METHODS AND APPARATUS TO MONITOR AND MANAGE LOADING DOCKS AND FACILITY OPERATIONS

FIELD OF THE DISCLOSURE

[0001] This disclosure relates generally to monitoring systems, and, more particularly, to methods and apparatus to monitor and manage loading docks and facility operations.

BACKGROUND

[0002] Loading docks provide an area for vehicles (e.g., trucks, trailers, etc.) to move next to an elevated platform of a building (e.g., a material handling facility) so that cargo can be readily transferred between the vehicle and the building. Some loading docks include equipment such as dock levelers, vehicle restraints, and/or dock doors, any of which may be associated with one or more sensor/monitoring systems. Within material handling facilities there may be additional equipment to facilitate the movement, storage, and/or handling of cargo such as, for example, grade-level doors, HVAC (heating, ventilation, and air conditioning) systems, industrial doors to partition freezer rooms and/or other rooms, conveyor systems, fans for air movement within the facility, lighting and signal systems, etc.

SUMMARY

[0002a] According to a first aspect of the present invention, there is provided an apparatus to monitor operations at a material handling facility, the apparatus including: a data analyzer to: monitor first data indicating whether a truck trailer is present at a dock of the material handling facility; and monitor second data indicating a condition associated with equipment at the dock, the second data being different than the first data; and

a notification generator to generate a notification based on the first data and the second data.

[0002b] According to a second aspect of the present invention, there is provided an apparatus to monitor operations at a material handling facility, the apparatus including: a data analyzer to: monitor first data indicative of when a door associated with the material handling facility is in a non-closed state; monitor second data indicative of passage of at least one of a person or an object through a doorway associated with the door in the non-closed state; and a notification generator to generate a notification in response to the second data indicating no passage of at least one of the person or the object through the doorway during a duration of time in which the first data indicates the door is in the non-closed state, the notification indicative of a false activation of the door.

[0002c] According to a third aspect of the present invention, there is provided an apparatus to monitor operations at a material handling facility, the apparatus including: a database to aggregate dock data associated with a plurality of docks of the material handling facility, the dock data including (1) an indication of operational states of equipment associated with the plurality of docks, (2) an indication of activity of personnel in proximity of the plurality of docks based on feedback from sensors associated with the plurality of docks, and (3) load information associated with trailers to be at least one of loaded or unloaded at ones of the plurality of docks; and a notification generator to: render a plurality of dock icons corresponding to the plurality of docks; and in response to a user selecting a first dock icon of the plurality of dock icons, render a menu of options for the user to select, the options presented in the menu to be dynamically updated based on the dock data.

[0002d] According to a fourth aspect of the present invention, there is provided a non-transitory computer readable medium comprising instructions that, when executed, cause a processor to at least: monitor first data indicating whether a truck trailer is present at a dock of the material handling facility; and monitor second data indicating a condition associated with equipment at the dock, the second data being different than the first data; and generate a notification based on the first data and the second data.

[0002e] According to a fifth aspect of the present invention, there is provided a non-transitory computer readable medium comprising instructions that, when executed, cause a process to at least: monitoring first data indicative of when a door associated with the material handling facility is in a non-closed state; monitoring second data indicative of passage of at least one of a person or an object through a doorway associated with the door in the non-closed state; and generating a notification in response to the second data indicating no passage of at least one of the person or the object through the doorway while the first data indicates the door is in the non-closed state, the notification indicative of a false activation of the door.

[0002f] According to a sixth aspect of the present invention, there is provided a non-transitory computer readable medium comprising instructions that, when executed, cause a process to at least: aggregating dock data associated with a plurality of docks of the material handling facility, the dock data including (1) an indication of operational states of equipment associated with the plurality of docks, (2) an indication of activity of personnel in proximity of the plurality of docks based on feedback from sensors associated with the plurality of docks, and (3) load information associated with trailers to be at least one of loaded or unloaded at ones of the plurality of docks; rendering a plurality of dock icons corresponding to the plurality of

docks; and in response to a user selecting a first dock icon of the plurality of dock icons, rendering a menu of options for the user to select, the options presented in the menu dynamically updated based on the dock data.

[0002g] According to a seventh aspect of the present invention, there is provided a method to monitor operations at a material handling facility, the method including: monitoring first data indicating whether a truck trailer is present at a dock of the material handling facility; and monitoring second data indicating a condition associated with equipment at the dock, the second data being different than the first data; and generating a notification based on the first data and the second data.

[0002h] According to an eighth aspect of the present invention, there is provided a method to monitor operations at a material handling facility, the method including: monitoring first data indicative of when a door associated with the material handling facility is in a non-closed state; monitoring second data indicative of passage of at least one of a person or an object through a doorway associated with the door in the non-closed state; and generating a notification in response to the second data indicating no passage of at least one of the person or the object through the doorway while the first data indicates the door is in the non-closed state, the notification indicative of a false activation of the door.

[0002i] According to a ninth aspect of the present invention, there is provided a method to monitor operations at a material handling facility, the method including: aggregating dock data associated with a plurality of docks of the material handling facility, the dock data including (1) an indication of operational states of equipment associated with the plurality of docks, (2) an indication of activity of personnel in proximity of the plurality of docks based on feedback from sensors associated with the plurality of docks, and (3) load information associated with trailers to be at least one of loaded or unloaded at ones of the plurality of docks; rendering a plurality of dock icons corresponding to the plurality of docks; and in response to a user selecting a first dock icon of the plurality of dock icons, rendering a menu of options for the user to select, the options presented in the menu dynamically updated based on the dock data.

[0002j] According to a tenth aspect of the present invention, there is provided an apparatus including: an IO network interface to receive IO data reported from a controller associated with a material handling facility, the IO data including a value for an IO parameter monitored by the controller; a web server to provide a first web page to a first client device and a second web page to a second client device, the second web page different than the first web page, the first web page including first information based on the value of the IO parameter, the second web

page including second information based on the value of the IO parameter, the web server to receive user input data entered via the first web page; and a push service manager to push the user input data to the second web page, the second information to be updated based on the user input data.

[0002k] According to an eleventh aspect of the present invention, there is provided an apparatus including: an IO network interface to receive IO data reported from a controller associated with a material handling facility; a web server to provide a first web page to a first client device and a second web page to a second client device, the second web page different than the first web page; and a push service manager to push the IO data to both the first and second web pages based on a common string included in both the first and second web pages, the common string identifying a data stream to which the first and second web pages subscribe, the data stream associated with the IO data reported from the controller.

[0002l] According to a twelfth aspect of the present invention, there is provided a system to monitor operation of a door associated with a material handling facility, including: a first sensor to generate a first output, the first output indicating when the door is in a non-closed state; a second sensor to generate a second output, the second output indicating passage of at least one of a person or an object through a doorway associated with the door in the non-closed state; and a processor to receive the first and second outputs, the processor to detect a false activation of the door when the second output is not generated by the second sensor while the first output indicates the door is in the non-closed state.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] FIG. 1 illustrates an example material handling facility in which teachings disclosed herein may be implemented.

[0004] FIG. 2 illustrates the example loading dock of FIG. 1 viewed from an exterior of the material handling facility.

[0005] FIG. 3 illustrates the example loading dock of FIG. 1 viewed from an interior of the material handling facility with a trailer parked at the dock.

[0006] FIG. 4 illustrates a cross-sectional side view of the example loading dock of FIG. 1 with the associated trailer of FIG. 3.

[0007] FIG. 5 is a block diagram of the example management server(s) of FIG. 1.

[0008] FIG. 6 is a block diagram of the example main server of FIG. 1.

[0009] FIG. 7 is a block diagram of an example database associated with the example main server of FIG. 1.