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

RELATED APPLICATION(S)

[0001] This patent claims the benefit of U.S. Provisional Patent Application No. 63/386,620, which was filed on December 8, 2022. U.S. Provisional Patent Application No. 63/386,620 is hereby incorporated herein by reference in its entirety. Priority to U.S. Provisional Patent Application No. 63/386,620 is hereby claimed.

FIELD OF THE DISCLOSURE

[0002] This disclosure relates generally to monitoring systems and, more particularly, to methods and apparatus to monitor and manage loading docks and facility operations.

BACKGROUND

[0003] 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

[0003a] According to a first aspect of the present disclosure, there is provided an apparatus including: at least one memory; machine readable instructions; and processor circuitry to at least one of instantiate or execute the machine readable instructions to: identify a first occurrence of a safety event based on outputs of sensors associated with at least one of doors or docks at a material handling facility, the event associated with a first event type of a plurality of event types; determine a time of day different instances of the event occurred within a given period of time; determine a number of at least one of different doors or different docks associated with the different instances of the event; select a particular corrective action from among a set of possible corrective actions based on the time of day of the different instances of

the event and based on the number of the at least one of the different doors or the different docks; and cause an output device to output an indication of the particular corrective action to a user.

[0003b] According to a second aspect of the present disclosure, there is provided at least one non-transitory computer readable medium including instructions that, when executed, cause processor circuitry to at least: identify a first occurrence of a safety event based on outputs of sensors associated with at least one of doors or docks at a material handling facility, the event associated with a first event type of a plurality of event types; determine a time of day different instances of the event occurred within a given period of time; determine a number of at least one of different doors or different docks associated with the different instances of the event; select a particular corrective action from among a set of possible corrective actions based on the time of day of the different instances of the event and based on the number of the at least one of the different doors or the different docks; and cause an output device to output an indication of the particular corrective action to a user.

[0003c] According to a third aspect of the present disclosure, there is provided a method including: identifying a first occurrence of a safety event based on outputs of sensors associated with at least one of doors or docks at a material handling facility, the event associated with a first event type of a plurality of event types; determining a time of day different instances of the event occurred within a given period of time; determining a number of at least one of different doors or different docks associated with the different instances of the event; selecting, by executing an instruction with processor circuitry, a particular corrective action from among a set of possible corrective actions based on the time of day of the different instances of the event and based on the number of the at least one of the different doors or the different docks; and causing an output device to output an indication of the particular corrective action to a user.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. 1 illustrates an example material handling facility in which teachings disclosed herein may be implemented.

[0005] FIG. 2 illustrates the example loading dock of FIG. 1 viewed from an exterior of the material handling facility.

[0006] 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.

[0007] FIG. 4 is a cross-sectional side view of the example loading dock of FIG. 1 with the associated trailer of FIG. 3.