The present disclosure relates to an electrical fan (2) controllable by a camera-equipped device (3). The fan comprises processor circuitry, and a storage unit storing instructions that, when executed by the processor circuitry, can cause the fan to receive a signal from the camera-equipped device based on an output of a face recognition and tracking software analysing a camera feed from a camera (5) comprised in the camera-equipped device. The instructions can also cause the fan to control the fan based on the received signal.
CAMERA CONTROLLED ELECTRICAL FAN

TECHNICAL FIELD
The present disclosure relates to a controllable electrical fan, e.g. a portable fan.

BACKGROUND
In many countries, e.g. developing countries, around the clock grid electricity supply is a rare commodity. In e.g. India, rural and semi urban areas comprising > 70% of the total population, receives very limited access to grid electricity. People in those areas often use battery powered hand fans throughout the hot summers. India is predominately a warm weather country, where millions of people use public transport (state transport buses and trains) daily. Waiting on a bus stop or traveling in a bus with no air cooling or fan is a common scenario. Further, increasing traffic and over loaded buses force people to use hand fan for keeping themselves cool. The same is relevant also in other countries.

There is also often a need to clear dust off some small area, either for sitting or just cleaning. People often blow the air off using their breath or use e.g. paper, hankerchief or something else available, to clear the dust without having to touch it and get dirty.

Today, portable fans and dust blowers come as individual electronic units - with or without batteries. They need to be constantly carried with a person and be charged regularly. There is thus a general need to improve and simplify the access and handling/maintenance of hand fans and dust blowers.

SUMMARY
It has been noted by the applicant that people, also in developing countries, often has a camera equipped device, such as a smartphone or tablet, in their vicinity, e.g. carried on their persons. It has also been noted that fans, as well as dust blowers, are often used in connection with the use of such a camera equipped device, e.g. when watching video on a screen of the camera.
equipped device or for clearing a place to sit down when using the device. Such camera equipped devices often have face recognition and/or face tracking software, which may not be limited to recognising/tracking a face but may also generally recognise/track a persons, or several persons, head(s) or whole body/bodies.

According to an aspect of the present disclosure, there is provided an electrical fan controllable by a camera equipped device. The fan comprises processor circuitry, and a storage unit storing instructions that, when executed by the processor circuitry, can cause the fan to receive a signal from the camera equipped device based on an output of a face recognition and tracking software analysing a camera feed from a camera comprised in the camera equipped device. The instructions can also cause the fan to control the fan based on the received signal. The processor circuitry may e.g. comprise a control unit configured to control the speed and direction of the air flow generated by the fan based on the received signal.

According to another aspect of the present disclosure, there is provided a camera equipped device comprising an embodiment of the electrical fan of the present disclosure.

According to another aspect of the present disclosure, there is provided an arrangement comprising at least one electrical fan according to the present disclosure. The arrangement also comprises an embodiment of the camera equipped device of the present disclosure. The camera equipped device comprises processor circuitry, a storage unit, a camera, and a face recognition and tracking software, stored in the storage unit of the camera equipped device and configured to, when run on the processor circuitry of the camera equipped device, analyse the camera feed from the camera.

According to another aspect of the present disclosure, there is provided a method for controlling an electrical fan. The method comprises receiving a signal from a camera equipped device based on an output of a face recognition and tracking software analysing a camera feed from a camera
comprised in the camera equipped device. The method also comprises controlling the fan based on the received signal.

According to another aspect of the present disclosure, there is provided a computer program product comprising computer-executable components for causing an electrical fan to perform an embodiment of the method of the present disclosure when the computer-executable components are run on processor circuitry comprised in the fan.

According to another aspect of the present disclosure, there is provided a computer program for controlling an electrical fan. The computer program comprises computer program code which is able to, when run on processor circuitry of the fan, cause the fan to receive a signal from the camera equipped device based on an output of a face recognition and tracking software analysing a camera feed from a camera comprised in the camera equipped device. The code is also able to cause the fan to control the fan based on the received signal.

According to another aspect of the present disclosure, there is provided a computer program product comprising an embodiment of the computer program according to the present disclosure and a computer readable means on which the computer program is stored.

It is an advantage of the different aspects of the aspects of the present disclosure that a face recognition and/or tracking software of a camera equipped device can be used for facilitating control, e.g. automatic control, of an electrical fan. The fan may then e.g. adjust the speed and/or direction of the air flow it generates based where a person, or several persons, is positioned in sight of the camera.

Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the element, apparatus, component, means, step, etc." are to be interpreted openly as referring to at least one instance of the element, apparatus, component, means, step, etc., unless explicitly stated
otherwise. The steps of any method disclosed herein do not have to be performed in the exact order disclosed, unless explicitly stated. The use of "first", "second" etc. for different features/components of the present disclosure are only intended to distinguish the features/components from other similar features/components and not to impart any order or hierarchy to the features/components.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Embodiments will be described, by way of example, with reference to the accompanying drawings, in which:

Fig 1a is a schematic front view of an embodiment of a fan arrangement of the present disclosure, with wireless communication between the electrical fan and the camera equipped device.

Fig 1b is a schematic front view of another embodiment of a fan arrangement of the present disclosure, with wired communication between the electrical fan and the camera equipped device.

Fig 2 is a schematic front view of another embodiment of a fan arrangement of the present disclosure, with the electrical fan being integrated with the camera equipped device.

Fig 3 is a schematic front view of an embodiment of a fan arrangement of the present disclosure, with two electrical fans and a camera equipped device.

Fig 4 is a schematic block diagram of an embodiment of an electrical fan of the present disclosure.

Fig 5 is a schematic block diagram of an embodiment of a camera equipped device of the present disclosure.

Fig 6 is a schematic flow chart of an embodiment of a method of the present disclosure.
Fig 7 is a schematic illustration of an embodiment of a computer program product of the present disclosure.

Fig 8 is a schematic flow chart of an embodiment of a method for controlling an electrical fan of the present disclosure.

5 DETAILED DESCRIPTION

Embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which certain embodiments are shown. However, other embodiments in many different forms are possible within the scope of the present disclosure. Rather, the following embodiments are provided by way of example so that this disclosure will be thorough and complete, and will fully convey the scope of the disclosure to those skilled in the art. Like numbers refer to like elements throughout the description.

Face detection (herein called recognition) and tracking is the process of determining whether or not a face or (more generally) a head is present in an image. Face detection can be regarded as a specific case of object-class detection. In object-class detection, the task is to find the locations and sizes of objects in an image that belong to a given class. Examples include upper torsos, pedestrians, and cars. Face detection can be regarded as a more general case of face localization. In face localization, the task is to find the locations and sizes of number of faces. Early face-detection algorithms focused on the detection of frontal human faces, whereas newer algorithms attempt to solve the more general and difficult problem of multi-view face detection. That is, the detection of faces that are either rotated along the axis from the face to the observer (in-plane rotation), or rotated along the vertical or left-right axis (out-of-plane rotation), or both. The newer algorithms take into account variations in the image or video by factors such as face appearance, lighting, and pose. Researchers have come up with many algorithms in the field of face detection and tracking. OpenCV (Open Source Computer Vision Library) is a library of programming functions mainly aimed at real-time computer vision, developed by Intel. It is free for use under the open source BSD license. The library is cross-platform. It focuses
mainly on real-time image processing. If the library finds Intel's Integrated Performance Primitives on the system, it will use these proprietary optimized routines to accelerate itself. There are many libraries available for achieving real-time computer vision.

Figure 1a schematically illustrates a front view of an embodiment of an arrangement 1 of the present disclosure. The arrangement 1 comprises an electrical fan 2 with a propeller 9, and a camera equipped device 3. The camera equipped device comprises a camera 5. Depending on the type of device, the camera equipped device 3 may also comprise a display screen 4, e.g. a touch screen, where e.g. video can be displayed to a user, and/or one or more physical button(s) 7. The screen 4 and/or the button 7 can be part of a user interface (UI) by means of which a user can interact with and control the device 3, and possibly, via the device 3, interact with and control the electrical fan 2. In the embodiment depicted in figure 1a, the fan 2 is a separate unit from the device 3, and is enabled to communicate with the device 3 wirelessly, e.g. via Bluetooth. By using a wireless connection, the positioning of the fan 2 in relation to the device 3 may be more free and without a wire getting in the way and causing restrictions.

Figure 1b schematically illustrates a front view of another embodiment of an arrangement 1 of the present disclosure. The arrangement 1 comprises an electrical fan 2 with a propeller 9, and a camera equipped device 3. The camera equipped device comprises a camera 5. Depending on the type of device, the camera equipped device 3 may also comprise a display screen 4, e.g. a touch screen, where e.g. video can be displayed to a user, and/or one or more physical button(s) 7. The screen 4 and/or the button 7 can be part of a user interface (UI) by means of which a user can interact with and control the device 3, and possibly, via the device 3, interact with and control the electrical fan 2. In the embodiment depicted in figure 1b, the fan 2 is a separate unit from the device 3, and is enabled to communicate with the device 3 via wire.

A socket 8 of the device 3 is used for this wired connection, e.g. a socket 8 for charging and wired communication with the device 3 in the form of a portable radio device. By using a wired connection, the fan 2 may in some
embodiments also be powered via said wired connection e.g. by a battery in the camera equipped device 3.

Figure 2 schematically illustrates a front view of another embodiment of an arrangement 1 of the present disclosure. The arrangement 1 comprises an electrical fan 2 with a propeller 9, and a camera equipped device 3. The camera equipped device comprises a camera 5. Depending on the type of device, the camera equipped device 3 may also comprise a display screen 4, e.g. a touch screen, where e.g. video can be displayed to a user, and/ or one or more physical button(s) 7. The screen 4 and/or the button 7 can be part of a user interface (UI) by means of which a user can interact with and control the device 3, and possibly, via the device 3, interact with and control the electrical fan 2. In the embodiment depicted in figure 2, the fan 2 is integrated in/with the device 3, and is enabled wired communication within the device 3.

Figure 3 schematically illustrates a front view of another embodiment of an arrangement 1 of the present disclosure. The arrangement 1 comprises a first electrical fan 2, as well as a second electrical fan 6, with respective propellers 9, and a camera equipped device 3. By using a plurality of fans 2 & 6, better and wider coverage of the fans may be accomplished. The camera equipped device comprises a camera 5. Depending on the type of device, the camera equipped device 3 may also comprise a display screen 4, e.g. a touch screen, where e.g. video can be displayed to a user, and/ or one or more physical button(s) 7. The screen 4 and/or the button 7 can be part of a user interface (UI) by means of which a user can interact with and control the device 3, and possibly, via the device 3, interact with and control the electrical fan 2. The plurality of fans 2 & 6 may be separate units as in figures 1a and 1b, or may be integrated with the camera equipped device 3 as in figure 2. If the fans are separate units, communication with the camera equipped device 3 may be wired as in figure 1b or wireless as in figure 1a.

It is generally noted that a propeller 9 is a convenient means for enabling the fan 2 to generate a flow of air, but other means such as moving flaps, a bellow, or the like are also possible.
Fig 4 is a schematic block diagram of an embodiment of an electrical fan 2 of the present disclosure. The discussion relating to the fan 2 is also relevant for any second or further fan(s) 6. The electrical fan 2 comprises processor circuitry 41 e.g. a central processing unit (CPU). The processor circuitry 41 may comprise one or a plurality of processing units in the form of microprocessor(s). However, other suitable devices with computing capabilities could be comprised in processor circuitry 41, e.g. an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or a complex programmable logic device (CPLD). The processor circuitry 41 is configured to run one or several computer program(s) or software 45 stored in a storage unit 42 e.g. a memory. Such software (SW) includes i.a. software for controlling the fan 2, such as the air flow created by the fan 2, based on a received signal from the camera equipped device 3. The storage unit 42 is regarded as a computer readable means and may e.g. be in the form of a Random Access Memory (RAM), a Flash memory or other solid state memory, or a hard disk. The processor circuitry 41 may also be configured to store data in the storage unit 42, as needed. The fan 2 also comprises a communication interface 43 configured for wired or wireless communication with the camera equipped device 3, depending on whether the fan is configured to communicate via wire or wirelessly with, or is integrated with, the camera equipped device 3. The fan 2 may also comprise a battery 44 for powering the fan including the propeller 9 and the processor circuitry 41, unless the fan is integrated with the camera equipped device 3 or otherwise powered via a wired connection by the camera equipped device 3. The electrical fan 2 (may alternatively be regarded as a fan unit) discussed herein typically comprises a rotating propeller 9 for creating an air flow. The direction of the air flow from the propeller may be adjustable e.g. by means of the rotational axis of the propeller being adjustable, or by adjustable flaps in front of the propeller, or in any other way. The electrical fan 2 comprises a control unit implemented by the processor circuitry 41 for controlling the air flow created by the fan, e.g. by a propeller 9.
Figure 5 is a schematic block diagram of an embodiment of a camera equipped device 3 of the present disclosure. The camera equipped device may e.g. be a radio device which may be any device or user equipment (UE), mobile or stationary, enabled to communicate over a radio interface 55 in a communications network, for instance but not limited to e.g. mobile phone, smart phone, household appliances, media players, cameras, or any type of consumer electronic, for instance but not limited to television, radio, tablet computer, laptop, or personal computer (PC), which is equipped with a camera and has face recognition/tracking SW 53. Alternatively, the camera equipped device 3 is not a radio device, but is e.g. a television or media player without a radio interface 55. The camera equipped device 3 comprises processor circuitry 51 e.g. a central processing unit (CPU). The processor circuitry 51 may comprise one or a plurality of processing units in the form of microprocessor(s). However, other suitable devices with computing capabilities could be comprised in processor circuitry 51, e.g. an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or a complex programmable logic device (CPLD). The processor circuitry 51 is configured to run one or several computer program(s) or software 53 stored in a storage unit 52 e.g. a memory. Such software (SW) 53 includes i.a. the face recognition/tracking SW 53 discussed herein. The storage unit 52 is regarded as a computer readable means and may e.g. be in the form of a Random Access Memory (RAM), a Flash memory or other solid state memory, or a hard disk. The processor circuitry 51 may also be configured to store data in the storage unit 52, as needed. The camera equipped device 3 also comprises a fan communication interface 57 configured for wired or wireless communication with the electrical fan 2, depending on whether the fan is configured to communicate via wire or wirelessly with, or is integrated with, the camera equipped device 3. The camera equipped device 3 may also comprise a battery 56 for powering the camera equipped device 3 and the parts therein. In some embodiments, also the fan 2 is powered by the battery 56, especially if the fan 2 does not comprise its own battery 44. As discussed above, the camera equipped device 3 may also comprise a user interface (UI)
58, e.g. in the form of a touch screen 4 and/or button(s) 7. Of course, as discussed above, the camera equipped device 3 comprises a camera 5.

Figure 6 is a schematic flow chart of an embodiment of a method of the present disclosure. A signal is received 61 from a camera equipped device 3 based on an output of a face recognition and tracking software 53 analysing a camera feed from a camera 5 comprised in the camera equipped device 3. Then, the fan 2 is controlled 62 based on the received 61 signal, typically by means of the processor circuitry 41 of the fan 2 acting as a control unit of the fan.

Figure 7 illustrates a computer program product 70. The computer program product 70 comprises a computer readable medium 72 comprising a computer program 71 in the form of computer-executable components 71. The computer program/computer-executable components 71 maybe configured to cause an electrical fan 2, e.g. as discussed herein, to perform an embodiment of the method of the present disclosure. The computer program/computer-executable components may be run on the processor circuitry 41 of the fan 2 for causing the fan to perform the method. The computer program product 70 may e.g. be comprised in a storage unit or memory 42 comprised in the fan 2 and associated with the processor circuitry 41. Alternatively, the computer program product 70 may be, or be part of, a separate, e.g. mobile, storage means, such as a computer readable disc, e.g. CD or DVD or hard disc/drive, or a solid state storage medium, e.g. a RAM or Flash memory.

In some embodiments, the fan 2 is configured to be controlled to adjust its air flow direction and/or its speed, based on the received signal. Thus, the signal may inform the fan 2 that the direction of the air flow created by e.g. the propeller 9 of the fan should be altered, e.g. due to the tracking SW having noted that a person in line of sight of the camera 5 has moved in relation to the fan 2. Similarly, the signal may indicate that it is desirable to increase or decrease the speed of the propeller 9 and thus the air flow.
In some embodiments, the fan 2 is configured to be controlled 62 to reduce its speed when the received 61 signal indicates that no-one is in front of and facing a screen 4 of the camera equipped device 3. For instance, if the fan 2 is used to cool a person watching e.g. a video on the screen 4 and the received signal indicates that no such person is in front of the screen, then power can be preserved by reducing the speed of the propeller 9 and thus the air flow, possibly to zero by turning off the propeller.

In some embodiments, the fan 2 is configured to be controlled to direct its air flow towards a face or head of a person when the received signal indicates that said person is in front of the camera 5 of the camera equipped device 3. For instance, a front camera 5 of the device 3 can be used, which may mean that if a person is in front of the camera 5, it is also in front of the screen 4. Thus, the fan maybe used to direct cooling air flow towards the head of a person in front of the camera and/or the screen of the device 3. Similarly, in some embodiments, the fan 2 is configured to be controlled to direct its air flow in a panning motion over a plurality of faces or heads of persons when the received signal indicates that said persons are in front of the screen 4 and/or the camera 5 of the camera equipped device 3. Thus, if several people are detected, the fan 2 and possibly second fan(s) 6 can periodically sweep its cooling air flow over the heads of more than one person.

In some embodiments, the fan 2 is configured to be controlled 62 to produce a maximum unidirectional air flow when the received 61 signal from the camera equipped device 3 includes an indication that the fan should be used as a dust blower. A user of the arrangement 1 may e.g. input a command via a UI 58 (e.g. touch screen 4 or button 7) that the fan 2 should be used as a dust blower, and this is then indicated as additional information in the signal sent to the fan 2.

In some embodiments, the electrical fan 2 comprises a wired connection interface (e.g. comprising the socket 8 and the communication interface 43) configured to receive 61 the signal via wire from the camera equipped device 3. The wired connection may e.g. be by means of a flexible electrical cord or
by means of a rigid connection e.g. a charging or USB interface of the device
3. A rigid connection maybe convenient to help the fan 2 and/or the device 3
determine the position and direction of the fan 2 in relation to the device 3. A
flexible cord, on the other hand, may give greater freedom for a user to
position the fan 2. An indication of how the fan is positioned in relation to the
device 3 may then e.g. be inputted via the UI 58. In some embodiments, the
wired connection interface 8, 43 is also configured to receive electrical power
from a battery 56 comprised in the camera equipped device 3 for
running/powering the fan 2. Thus, the fan 2 may not need to comprise a
battery or other power source itself, since it can receive electrical power via
the wired connection.

In some embodiments, the communication interface 43 of the electrical fan 2
is or comprises a radio interface 43 configured to receive 61 the signal
wirelessly from the camera equipped device 3, and a battery 44 for supplying
electrical power to the fan 2. The signal may e.g. be sent via Bluetooth, near
field communication (NFC), Wi-Fi or other radio communication protocol,
why both the fan 2 and the device 3 comprises a radio interface 43 and 55,
respectively, supporting said radio communication protocol. Since the
connection to the device 3 is not wired, the fan 2 needs its own power source
in form of the battery 44. The battery may be re-chargeable by the fan 2 being
connectable to the general electrical grid, or the fan 2 may e.g. comprise a
solar panel with solar cells for charging the battery. In some embodiments,
the fan 2 may be able to connect to the device 3 both via wire and wirelessly.

In some embodiments, the instructions 45 stored in the storage unit 42 can
also cause the fan 2 to prompt the camera equipped device 3 to run fan
control software, which control software enables the camera equipped device
to send the signal to the fan, e.g. in a plug-and-play manner. By means of
such fan control software stored in the storage unit 52 of the device 3, the
device may use the output of the face recognition and tracking software 53
and form the signal to be sent to the fan 2 for controlling the fan. If this is
plug-and-play control SW, the SW may activate automatically upon detection
of the fan 2. The fan control software may e.g. be an application (app) which
is downloadable to the device 3 and designed for control of and communication with the fan 2.

In some embodiments, the fan 2 is integrated with the camera equipped device 3, e.g. as shown in figure 2. Then e.g. the processor circuitry 41 of the fan 2 and the processor circuitry 51 of the device 3 may be part of the same processing unit or processor, and the storage unit 42 of the fan 2 and the storage unit 52 of the device 3 may be part of the same physical storage unit in the integrated arrangement 1. Typically, the fan 2 and the device 3 will then also be powered by the same battery 44, 56. Thus, the processor circuitry 41 and the storage unit 42 of the fan 2 are also configured to function as processor circuitry 51 and storage unit 52 of the camera equipped device 3.

In some embodiments, the camera equipped device 3 also comprises a user interface 58, e.g. a touch screen 4 or button(s) 7, enabling a user to input commands for controlling the electrical fan 2, e.g. controlling the speed the speed or direction of an air flow created by the fan. The signal sent by the device 3 and received 61 by the fan 2 may then be based on both the face tracking SW 53 and the commands inputted by the user.

As discussed above, the arrangement 1 may in some embodiments, comprises at least two electrical fans 2 and 6.

In some embodiments, the camera equipped device 3 is a portable device such as a mobile phone e.g. a smartphone, a tablet, a portable computer e.g. a laptop computer, a gaming device, a television, or a music player; or a stationary device such as a television. These are only some examples of camera equipped devices 3 with which embodiments of the present disclosure can be beneficially used. This disclosure is mainly directed to the use of a portable radio device as the camera equipped device, but it may alternatively be a camera enabled television (TV), typically stationary, which wirelessly manages air flow through a fan 2 kept somewhere in the room facing the user facing the TV. In some embodiments, the camera equipped
device 3 is a radio device and also comprises a radio interface 55, and a battery 56 for providing electrical power to the camera equipped device 3.

**Examples**

Below follow some specific examples of embodiments of the present disclosure.

(i) A mobile phone (as the device 3) is fixed to a car dashboard e.g. in the front rear-mirror facing the traveller(s) sitting in the car, such that the camera 5 of the phone captures an image of the travellers as camera feed. The phone 3 can connect to the fan unit 2 of the car over a radio interface and direct air flow using the face tracking software 53 towards the travellers.

It may be possible to connect only a few out of all the available fans 2, 6 via wire/ wireless mode e.g.: in a car, a person sitting in the middle seat may only want that the fan unit facing him should be activated, and not fan units 2, 6 directed towards the back seats where nobody is sitting. So it is possible to connect some or more fan unit wirelessly depending on user preferences for tracking air flow using the camera feed.

(ii) A TV (as the device 3) may have a camera 5 such that it obtains a live picture or video feed and tracks any number of people sitting in front if the TV 3. A separate wireless enabled fan unit 2 (cooler) can be put in front of the people (somewhere in the room) such that air flow is managed towards the people present in front of the TV 3.

(iii) A portable fan comprising a camera 5 (the portable fan thus comprising both the fan 2 and the device 3), whereby air flow can be directed towards persons facing the camera 5 based on the camera feed by means of face tracking SW 53. In this case there are no radio signals for fan 2 to receive since all components are comprised in the portable fan 2 and 3.

Figure 8 is a schematic flow chart of an embodiment of a method for a fan 2 of the present disclosure. The choices made according to the flow chart via
the signal received 61 by the fan 2 may be done by e.g. a preprogramed SW 45 or by a user via a UI 58 of the device 3.

Hand fan mode or dust blower mode is chosen 801. In case dust blower mode is chosen, the fan is controlled 62 to provide a constant air flow providing a focused and high pressure air flow 802. The dust blower mode 802 continues until it is stopped and it is checked 803 whether a stop command has arrived, e.g. from the user. If there is no stop command, then it is again checked 801 if the fan 2 is chosen to be a dust blower or hand fan and unless it has been chosen 801 to be a hand fan, the fan 2 continues to act as a dust blower 802.

If the fan 2 is chosen 801 to act as a hand fan, then the speed may be set 804, e.g. by the user. It is chosen 805 whether the fan 2 should be controlled 62 by means of the camera 5. If not, the fan 2 operates with constant propeller 9 speed 806 until stopped, and it is stopped 807.

If it is chosen 805 that the fan 2 should be controlled 62 by means of the camera 5, then it is determined 808 if there are any persons in front of the camera 5 or screen 4, if not then the signal received 61 by the fan 2 indicates 809 this and the fan 2, or rather the propeller 9 of the fan 2, slows down 810 until stopped 807.

If it is determined 808 that at least one person is in front of the camera 5 or screen 4, then information about this is supplied 811 to the fan 2 via the received 61 signal and the fan 2 is run 812 and controlled 62 to direct air flow towards the person(s), until stopped 807.

Below follow other aspects of the present disclosure.

According to an aspect of the present disclosure, there is provided an electrical fan 2 controllable by a camera equipped device 3. The fan comprises means 41, 43 for receiving 61 a signal from a camera equipped device 3 based on an output of a face recognition and tracking software 53 analysing a camera feed from a camera 5 comprised in the camera equipped
device. The fan 2 also comprises means 4.1 for controlling 6.2 the fan 2 based on the received 6.1 signal.

According to another aspect of the present disclosure, there is provided an electrical fan 2 controllable by a camera equipped device 3. The fan comprises processor circuitry 4.1 and communication circuitry 4.3 configured for receiving 6.1 a signal from a camera equipped device 3 based on an output of a face recognition and tracking software 5.3 analysing a camera feed from a camera 5 comprised in the camera equipped device. The fan 2 also comprises processor circuitry 4.1 configured for controlling 6.2 the fan 2 based on the received 6.1 signal.

The present disclosure has mainly been described above with reference to a few embodiments. However, as is readily appreciated by a person skilled in the art, other embodiments than the ones disclosed above are equally possible within the scope of the present disclosure, as defined by the appended claims.
CLAIMS

1. An electrical fan (2) controllable by a camera equipped device (3), the fan comprising:

   processor circuitry (41); and

   a storage unit (42) storing instructions (45) that, when executed by the processor circuitry, can cause the fan to:

   receive a signal from the camera equipped device (3) based on an output of a face recognition and tracking software (53) analysing a camera feed from a camera (5) comprised in the camera equipped device; and

   control the fan (2) based on the received signal.

2. The electrical fan of claim 1, wherein the fan (2) is configured to be controlled to adjust its air flow direction and/or its speed based on the received signal.

3. The electrical fan of any preceding claim, wherein the fan (2) is configured to be controlled to reduce its speed when the received signal indicates that no-one is in front of and facing a screen (4) of the camera equipped device (3).

4. The electrical fan of any preceding claim, wherein the fan (2) is configured to be controlled to direct its air flow towards a face or head of a person when the received signal indicates that said person is in front of the camera (5) of the camera equipped device (3).

5. The electrical fan of any preceding claim, wherein the fan (2) is configured to be controlled to direct its air flow in a panning motion over a plurality of faces or heads of persons when the received signal indicates that said persons are in front of a screen (4) of the camera equipped device (3).

6. The electrical fan of any preceding claim, wherein the fan (2) is configured to be controlled to produce a maximum unidirectional air flow
when the received signal from the camera equipped device (3) includes an indication that the fan should be used as a dust blower.

7. The electrical fan of any preceding claim, further comprising:

a wired connection interface (8, 43) configured to receive the signal via wire from the camera equipped device (3).

8. The electrical fan of claim 7, wherein the wired connection interface (8, 43) is also configured to receive electrical power from a battery (56) comprised in the camera equipped device (3) for running the fan (2).

9. The electrical fan of any preceding claim, further comprising:

a radio interface (43) configured to receive the signal wirelessly from the camera equipped device (3); and

a battery (44) for supplying electrical power to the fan (2).

10. The electrical fan of any preceding claim, wherein the instructions (45) can also cause the fan (2) to prompt the camera equipped device (3) to run fan control software, which control software enables the camera equipped device to send the signal to the fan, e.g., in a plug-and-play manner.

11. The electrical fan of any one of claims 1-6, wherein the fan (2) is integrated with the camera equipped device (3).

12. The electrical fan of claim 11, wherein the processor circuitry (41) and the storage unit (42) of the fan (2) are also configured to function as processor circuitry (51) and a storage unit (52) of the camera equipped device (3).

13. A camera equipped device (3) comprising an electrical fan (2) of claim 11 or 12.

14. An arrangement (1) comprising:

at least one electrical fan (2, 6) according to any preceding claim; and
the camera equipped device (3), comprising:

processor circuitry (51),
a storage unit (52),
the camera (5), and

the face recognition and tracking software (53), stored in the storage unit (52) and configured to, when run on the processor circuitry (51), analyse the camera feed from the camera (5).

15. The arrangement of claim 14, wherein the camera equipped device (3) further comprises a user interface (58), e.g. a touch screen (4) or button(s) (7), enabling a user to input commands for controlling the at least one electrical fan (2, 6), e.g. controlling the speed or direction of an air flow created by the fan.

16. The arrangement of claim 14 or 15, wherein the arrangement (1) comprises at least two such electrical fans (2, 6).

17. The arrangement of any claim 14-16, wherein the camera equipped device (3) is a portable device such as a mobile phone e.g. a smartphone, a tablet, a portable computer e.g. a laptop computer, a gaming device, a television, or a music player; or a stationary device such as a television.

18. The arrangement of any claim 14-17, wherein the camera equipped device (3) is a radio device and further comprises:

a radio interface (55), and

a battery (56) for providing electrical power to the camera equipped device.

19. A method for controlling an electrical fan (2), the method comprising:

receiving (61) a signal from a camera equipped device (3) based on an output of a face recognition and tracking software (53) analysing a camera feed from a camera (5) comprised in the camera equipped device; and
controlling (62) the fan (2) based on the received (61) signal.

20. A computer program product (70) comprising computer-executable components (71) for causing an electrical fan (2) to perform the method of claim 19 when the computer-executable components are run on processor circuitry (41) comprised in the fan.

21. A computer program (71) for controlling an electrical fan (2), the computer program comprising computer program code which is able to, when run on processor circuitry (41) of the fan (2), cause the fan to:

receive (61) a signal from the camera equipped device (3) based on an output of a face recognition and tracking software (53) analysing a camera feed from a camera (5) comprised in the camera equipped device; and

control (62) the fan (2) based on the received (61) signal.

22. A computer program product (70) comprising a computer program (71) according to claim 21 and a computer readable means (72) on which the computer program is stored.
A. CLASSIFICATION OF SUBJECT MATTER

INV. G08C17/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G08C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search: 26 September 2013

Date of mailing of the international search report: 07/10/2013

Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax. (+31-70) 340-3016

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