Claims

1. A cleaning system for an air conditioner, the cleaning system comprising:

a support structure;

a coupling means for removably coupling the support structure to the air conditioner for suspending the support structure therefrom;

at least one cleaning nozzle being positionable for discharging and directing fluids to exposed portions of a heat exchanger of the air conditioner; ~~and~~

a manipulator system coupled to the at least one cleaning nozzle and controllable for spatially displacing the at least cleaning nozzle to thereby vary where the fluid discharged by the at least one cleaning nozzle contacts the heat exchanger; and

at least one image capture device for capturing images of at least the heat exchanger, the at least one image capture device being mounted with the at least one cleaning nozzle for enabling displacement and positioning thereof with the at least one cleaning nozzle by the manipulator system,

wherein the support structure is adapted for substantially collecting the fluid discharged by the at least one cleaning nozzle and the fluid comprising at least one of water, steam, surfactant, cleaning chemicals and compressed air.

2. The cleaning system as in claim 1, the support structure comprising a collection tray being shaped and dimensioned for receiving fluids and dirt from the heat exchanger.

3. The cleaning system as in claim 2, further comprising:

a collector bin; and

a flexible tube for fluid communicating the collection tray with the collector bin to enable fluids and dirt collected into the collection tray to be directed to and collected by the collector bin.

4. The cleaning system as in claim 1, further comprising at least one pump controllable for drawing fluids from at least one fluid reservoir for provision to the at least one cleaning nozzle.

5. The cleaning system as in claim 1, further comprising at least one temperature sensor for sensing and capturing temperature data from adjacent the heat exchanger, the heat exchanger of the air conditioner comprising coil fins.

~~6. The cleaning system as in claim 1, further comprising at least one image capture device for capturing images of at least the heat exchanger.~~

~~7. The cleaning system as in claim 6, the at least one image capture device being mounted with the at least one cleaning nozzle for enabling displacement and positioning thereof with the at least one cleaning nozzle by the manipulator system.~~

~~8~~6. The cleaning system as in claim 1, further comprising:

a controller for controlling the manipulator system and for executing a service sequence for the displacement and positioning of the at least one cleaning nozzle and discharge of fluid from the at least one cleaning nozzle for at least one of prepping, cleaning and drying the heat exchanger from the fluids discharged therefrom, the manipulator system comprising at least one displacement actuator.

~~9~~7. The cleaning system as in claim 6~~8~~, further comprising:

a communication module in signal communication with and being controllable by the controller for transmitting data on progress of the service sequence to a central server, the communication module being further for communicating instructions from the central server to the controller for at least one of starting, interrupting and overriding the service sequence.

~~10~~8. The cleaning system as in claim 1, the manipulator system being mounted to the support structure and comprising:

at least one of a rotary actuator for angular displacement of the at least one cleaning nozzle about a z-axis defined by the support structure; and

a translational stage for displacing the at least one cleaning nozzle substantially along the z-axis,

wherein the z-axis is substantially perpendicular the ceiling when the support structure is coupled to the air conditioner by the coupling means.

~~11~~9. The cleaning system as in claim 1, the at least one cleaning nozzle being at least one cleaning nozzle with adjustable spray profile.

10~~2~~. The cleaning system as in claim 1, further comprising at least one brush coupled to the at least one spray nozzle adjacent thereof for brushing portions of the heat exchanger for dislodging dirt therefrom,

wherein the at least one brush is one of at least one rotary brush.

11~~3~~. The cleaning system as in claim 1, the coupling means comprising a receiver structure defining a receptacle for receiving at least a portion of an output shaft of a motor of the air conditioner thereinto, the receiver structure being operable for at least one of magnetically and mechanically clasping to the output shaft to thereby removably couple the cleaning system with the air conditioner.

12~~4~~. A cleaning method for an air conditioner, the cleaning method comprising:

removably coupling a support structure to the air conditioner with a coupling means for suspending the support structure from the air conditioner; ~~and~~

discharging and directing fluids to exposed portions of a heat exchanger of the air conditioner by at least one cleaning nozzle based on a cleaning sequence, the at least cleaning nozzle being spatially displacable by a manipulator system to thereby vary where the fluid discharged by the at least one cleaning nozzle contacts the heat exchanger;

sensing and capturing temperature data from adjacent the heat exchanger by at least one temperature sensor, the heat exchanger of the air conditioner comprising coil fins; and

capturing images of at least the heat exchanger by at least one image capture device mounted with the at least one cleaning nozzle for enabling displacement and positioning thereof with the at least one cleaning nozzle by the manipulator system,

wherein the support structure is adapted for substantially collecting the fluid discharged by the at least one cleaning nozzle and the cleaning sequence comprises:

discharging and directing at least one of steam and cleaning chemicals to the heat exchanger;

discharging and directing water to the heat exchanger; and

discharging and directing compressed air towards the heat exchanger.

13~~5~~. The cleaning method as in claim 12~~4~~, the support structure comprising a collection tray being shaped and dimensioned for receiving fluids and dirt from the heat exchanger, the received fluids and dirt being directed by a flexible tube to a collector bin for collection thereby.

14~~6~~. The cleaning method as in claim 12~~4~~, further comprising at least one pump controllable for drawing fluids from at least one fluid reservoir for provision to the at least one cleaning nozzle.

~~17. The cleaning method as in claim 14, further comprising:~~

~~sensing and capturing temperature data from adjacent the heat exchanger by at least one temperature sensor, the heat exchanger of the air conditioner comprising coil fins; and~~

~~capturing images of at least the heat exchanger by at least one image capture device mounted with the at least one cleaning nozzle for enabling displacement and positioning thereof with the at least one cleaning nozzle by the manipulator system.~~

15~~8~~. The cleaning method as in claim 12~~4~~, further comprising:

executing the service sequence by a controller for controlling the manipulator system displace and position the at least one cleaning nozzle and discharge of fluid from the at least one cleaning nozzle for at least one of prepping, cleaning and drying the heat exchanger from the fluids discharged therefrom, the manipulator system comprising at least one displacement actuator.

16~~9~~. The cleaning method as in claim 15~~8~~, further comprising:

transmitting data on progress of the service sequence by a communication module in signal communication with the controller to a central server; and

communicating instructions by the communications module from the central server to the controller for at least one of starting, interrupting and overriding the service sequence.

~~20~~17. The cleaning method as in claim 12~~4~~, the service sequence further comprising:

operating and spatially displacing at least one brush coupled to the at least one spray nozzle adjacent thereof for brushing portions of the heat exchanger for dislodging dirt therefrom,

wherein the at least one brush is one of at least one rotary brush.

~~2~~18. The cleaning method as in claim 12~~4~~, removably coupling a support structure to the air conditioner comprising:

receiving at least a portion of an output shaft of a motor of the air conditioner into a receptacle defined by a receiver structure of the coupling means; and

at least one of magnetically and mechanically clasping the receiver structure to the output shaft to thereby removably couple the cleaning system with the air conditioner.

~~22~~19. A cleaning system for an air conditioner, the cleaning system comprising:

a support structure;

a coupling means for removably coupling the support structure to the air conditioner for suspending the support structure therefrom;

at least one cleaning nozzle being positionable for discharging and directing fluids to exposed portions of a heat exchanger of the air conditioner;

a manipulator system coupled to the at least one cleaning nozzle and controllable for spatially displacing the at least cleaning nozzle to thereby vary where the fluid discharged by the at least one cleaning nozzle contacts the heat exchanger;

at least one image capture device for capturing images of at least the heat exchanger, the at least one image capture device being mounted with the at least one cleaning nozzle for enabling displacement and positioning thereof with the at least one cleaning nozzle by the manipulator system;

at least one temperature sensor for sensing and capturing temperature data from adjacent the heat exchanger, the heat exchanger of the air conditioner comprising coil fins;

a controller for controlling the manipulator system and for executing a service sequence for the displacement and positioning of the at least one cleaning nozzle and discharge of fluid from the at least one cleaning nozzle for at least one of prepping, cleaning and drying the heat exchanger from the fluids discharged therefrom, the manipulator system comprising at least one displacement actuator; and

a communication module in signal communication with and being controllable by the controller for at least one of transmitting data on progress of the service sequence to a central server for communicating instructions from the central server to the controller for at least one of starting, interrupting and overriding the service sequence and for transmitting the captured temperature data to a mobile computing device for generating one of a report and a score therefrom.~~,~~

wherein the fluids comprise at least one of water, steam, surfactant, cleaning chemicals and compressed air, the mobile computing device being one of a smart phone, a user interface, a tablet and a displace device.