits; and a control means, the control means comprising: at least one processor; and at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, provide control signals to the at least one mechanical component and the at least one electrical component of the manual surface maintenance machine, for controlling the manual surface maintenance machine to at least move to one or more predetermined locations in response to location data stored in the at least one memory.

[0007] ~~According to a second aspect of the present invention,~~Herein disclosed is a network of one or more devices for controlling corresponding

manual surface maintenance machines is presented. The network comprises a central controller, a plurality of monitoring units, a plurality of manual surface maintenance machines and a plurality of devices coupled to a corresponding one of the plurality of manual surface maintenance machines.

[007a] According to a second aspect, there is provided a network of one or more devices in accordance with any of the above claims for controlling corresponding manual surface maintenance machines, the network comprising: a central controller; a plurality of monitoring units; a plurality of manual surface maintenance machines; and a plurality of devices coupled to a corresponding one of the plurality of manual surface maintenance machines.

[0008] ~~According to a third aspect of the present invention,~~Herein disclosed is a method for automating a manual surface maintenance machine is presented. The method comprises the steps of attaching a device to the manual surface maintenance machine, coupling the device to the manual surface maintenance machine mechanically and electronically and controlling the manual surface maintenance machine, through the device, to perform the steps of a first mode, the steps of the first mode comprising moving to a first location amongst a plurality of locations, performing at least one operation, while moving to the first location and at the first location, moving to a next location amongst a plurality of locations and performing at least one operation, while moving to the next location and at the next location.

~~CLAIMS~~

~~1. A device for controlling a manual surface maintenance machine, the device comprising:~~

~~at least one attachment means for coupling the device to at least one component of the manual surface maintenance machine;~~

~~at least one control coupling means for electrically and mechanically coupling the device to a plurality of components of the manual surface maintenance machine, the plurality of components comprising at least one mechanical component and at least one electrical component, wherein the mechanical component includes apparatus control mechanisms, velocity control mechanisms and steering control mechanisms, wherein the at least one electrical component includes an energy storage device, velocity control means, and mechanical component on-off circuits; and~~

~~a control means, the control means comprising:~~

~~at least one processor; and~~

~~at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, provide control signals to the at least one mechanical component and the at least one electrical component of the manual surface maintenance machine, for controlling the manual surface maintenance machine to perform the steps of a first mode, the steps of the first mode comprising:~~

~~moving to a first location amongst a plurality of locations;~~

performing at least one operation, while moving to the first location and at the first location;

moving to a next location amongst a plurality of locations; and

performing at least one operation, while moving to the next location and at the next location.

2. The device in accordance with claim 1 wherein the at least one operation comprises surface maintenance operations, including one or more of cleaning, wiping, vacuuming, buffing, cutting and raking.

3. The device in accordance with claim 1 wherein the at least one operation further comprises performing a non-maintenance operation including operating one or more of the apparatus control mechanisms to raise an apparatus off the surface, reduce the rotation of the apparatus or divert power from the apparatus completely.

4. The device in accordance with any of the preceding claims wherein the computer program code is further configured to perform the steps of a second mode, the steps of the second mode comprising:

recording movement between a plurality of positions from a first location to a next location;

recording the operations performed when at the first location and while moving to the next location;

storing the movement between the plurality of positions and operations performed into the memory; and

performing the steps of recording and storing as an operator uses the manual surface maintenance machine.

5. The device in accordance with claim 4 wherein the computer program code is further configured to perform the first mode according to the movement and the operations recorded in the second mode.

6. The device in accordance with any of the preceding claims wherein the device further comprises a network coupling component to enable the device to couple to a network though network coupling, and to transmit and receive information through the network coupling to a central controller and/or at least one monitoring unit.

7. The device in accordance with any of the preceding claims wherein the computer program code is further configured to perform the steps of a third mode, the steps of the third mode comprising:

moving to a first position amongst a plurality of positions while performing an operation;

recording a surface condition of the first position;

~~storing the surface condition of the first position into the memory; and~~

~~repeating the steps of moving, recording and storing for a plurality of positions.~~

~~8. The device in accordance with claim 6 wherein the received information is a command to switch between two modes, the modes including the first mode, the second mode and the third mode.~~

~~9. The device in accordance with claim 6 wherein the transmitted information is data stored in the memory of the device.~~

~~10. The device in accordance with claim 9 wherein the data stored in the memory of the device includes battery life of the device, battery life of the manual surface maintenance machine, utilization status of the manual surface maintenance machine or device, apparatus control status, speed, direction, mileage, recorded video and still image data.~~

~~11. The device in accordance with claims 6 to 10 wherein the network coupling comprises wired coupling includes USB and Firewire coupling.~~

~~12. The device in accordance with any of the above claims wherein the device further comprises a first plurality of sensors and a second plurality of sensors, the first plurality of sensors for determining the position and environment~~

around the device including one or more of capacitive and photoelectric proximity sensors, laser and infrared scanners, GPS, accelerometers, bumper switches, electronic compasses, infrared range finders, ultrasonic rangefinders, and the second plurality of sensors for determining the condition of the surface around the device including one or more of video recorders, cameras, infrared imaging, light scattering and detection devices.

13. The device in accordance with any of the above claims wherein the device further comprises a user interface for users to access the control means.

14. A network of one or more devices in accordance with any of the above claims for controlling corresponding manual surface maintenance machines, the network comprising:

a central controller;

a plurality of monitoring units;

a plurality of manual surface maintenance machines; and

a plurality of devices coupled to a corresponding one of the plurality of manual surface maintenance machines.

15. The network in accordance with claim 14 wherein the central controller is able to transmit information through a network coupling to at least one device, the information comprising:

~~commands for the at least one device to switch between two modes, the modes including the first mode, the second mode and the third mode; and~~

~~recorded data of the at least one device.~~

~~16. The network in accordance with claim 14 wherein the central controller is able to receive information through a network coupling from at least one device, the information comprising battery life, utilization status, and recorded data of the at least one device.~~

~~17. The network in accordance with claim 14 to 16 wherein the plurality of monitoring units are able to transmit information to, and receive information from, the at least one device through a network coupling to at least one device, the information comprising commands for the at least one device to switch between two modes, the modes including the first mode, the second mode and the third mode, battery life, utilization status, and recorded data of the at least one device.~~

~~18. The network in accordance with claim 14 to 17 wherein the plurality of monitoring units are able to transmit information to, and receive information from, the at least one device through a network coupling to the central controller, the information comprising commands for the at least one device to switch between two modes, the modes including the first mode, the second mode and the third~~

~~mode, battery life, utilization status, and recorded data of the at least one device.~~

~~19. The network in accordance with claim 14 to 18 wherein the network coupling comprises wireless coupling includes Wi-Fi, 3G, 4G, radiofrequency, microwave and infrared transceiving means.~~

~~20. The device in accordance with claim 14 to 19 wherein the network coupling comprises wired coupling includes USB and Firewire coupling means.~~

~~21. A method for automating a manual surface maintenance machine comprising the steps of:~~

~~attaching a device to the manual surface maintenance machine;~~

~~coupling the device to the manual surface maintenance machine mechanically and electronically; and~~

~~controlling the manual surface maintenance machine, through the device, to perform the steps of a first mode, the steps of the first mode comprising:~~

~~moving to a first location amongst a plurality of locations;~~

~~performing at least one operation, while moving to the first location and at the first location;~~

~~moving to a next location amongst a plurality of locations; and~~

~~performing at least one operation, while moving to the next location and at the next location.~~

~~22. The method in accordance with claim 21 wherein the step of controlling the manual surface maintenance machine device comprises controlling the manual surface maintenance machine, through the device, to perform the steps of a second mode, the steps of the second mode comprising:~~

~~recording movement between a plurality of positions from a first location to a next location;~~

~~recording the operations performed when at the first location and while moving to the next location;~~

~~storing the movement between the plurality of positions and operations performed into the memory; and~~

~~performing the steps of recording and storing as an operator uses the manual surface maintenance machine.~~

~~23. The method in accordance with claim 21 wherein the step of controlling the manual surface maintenance machine device comprises controlling the manual surface maintenance machine, through the device, to perform the steps of:~~

~~moving to a first position amongst a plurality of positions while performing an operation;~~

~~recording a surface condition of the first position;~~

~~storing the surface condition of the first position into the memory; and~~

~~repeating the steps of moving, recording and storing for a plurality of positions.~~

~~24. The method in accordance with claim 21 to 23, further comprising the step of:~~

~~controlling the manual surface maintenance machine to perform the steps of any of the first mode, the second mode and the third mode at a scheduled time and for a determined period of time.~~

CLAIMS

1. A detachable device for converting a manual surface maintenance machine to an automatic surface maintenance machine, the device comprising:

at least one attachment means for mechanically attaching the device to the manual surface maintenance machine;

at least one mechanical control coupling means for mechanically coupling the device to at least one mechanical component, the at least one mechanical component comprising apparatus control mechanisms, velocity control mechanisms and steering control mechanisms;

at least one electrical control coupling means for electrically coupling the device to at least one electrical component, the at least one electrical component comprising an energy storage device, velocity control means, and mechanical component on-off circuits; and

a control means, the control means comprising:

at least one processor; and

at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, provide control signals to the at least one mechanical component and the at least one electrical component of the manual surface maintenance machine, for controlling the manual surface maintenance machine to at least move to one or more

predetermined locations in response to location data stored in the at least one memory.

2. The device in accordance with claim 1 wherein the computer program code is further configured to perform the steps of a first mode, the steps of the first mode comprising:

moving to a first location amongst a plurality of locations,

performing at least one operation, while moving to the first location and at the first location;

moving to a next location amongst a plurality of locations; and

performing at least one operation, while moving to the next location and at the next location.

3. The device in accordance with claim 2 wherein the at least one operation comprises surface maintenance operations, including one or more of cleaning, wiping, vacuuming, buffing, cutting and raking.

4. The device in accordance with claim 2 wherein the at least one operation further comprises performing a non-maintenance operation including operating one or more of the apparatus control mechanisms to raise an apparatus off the surface, reduce the rotation of the apparatus or divert power from the apparatus completely.

5. The device in accordance with any of the preceding claims wherein the computer program code is further configured to perform the steps of a second mode, the steps of the second mode comprising:

recording movement between a plurality of positions from a first location to a next location;

recording the operations performed when at the first location and while moving to the next location;

storing the movement between the plurality of positions and operations performed into the memory; and

performing the steps of recording and storing as an operator uses the manual surface maintenance machine.

6. The device in accordance with claim 5 wherein the computer program code is further configured to perform the first mode according to the movement and the operations recorded in the second mode.

7. The device in accordance with any of the preceding claims wherein the computer program code is further configured to perform the steps of a third mode, the steps of the third mode comprising:

moving to a first position amongst a plurality of positions while performing an operation;

recording a surface condition of the first position;

storing the surface condition of the first position into the memory; and

repeating the steps of moving, recording and storing for a plurality of positions.

8. The device in accordance with any of the preceding claims wherein the device further comprises a network coupling component to enable the device to couple to a network though network coupling, and to transmit and receive information through the network coupling to a central controller and/or at least one monitoring unit.

9. The device in accordance with claim 8 wherein the received information is a command to switch between two modes, the modes including the first mode, the second mode and the third mode.

10. The device in accordance with claim 8 wherein the transmitted information is data stored in the memory of the device.

11. The device in accordance with claim 10 wherein the data stored in the memory of the device includes battery life of the device, battery life of the manual surface maintenance machine, utilization status of the manual surface maintenance machine or device, apparatus control status, speed, direction, mileage, recorded video and still image data.

12. The device in accordance with claims 8 to 11 wherein the network coupling comprises wired coupling includes USB and Firewire coupling.

13. The device in accordance with any of the above claims wherein the device further comprises a first plurality of sensors and a second plurality of sensors, the first plurality of sensors for determining the position and environment around the device including one or more of capacitive and photoelectric proximity sensors, laser and infrared scanners, GPS, accelerometers, bumper switches, electronic compasses, infrared range finders, ultrasonic rangefinders, and the second plurality of sensors for determining the condition of the surface around the device including one or more of video recorders, cameras, infrared imaging, light scattering and detection devices.

14. The device in accordance with any of the above claims wherein the device further comprises a user interface for users to access the control means.

15. A network of one or more devices in accordance with any of the above claims for controlling corresponding manual surface maintenance machines, the network comprising:

a central controller;

a plurality of monitoring units;

a plurality of manual surface maintenance machines; and

a plurality of devices coupled to a corresponding one of the plurality of manual surface maintenance machines.

16. The network in accordance with claim 15 wherein the central controller is able to transmit information through a network coupling to at least one device, the information comprising:

commands for the at least one device to switch between two modes, the modes including the first mode, the second mode and the third mode; and

recorded data of the at least one device.

17. The network in accordance with claim 15 wherein the central controller is able to receive information through a network coupling from at least one device, the information comprising battery life, utilization status, and recorded data of the at least one device.

18. The network in accordance with claim 15 to 17 wherein the plurality of monitoring units are able to transmit information to, and receive information from, the at least one device through a network coupling to at least one device, the information comprising commands for the at least one device to switch between two modes, the modes including the first mode, the second mode and the third mode, battery life, utilization status, and recorded data of the at least one device.

19. The network in accordance with claim 15 to 18 wherein the plurality of monitoring units are able to transmit information to, and receive information from, the at least one device through a network coupling to the central controller, the information comprising commands for the at least one device to switch between two modes, the modes including the first mode, the second mode and the third mode, battery life, utilization status, and recorded data of the at least one device.

20. The network in accordance with claim 15 to 19 wherein the network coupling comprises wireless coupling includes Wi-Fi, 3G, 4G, radiofrequency, microwave and infrared transceiving means.

21. The device in accordance with claim 15 to 20 wherein the network coupling comprises wired coupling includes USB and Firewire coupling means.