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FORM 2

THE PATENTS ACT, 1970

(39 OF 1970)

AND

THE PATENT RULES, 2003

COMPLETE SPECIFICATION

(See section 10 and rule 13)

Title of Invention:

**SYSTEM AND METHOD FOR IDENTIFYING AND MONITORING A
PERSON INFECTED BY A VIRULENT RESPIRATORY VIRUS**

Name of Applicant	Nationality	Address
University of Petroleum and Energy Studies	Indian	Energy Acres, Bidholi, Premnagar, Dehradun, Uttarakhand, India-248007

The following specification particularly describes the invention and the manner in which it is to be performed.

FIELD OF INVENTION

[001] The present invention is generally related to system and method for identifying and monitoring a person infected by a virulent respiratory virus such as coronavirus or 2019-nCoV.

BACKGROUND OF INVENTION

[002] The subject matter discussed in the background section should not be assumed to be prior art merely as a result of its mention in the background section. Similarly, a problem mentioned in the background section or associated with the subject matter of the background section should not be assumed to have been previously recognized in the prior art. The subject matter in the background section merely represents different approaches, which in-and-of-themselves may also be inventions.

[003] The health care services throughout the world are failing to contain and prevent the spread of contagious diseases within the premises such as medical facility, grocery store, manufacturing facility, shopping mall, etc. Typically, the contagious diseases, and COVID in particular, spread through an infected person when he/she comes in contact with other objects, which are in turn touched by regular patients who can become a carrier. An alarming number of patients have contracted these contagious diseases when present in the premises itself and increasing the difficulties for the health care service providers and security personnel. One of the most prone people is those who are currently on duty inspecting (be it the doctors or police officials) the people traveling if somehow this contact reduces then some people will be able to prevent themselves from this danger. Also not ignoring the inspection of people there must be some changes with this process to reduce the chances of infection especially in

the people who are currently on duty. There are also some scenarios where people are seen to be running after the detection of virus (corona) positive.

[004] WIPO publication WO2004110248A2 titled, “Remote technique to detect core body temperature in a subject using thermal imaging” discloses a technique to detect core body temperature in a warm-blooded such as human or animal with the help of thermal imaging. This publication does not capture the image of an affected person but only to detect core body temperature.

[005] US publication US20150150453A1 titled, “Thermal imaging system” talks about a platform to measure the physical, chemical, and biological parameters of the body and send the signal wirelessly to take an action.

[006] US patent US7203346B2 titled, “Face recognition method and apparatus using component-based face descriptor” provides a platform that uses a component-based linear discriminant analysis (LDA) face descriptor to recognize the face.

[007] A publication titled, “Face detection techniques: a review” published in 2018 describes the concept of face detection in digital images automatically. (Reference: Face detection techniques: a review. 2018 Aug 4; DOI: 10.1007/s10462-018-9650-2). A publication titled, “Thermal imaging system and its real-time applications: a survey” published in 2018 describes the real-time application of thermal imaging system i.e. in medical diagnosis, agriculture, tracking, and reorganization of humans along with their facial expressions. (Reference: 2018 June 19; researchgate.net/publication/325685880).

[008] However, the existing systems and methods are inefficient and ineffective to wirelessly measure the human body temperature and capture the image of the infected on detecting virus-positive so that the infected person cannot run away and automatically capture the information of the infected person so that an effective quarantine process can be initiated.

[009] Therefore there is a need for an automated parking system and method for detecting wrong parking on a parking spot by utilizing edge detection image processing techniques on a live feed, to solve the issue of inconvenience that other users face due to invalid parking of any other person.

[0010] Thus, in view of the above, there is a long-felt need in the industry to address the aforementioned deficiencies and inadequacies.

[0011] Further limitations and disadvantages of conventional and traditional approaches will become apparent to one of skill in the art through comparison of described systems with some aspects of the present disclosure, as set forth in the remainder of the present application and with reference to the drawings.

[0012] In some embodiment, the numbers expressing quantities or dimensions of items, and so forth, used to describe and claim certain embodiment of the invention are to be understood as being modified in some instances by the term “about.” Accordingly, in some embodiment, the numerical parameters set forth in the written description and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by a particular embodiment. In some embodiment, the numerical parameters should be construed in light of the

number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of some embodiment of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as practicable. The numerical values presented in some embodiment of the invention may contain certain errors necessarily resulting from the standard deviation found in their respective testing measurements.

[0013] As used in the description herein and throughout the claims that follow, the meaning of “a,” “an,” and “the” includes plural reference unless the context clearly dictates otherwise. Also, as used in the description herein, the meaning of “in” includes “in” and “on” unless the context clearly dictates otherwise.

[0014] The recitation of ranges of values herein is merely intended to serve as a shorthand method of referring individually to each separate value falling within the range. Unless otherwise indicated herein, each individual value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g. “such as”) provided with respect to a certain embodiment herein is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention otherwise claimed. No language in the specification should be construed as indicating any non-claimed element essential to the practice of the invention.

[0015] Groupings of alternative elements or embodiment of the invention disclosed herein are not to be construed as limitations. Each group

member can be referred to and claimed individually or in any combination with other members of the group or other elements found herein. One or more members of a group can be included in, or deleted from, a group for reasons of convenience and/or patentability. When any such inclusion or deletion occurs, the specification is herein deemed to contain the group as modified thus fulfilling the written description of all groups used in the appended claims.

SUMMARY OF THE INVENTION

[0016] A system and method for identifying and monitoring a person infected by a virulent respiratory virus such as coronavirus or 2019-nCoV are provided substantially, as shown in and/or described in connection with at least one of the figures.

[0017] An aspect of the present disclosure relates to a system and method for identifying and monitoring a person infected by a virulent respiratory virus. The system includes a thermal camera, a notification device, a camera, and an information capture module. The thermal camera is configured to perform thermal screening on the person present in a proximity to detect the body temperature of the person and to determine if the body temperature of the person is greater than a threshold value to transmit a command signal. The notification device is connected with the thermal camera to initiate a notification signal on receiving the command signal from the thermal camera. The camera consecutively captures an image of the person present in the proximity of the thermal camera. The person with the body temperature greater than the threshold value is identified as an infected person. The information capture module is configured with a computing device to capture the personal information of the infected person.

[0018] In an aspect, the camera obtains a high-resolution image of the infected person by executing a face detection algorithm.

[0019] In an aspect, the thermal camera detects the body temperature of the infected person by executing a color detection algorithm.

[0020] An aspect of the present disclosure relates to a method for identifying and monitoring a person infected by a virulent respiratory virus. The

method includes a step of performing thermal screening, by a thermal camera, on the person present in proximity for detecting body temperature of the person, and determining if the body temperature of the person is greater than a threshold value to transmit a command signal. The method includes a step of initiating, by a notification device, a notification signal on receiving the command signal from the thermal camera. The method includes a step of consecutively capturing, by a camera, an image of the person present in the proximity of the thermal camera. The person with the body temperature greater than the threshold value is identified as an infected person. The method includes a step of capturing, by an information capture module configured with a computing device, personal information of the infected person.

[0021] In an aspect, the camera obtains a high-resolution image of the infected person by executing a face detection algorithm.

[0022] In an aspect, the thermal camera detects the body temperature of the infected person by executing a color detection algorithm.

[0023] Accordingly, one advantage of the present invention is that it automatically measures human body temperature, and captures an image of the infected person so that the authority can find the infected person in a crowded place without any manual interaction or human interaction.

[0024] Accordingly, one advantage of the present invention is that it automatically facilitates the infected person to provide personal information so that the authority can provide him/her with the quarantine facility process.

[0025] Accordingly, one advantage of the present invention is that it utilizes the thermal camera to detect human body temperature which reduces the

complexity of the temperature detection and provides an accurate result to take any action against the coronavirus disease and enables the authorities to stop the spreading of the virus among the humans.

[0026] Accordingly, one advantage of the present invention is that it provides an economical, and easy embedment with autonomous functionality of screening system that allows easy detection of the person infected with COVID-19 symptoms without any manual techniques as prevailing today.

[0027] Accordingly, one advantage of the present invention is that it prevents medical and governmental authority from exposing directly to the people for screening purposes as the system is equipped with intelligent sensors and image recognition which makes the whole process autonomous.

[0028] Accordingly, one advantage of the present invention is that it provides a notification device such as an alert system that is integrated with the emergency services database that allows the feasible flow of suspected patient data into the hospital. This approach could save time in the initial testing phase of the person.

[0029] These features and advantages of the present disclosure may be appreciated by reviewing the following description of the present disclosure, along with the accompanying figures wherein like reference numerals refer to like parts.

BRIEF DESCRIPTION OF DRAWINGS

[0030] The accompanying drawings illustrate the embodiment of systems, methods, and other aspects of the disclosure. Any person with ordinary skills in the art will appreciate that the illustrated element boundaries (e.g., boxes, groups of boxes, or other shapes) in the figures represent an example of the boundaries. In some examples, one element may be designed as multiple elements, or multiple elements may be designed as one element. In some examples, an element shown as an internal component of one element may be implemented as an external component in another and vice versa. Furthermore, the elements may not be drawn to scale.

[0031] Various embodiment will hereinafter be described in accordance with the appended drawings, which are provided to illustrate, not limit, the scope, wherein similar designations denote similar elements, and in which:

[0032] FIG. 1 illustrates a block diagram of a system for identifying and monitoring a person infected by a virulent respiratory virus, in accordance with an embodiment of the present subject matter.

[0033] FIG. 2 illustrates a schematic diagram of a system and method for identifying and monitoring a person infected by a virulent respiratory virus, in accordance with an embodiment of the present subject matter.

[0034] FIG. 3 illustrates a flowchart of a method for identifying and monitoring a person infected by a virulent respiratory virus, in accordance with at least one embodiment.

DETAILED DESCRIPTION

[0035] The present disclosure is best understood with reference to the detailed figures and description set forth herein. Various embodiments have been discussed with reference to the figures. However, those skilled in the art will readily appreciate that the detailed descriptions provided herein with respect to the figures are merely for explanatory purposes, as the methods and systems may extend beyond the described embodiments. For instance, the teachings presented and the needs of a particular application may yield multiple alternative and suitable approaches to implement the functionality of any detail described herein. Therefore, any approach may extend beyond certain implementation choices in the following embodiments.

[0036] References to “one embodiment,” “at least one embodiment,” “an embodiment,” “one example,” “an example,” “for example,” and so on indicate that the embodiment(s) or example(s) may include a particular feature, structure, characteristic, property, element, or limitation but that not every embodiment or example necessarily includes that particular feature, structure, characteristic, property, element, or limitation. Further, repeated use of the phrase “in an embodiment” does not necessarily refer to the same embodiment.

[0037] Methods of the present invention may be implemented by performing or completing manually, automatically, or a combination thereof, selected steps or tasks. The term “method” refers to manners, means, techniques and procedures for accomplishing a given task including, but not limited to, those manners, means, techniques, and procedures either known to or readily developed from known manners, means, techniques and procedures by practitioners of the art to which the invention belongs. The

descriptions, examples, methods, and materials presented in the claims and the specification are not to be construed as limiting but rather as illustrative only. Those skilled in the art will envision many other possible variations within the scope of the technology described herein.

[0038] FIG. 1 illustrates a block diagram of a system 100 for identifying and monitoring a person infected by a virulent respiratory virus, in accordance with an embodiment of the present subject matter. The system 100 includes a thermal camera 102, a notification device 104, a camera 106, and an information capture module 108. The thermal camera 102 is installed at an entry gate 112 of the premise to perform thermal screening on the person present in a proximity to detect the body temperature (shown as block 114) of the person and to determine if the body temperature of the person is greater than a threshold value to transmit a command signal. In an embodiment, the thermal camera 102 detects the body temperature of the infected person by executing a color detection algorithm. The color detection algorithm helps in determining the body temperature. For example, if the color is dark red then high temperature, if blue then low temperature so color detection may get handy in this case. At block 116, the present system allows the person to pass through an exit gate on detecting that the body temperature of the person is less than the threshold value. In an embodiment, the thermal camera 102 is a non-invasive, uses no radiation, a procedure that detects, records, and produces a careful analysis and image of skin surface temperature patterns (body heat) as a reflection of normal or abnormal human physiology.

[0039] The notification device 104 is connected with the thermal camera 102 to initiate a notification signal on receiving the command signal from the

thermal camera 102. In an embodiment, the notification device 104 is an alert system that initiates the notification signal such as an audio signal (sound), light signal (LED lights), or textual messages displayed on an LCD screen. In an embodiment, the notification device 104 automatically generates an alarm on the detection of the person with high temperature and enables a control system to display the person's image with body temperature on the monitor so that he/she could be easily recognized. At the same time store owner or workplace's authority can trigger emergency services through monitor displays of the present system which will automatically update data of the suspected person with virus (COVID-19) symptoms on a hospital database.

[0040] The camera 106 consecutively captures an image of the person present in the proximity of the thermal camera 102. The person with the body temperature greater than the threshold value is identified as an infected person. In an embodiment, the camera 106 is a high-definition (HD) camera. In an embodiment, the camera 106 obtains a high-resolution image of the infected person by executing a face detection algorithm. In an embodiment, the face detection is performed by the camera 106, just before the clicking of the photo of the person. This is to achieve a better image of the person who is actually diagnosed and to confirm whether the picture to be clicked is not blank. The present camera performs a paced face detection so that the photo gets clicked without many delays. In an embodiment, the face detection algorithm includes but not limited to the Viola and Jones (2004) algorithm. In an embodiment, the thermal camera 102 is integrated with the camera 106 to allow spontaneous capture of a person's body temperature as he/she passes through the entrance of the premise.

[0041] The information capture module 108 is configured with a computing device 110 to capture the personal information of the infected person. Examples of the computing device 110 may include but are not limited to, a portable computer, a personal digital assistant, a handheld device, and a workstation. The personal information of the infected person or the person with high temperature includes but not limited to the first name and last name, contact number, residential address, latest traveling details, recently interacted with people, family members details i.e. family members names, contact numbers, and address, if a person living in PG or Hostel then he/she needs to enter their PG or hostel details and also the details of the recently interacted with people, the Affected person experiencing any symptoms related to COVID, Recently interacted or lived with someone who has tested positive for COVID.

[0042] The computing device 110 is communicatively coupled to a network and utilizes the various operating system to perform the functions of the present system such as Android®, IOS®, Windows®, etc. In one implementation, the network may be a wireless network, a wired network, or a combination thereof. The network can be implemented as one of the different types of networks, such as an intranet, local area network (LAN), wide area network (WAN), the internet, and the like. The network may either be a dedicated network or a shared network. The shared network represents an association of the different types of networks that use a variety of protocols, for example, Hypertext Transfer Protocol (HTTP), Transmission Control Protocol/Internet Protocol (TCP/IP), Wireless Application Protocol (WAP), and the like, to communicate with one another. Further, the network 106 may include a variety of network devices, including routers, bridges, servers, computing devices, storage devices, and the like.

[0043] FIG. 2 illustrates a schematic diagram 200 of a system and method for identifying and monitoring a person infected by a virulent respiratory virus, in accordance with an embodiment of the present subject matter. FIG. 2 is explained in conjunction with FIG. 1. According to an embodiment herein, the present system 100 uses a micro-computer 202 such as a raspberry pi unit configured with the thermal camera 102 and the camera 106 to capture the high-resolution image of the person. The raspberry pi unit is cost-efficient to capture the face of the infected person and the camera 106 which is interfaced with the computing device 110 such as a personal computer that stores the details and also captures the image of an infected person. The present system 100 is installed at various workspaces such as the entrance of malls, small stores, grocery areas, hospitals, police stations, airports, etc. The present system 100 is a modular system that can be installed at the entrance and too equipped intelligent human detecting sensors 204 such as a PIR sensor integrated with a thermal image screening and HD face recognition system making it portable and easy to implement. In an embodiment, the present system 100 uses a DC-to-DC converter 206 which is an electronic circuit or electromechanical device that converts a source of direct current (DC) from one voltage level to another.

[0044] In operation, the present system automates the whole manual process which is checking the temperature of people using the thermal scanner, and if this temperature is high then the alarm system will initiate and those people are referred for further checkup. The thermal camera detects the high temperature of the person and if the temperature is high then there are two tasks to be done at the same time first is to take a picture of the person using the HD camera so that the person is not able to flee along with the blinking of red led lights so that if in case the person is trying to

flee the officials present at that area are able to catch him/her. Once a person with high temperature is detected it is his duty to give information to the officials so that they are able to keep a record of that person. The use of raspberry pi a thermal camera and HD camera setup can be installed in the entry area gate just like that of a metal detection gates. The use of face detection and color detection has to be applied for the initial processes. The algorithm flows like first with the thermal camera the temperature is detected as there is a certain color for a certain temperature. Once the temperature is found to be high in a person the HD camera detects the face and takes a photo and at the very same time, a bunch of red LEDs is set to be blinking (alarm) just as a metal detector gate does when metal gets detected. Once the image gets clicked the next step is to provide information to the official for updating patients under surveillance on the database. This whole automated system can be used in crowded areas like bus stands, railway stations, shopping malls and too in the future it could be mandatory to install in all stores if COVID – 19 increases.

[0045] Further, the present system provides a low cost and portable system that can be easily embedded on any entrance platforms and can easily be powered by battery supply or 230V AC. The present system is equipped with dual power supply options. In an embodiment, the present system is operated on a 5V power supply using batteries or 230V AC. The present system can easily be used at any place thus enhancing more safety measures to counter COVID 19 pandemic. Portability and modular embedment of the device at the entrance of workplaces makes the present system handy to operate. With intelligent algorithm which supports spontaneous thermal screening and simultaneous HD image processing allows the system to detect persons with respect to their motion in and out

of the entrance, this would prevent a person from queuing at the entrance or exit of the workplaces. Triggering of the alarming system on detecting person with high temperature will too initiate emergency alert messages which will be sent to the hospital with all details of the suspect, by manual initiation from workplace officials. Hence, allow concurrent action without any delay.

[0046] As used herein, and unless the context dictates otherwise, the term “configured to” or “coupled to” is intended to include both direct coupling (in which two elements that are coupled to each other contact each other) and indirect coupling (in which at least one additional element is located between the two elements). Therefore, the terms “configured to”, “configured with”, “coupled to” and “coupled with” are used synonymously. Within the context of this document terms “configured to”, “coupled to” and “coupled with” are also used euphemistically to mean “communicatively coupled with” over a network, where two or more devices are able to exchange data with each other over the network, possibly via one or more intermediary device.

[0047] It should be apparent to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the spirit of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms “comprises” and “comprising” should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined

with other elements, components, or steps that are not expressly referenced.

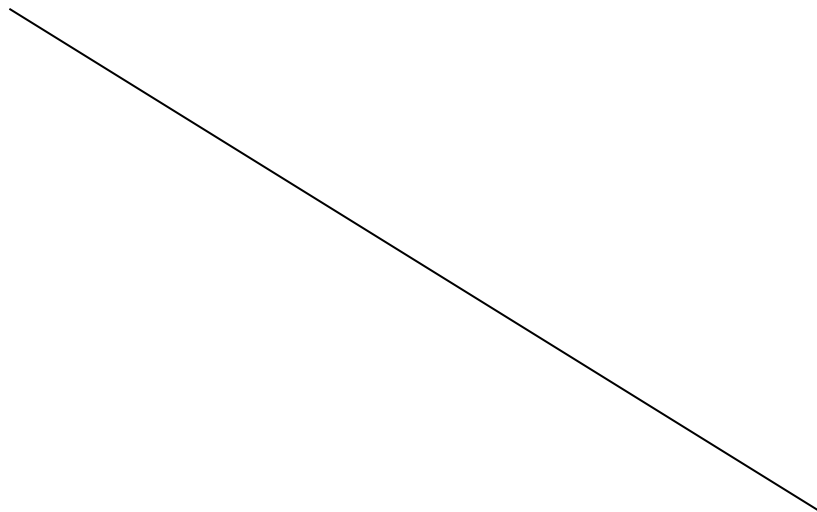
[0048] FIG. 3 illustrates a flowchart of a method 300 for identifying and monitoring a person infected by a virulent respiratory virus, in accordance with at least one embodiment. The method includes a step 302 of performing thermal screening on the person present in proximity for detecting the body temperature of the person through a thermal camera. At step 304, the method determines if the body temperature of the person is greater than a threshold value to transmit a command signal. The method includes a step of initiating a notification signal on receiving the command signal from the thermal camera through a notification device. The method includes a step 306 of consecutively capturing, by a camera, an image of the person present in the proximity of the thermal camera. In an embodiment, the camera obtains a high-resolution image of the infected person by executing a face detection algorithm. The person with the body temperature greater than the threshold value is identified as an infected person. In an embodiment, the thermal camera detects the body temperature of the infected person by executing a color detection algorithm. At step 308, the method allows the person to go ahead on determining that the body temperature of the person is less than the threshold value. The method includes a step 310 of capturing the personal information of the infected person through an information capture module configured with a computing device.

[0049] Thus the present system and method capture the image using the HD camera which is compatible with the raspberry pi unit. Further, the present system and method capture image of the affected person whose body temperature is high automatically using HD camera which is cheap in cost.

This helps the authority to catch the affected person through their captured images so that he/she can't run away/hide from the authority. After capturing the image, the infected/affected person enters his/her own details so that he/she can be sent for treatment and also asked to enter his/her own family details to start the quarantine process. This is also helping to stop or reduce the spread of the coronavirus disease among human beings.

[0050] No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the invention.

[0051] It will be apparent to those skilled in the art that various modifications and variations can be made to the present invention without departing from the ~~spirit and~~ scope of the invention. There is no intention to limit the invention to the specific form or forms enclosed. On the contrary, the intention is to cover all modifications, alternative constructions, and equivalents falling within the ~~spirit and~~ scope of the invention, as defined in the appended claims. Thus, it is intended that the present invention cover the modifications and variations of this invention, provided they are within the scope of the appended claims and their equivalents.



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30 and monitoring a person infected by a virulent respiratory virus. The

5 method includes a step of performing thermal screening, by a thermal camera, on the person present in proximity for detecting body temperature of the person, and determining if the body temperature of the person is greater than a threshold value to transmit a command signal. The method includes a step of initiating, by a notification device, a notification signal on
10 receiving the command signal from the thermal camera. The method includes a step of consecutively capturing, by a camera, an image of the person present in the proximity of the thermal camera. The person with the body temperature greater than the threshold value is identified as an infected person. The method includes a step of capturing, by an
15 information capture module configured with a computing device, personal information of the infected person.

[0021] In an aspect, the camera obtains a high-resolution image of the infected person by executing a face detection algorithm.

[0022] In an aspect, the thermal camera detects the body temperature of the
20 infected person by executing a color detection algorithm.

[0023] Accordingly, one advantage of the present invention is that it automatically measures human body temperature, and captures an image of the infected person so that the authority can find the infected person in a crowded place without any manual interaction or human interaction.

25 [0024] Accordingly, one advantage of the present invention is that it automatically facilitates the infected person to provide personal information so that the authority can provide him/her with the quarantine facility process.

[0025] Accordingly, one advantage of the present invention is that it utilizes
30 the thermal camera to detect human body temperature which reduces the

5 complexity of the temperature detection and provides an accurate result to
take any action against the coronavirus disease and enables the
authorities to stop the spreading of the virus among the humans.

[0026] Accordingly, one advantage of the present invention is that it provides
an economical, and easy embedment with autonomous functionality of
10 screening system that allows easy detection of the person infected with
COVID-19 symptoms without any manual techniques as prevailing today.

[0027] Accordingly, one advantage of the present invention is that it prevents
medical and governmental authority from exposing directly to the people
for screening purposes as the system is equipped with intelligent sensors
15 and image recognition which makes the whole process autonomous.

[0028] Accordingly, one advantage of the present invention is that it provides
a notification device such as an alert system that is integrated with the
emergency services database that allows the feasible flow of suspected
patient data into the hospital. This approach could save time in the initial
20 testing phase of the person.

[0029] These features and advantages of the present disclosure may be
appreciated by reviewing the following description of the present
disclosure, along with the accompanying figures wherein like reference
numerals refer to like parts.

5 **BRIEF DESCRIPTION OF DRAWINGS**

[0030] The accompanying drawings illustrate the embodiment of systems, methods, and other aspects of the disclosure. Any person with ordinary skills in the art will appreciate that the illustrated element boundaries (e.g., boxes, groups of boxes, or other shapes) in the figures represent an example of the boundaries. In some examples, one element may be designed as multiple elements, or multiple elements may be designed as one element. In some examples, an element shown as an internal component of one element may be implemented as an external component in another and vice versa. Furthermore, the elements may not be drawn to scale.

[0031] Various embodiment will hereinafter be described in accordance with the appended drawings, which are provided to illustrate, not limit, the scope, wherein similar designations denote similar elements, and in which:

20 [0032] FIG. 1 illustrates a block diagram of a system for identifying and monitoring a person infected by a virulent respiratory virus, in accordance with an embodiment of the present subject matter.

[0033] FIG. 2 illustrates a schematic diagram of a system and method for identifying and monitoring a person infected by a virulent respiratory virus, in accordance with an embodiment of the present subject matter.

[0034] FIG. 3 illustrates a flowchart of a method for identifying and monitoring a person infected by a virulent respiratory virus, in accordance with at least one embodiment.

5 **DETAILED DESCRIPTION**

10 [0035] The present disclosure is best understood with reference to the detailed figures and description set forth herein. Various embodiments have been discussed with reference to the figures. However, those skilled in the art will readily appreciate that the detailed descriptions provided herein with respect to the figures are merely for explanatory purposes, as the methods and systems may extend beyond the described embodiments. For instance, the teachings presented and the needs of a particular application may yield multiple alternative and suitable approaches to implement the functionality of any detail described herein.

15 Therefore, any approach may extend beyond certain implementation choices in the following embodiments.

20 [0036] References to “one embodiment,” “at least one embodiment,” “an embodiment,” “one example,” “an example,” “for example,” and so on indicate that the embodiment(s) or example(s) may include a particular feature, structure, characteristic, property, element, or limitation but that not every embodiment or example necessarily includes that particular feature, structure, characteristic, property, element, or limitation. Further, repeated use of the phrase “in an embodiment” does not necessarily refer to the same embodiment.

25 [0037] Methods of the present invention may be implemented by performing or completing manually, automatically, or a combination thereof, selected steps or tasks. The term “method” refers to manners, means, techniques and procedures for accomplishing a given task including, but not limited to, those manners, means, techniques, and procedures either known to or readily developed from known manners, means, techniques and

30 procedures by practitioners of the art to which the invention belongs. The

5 descriptions, examples, methods, and materials presented in the claims
and the specification are not to be construed as limiting but rather as
illustrative only. Those skilled in the art will envision many other possible
variations within the scope of the technology described herein.

10 [0038] FIG. 1 illustrates a block diagram of a system 100 for identifying and
monitoring a person infected by a virulent respiratory virus, in accordance
with an embodiment of the present subject matter. The system 100
includes a thermal camera 102, a notification device 104, a camera 106,
and an information capture module 108. The thermal camera 102 is
15 installed at an entry gate 112 of the premise to perform thermal screening
on the person present in a proximity to detect the body temperature
(shown as block 114) of the person and to determine if the body
temperature of the person is greater than a threshold value to transmit a
command signal. In an embodiment, the thermal camera 102 detects the
20 body temperature of the infected person by executing a color detection
algorithm. The color detection algorithm helps in determining the body
temperature. For example, if the color is dark red then high temperature, if
blue then low temperature so color detection may get handy in this case.
At block 116, the present system allows the person to pass through an
exit gate on detecting that the body temperature of the person is less than
25 the threshold value. In an embodiment, the thermal camera 102 is a non-
invasive, uses no radiation, a procedure that detects, records, and
produces a careful analysis and image of skin surface temperature
patterns (body heat) as a reflection of normal or abnormal human
physiology.

30 [0039] The notification device 104 is connected with the thermal camera 102
to initiate a notification signal on receiving the command signal from the

5 thermal camera 102. In an embodiment, the notification device 104 is an
alert system that initiates the notification signal such as an audio signal
(sound), light signal (LED lights), or textual messages displayed on an
LCD screen. In an embodiment, the notification device 104 automatically
generates an alarm on the detection of the person with high temperature
10 and enables a control system to display the person's image with body
temperature on the monitor so that he/she could be easily recognized. At
the same time store owner or workplace's authority can trigger emergency
services through monitor displays of the present system which will
automatically update data of the suspected person with virus (COVID-19)
15 symptoms on a hospital database.

[0040] The camera 106 consecutively captures an image of the person
present in the proximity of the thermal camera 102. The person with the
body temperature greater than the threshold value is identified as an
infected person. In an embodiment, the camera 106 is a high-definition
20 (HD) camera. In an embodiment, the camera 106 obtains a high-resolution
image of the infected person by executing a face detection algorithm. In
an embodiment, the face detection is performed by the camera 106, just
before the clicking of the photo of the person. This is to achieve a better
image of the person who is actually diagnosed and to confirm whether the
25 picture to be clicked is not blank. The present camera performs a paced
face detection so that the photo gets clicked without many delays. In an
embodiment, the face detection algorithm includes but not limited to the
Viola and Jones (2004) algorithm. In an embodiment, the thermal camera
102 is integrated with the camera 106 to allow spontaneous capture of a
30 person's body temperature as he/she passes through the entrance of the
premise.

5 **[0041]** The information capture module 108 is configured with a computing device 110 to capture the personal information of the infected person. Examples of the computing device 110 may include but are not limited to, a portable computer, a personal digital assistant, a handheld device, and a workstation. The personal information of the infected person or the
10 person with high temperature includes but not limited to the first name and last name, contact number, residential address, latest traveling details, recently interacted with people, family members details i.e. family members names, contact numbers, and address, if a person living in PG or Hostel then he/she needs to enter their PG or hostel details and also
15 the details of the recently interacted with people, the Affected person experiencing any symptoms related to COVID, Recently interacted or lived with someone who has tested positive for COVID.

[0042] The computing device 110 is communicatively coupled to a network and utilizes the various operating system to perform the functions of the
20 present system such as Android®, IOS®, Windows®, etc. In one implementation, the network may be a wireless network, a wired network, or a combination thereof. The network can be implemented as one of the different types of networks, such as an intranet, local area network (LAN), wide area network (WAN), the internet, and the like. The network may
25 either be a dedicated network or a shared network. The shared network represents an association of the different types of networks that use a variety of protocols, for example, Hypertext Transfer Protocol (HTTP), Transmission Control Protocol/Internet Protocol (TCP/IP), Wireless Application Protocol (WAP), and the like, to communicate with one
30 another. Further, the network 106 may include a variety of network devices, including routers, bridges, servers, computing devices, storage devices, and the like.

5 **[0043]** FIG. 2 illustrates a schematic diagram 200 of a system and method for
identifying and monitoring a person infected by a virulent respiratory virus,
in accordance with an embodiment of the present subject matter. FIG. 2 is
explained in conjunction with FIG. 1. According to an embodiment herein,
the present system 100 uses a micro-computer 202 such as a raspberry pi
10 unit configured with the thermal camera 102 and the camera 106 to
capture the high-resolution image of the person. The raspberry pi unit is
cost-efficient to capture the face of the infected person and the camera
106 which is interfaced with the computing device 110 such as a personal
computer that stores the details and also captures the image of an
15 infected person. The present system 100 is installed at various
workspaces such as the entrance of malls, small stores, grocery areas,
hospitals, police stations, airports, etc. The present system 100 is a
modular system that can be installed at the entrance and too equipped
intelligent human detecting sensors 204 such as a PIR sensor integrated
20 with a thermal image screening and HD face recognition system making it
portable and easy to implement. In an embodiment, the present system
100 uses a DC-to-DC converter 206 which is an electronic circuit or
electromechanical device that converts a source of direct current (DC)
from one voltage level to another.

25 **[0044]** In operation, the present system automates the whole manual process
which is checking the temperature of people using the thermal scanner,
and if this temperature is high then the alarm system will initiate and those
people are referred for further checkup. The thermal camera detects the
high temperature of the person and if the temperature is high then there
30 are two tasks to be done at the same time first is to take a picture of the
person using the HD camera so that the person is not able to flee along
with the blinking of red led lights so that if in case the person is trying to

5 flee the officials present at that area are able to catch him/her. Once a
person with high temperature is detected it is his duty to give information
to the officials so that they are able to keep a record of that person. The
use of raspberry pi a thermal camera and HD camera setup can be
installed in the entry area gate just like that of a metal detection gates.
10 The use of face detection and color detection has to be applied for the
initial processes. The algorithm flows like first with the thermal camera the
temperature is detected as there is a certain color for a certain
temperature. Once the temperature is found to be high in a person the HD
camera detects the face and takes a photo and at the very same time, a
15 bunch of red LEDs is set to be blinking (alarm) just as a metal detector
gate does when metal gets detected. Once the image gets clicked the
next step is to provide information to the official for updating patients
under surveillance on the database. This whole automated system can be
used in crowded areas like bus stands, railway stations, shopping malls
20 and too in the future it could be mandatory to install in all stores if COVID
– 19 increases.

[0045] Further, the present system provides a low cost and portable system
that can be easily embedded on any entrance platforms and can easily be
powered by battery supply or 230V AC. The present system is equipped
25 with dual power supply options. In an embodiment, the present system is
operated on a 5V power supply using batteries or 230V AC. The present
system can easily be used at any place thus enhancing more safety
measures to counter COVID 19 pandemic. Portability and modular
embedment of the device at the entrance of workplaces makes the
30 present system handy to operate. With intelligent algorithm which supports
spontaneous thermal screening and simultaneous HD image processing
allows the system to detect persons with respect to their motion in and out

5 of the entrance, this would prevent a person from queuing at the entrance
or exit of the workplaces. Triggering of the alarming system on detecting
person with high temperature will too initiate emergency alert messages
which will be sent to the hospital with all details of the suspect, by manual
initiation from workplace officials. Hence, allow concurrent action without
10 any delay.

[0046] As used herein, and unless the context dictates otherwise, the term
“configured to” or “coupled to” is intended to include both direct coupling
(in which two elements that are coupled to each other contact each other)
and indirect coupling (in which at least one additional element is located
15 between the two elements). Therefore, the terms “configured to”,
“configured with”, “coupled to” and “coupled with” are used synonymously.
Within the context of this document terms “configured to”, “coupled to” and
“coupled with” are also used euphemistically to mean “communicatively
coupled with” over a network, where two or more devices are able to
20 exchange data with each other over the network, possibly via one or more
intermediary device.

[0047] It should be apparent to those skilled in the art that many more
modifications besides those already described are possible without
departing from the inventive concepts herein. The inventive subject
25 matter, therefore, is not to be restricted except in the spirit of the
appended claims. Moreover, in interpreting both the specification and the
claims, all terms should be interpreted in the broadest possible manner
consistent with the context. In particular, the terms “comprises” and
“comprising” should be interpreted as referring to elements, components,
30 or steps in a non-exclusive manner, indicating that the referenced
elements, components, or steps may be present, or utilized, or combined

5 with other elements, components, or steps that are not expressly referenced.

[0048] FIG. 3 illustrates a flowchart of a method 300 for identifying and monitoring a person infected by a virulent respiratory virus, in accordance with at least one embodiment. The method includes a step 302 of performing thermal screening on the person present in proximity for detecting the body temperature of the person through a thermal camera. At step 304, the method determines if the body temperature of the person is greater than a threshold value to transmit a command signal. The method includes a step of initiating a notification signal on receiving the command signal from the thermal camera through a notification device. The method includes a step 306 of consecutively capturing, by a camera, an image of the person present in the proximity of the thermal camera. In an embodiment, the camera obtains a high-resolution image of the infected person by executing a face detection algorithm. The person with the body temperature greater than the threshold value is identified as an infected person. In an embodiment, the thermal camera detects the body temperature of the infected person by executing a color detection algorithm. At step 308, the method allows the person to go ahead on determining that the body temperature of the person is less than the threshold value. The method includes a step 310 of capturing the personal information of the infected person through an information capture module configured with a computing device.

[0049] Thus the present system and method capture the image using the HD camera which is compatible with the raspberry pi unit. Further, the present system and method capture image of the affected person whose body temperature is high automatically using HD camera which is cheap in cost.

5 This helps the authority to catch the affected person through their
captured images so that he/she can't run away/hide from the authority.
After capturing the image, the infected/affected person enters his/her own
details so that he/she can be sent for treatment and also asked to enter
his/her own family details to start the quarantine process. This is also
10 helping to stop or reduce the spread of the coronavirus disease among
human beings.

[0050] No language in the specification should be construed as indicating any
non-claimed element as essential to the practice of the invention.

15 [0051] It will be apparent to those skilled in the art that various modifications
and variations can be made to the present invention without departing
from the scope of the invention. There is no intention to limit the invention
to the specific form or forms enclosed. On the contrary, the intention is to
cover all modifications, alternative constructions, and equivalents falling
within the scope of the invention, as defined in the appended claims.
20 Thus, it is intended that the present invention cover the modifications and
variations of this invention, provided they are within the scope of the
appended claims and their equivalents.