

AN ELECTRONIC SYSTEM ASSOCIABLE WITH A PARKING FACILITY AND A CONTROL METHOD IS ASSOCIATION THEREWITH

Field Of Invention

5 The present disclosure generally relates to an electronic system corresponding to a parking system which can be suitable for use in connection with a parking facility (open-air carpark, underground carpark, multistorey carpark etc.) for parking one or more vehicles.

Background

10 Generally, a carpark can be associated with a conventional parking system which can include an entrance and exit through which vehicles enter into and exit, respectively, from the carpark. Moreover, gantries are positioned at the entrance and the exit to, for example, regulate parking
15 charges. A gantry positioned at the entrance can be commonly referred to as an entry gantry whereas a gantry positioned at the exit can be commonly referred to as an exit gantry.

For example, at the entrance of the carpark, a vehicle would be validated
20 before entry into the carpark is allowed. At the point of entry, the time of entry (i.e., entry time) of the vehicle may be recorded and at the point of exit, the time of exit (i.e., exit time) of that vehicle may be ascertained. The entry time and the exit time can be used for computing parking duration so that the relevant parking charge(s)/fee(s) for that vehicle can
25 be derived.

However, for a conventional parking system, the entry gantry is configured to allow a vehicle into the carpark only when that vehicle has successfully validated. Similarly, the exit gantry is configured to only allow a vehicle to
30 exit from the carpark after successful validation.

Validation of a vehicle is conventionally by manner of vehicle registration plate recognition. An issue encountered could be failure by the conventional parking system to successfully validate a vehicle. Such an issue can be encountered if the vehicle registration plate cannot be properly recognized. For example, failure in proper recognition could be due to the vehicle registration plate being of a numbering format not recognized in a local jurisdiction (e.g., foreign vehicle registration plate).

Appreciably, when a vehicle cannot be successfully validated, passage of that vehicle through the entry gantry and/or exit gantry may be impeded. In adverse scenarios, this may cause undue obstruction to vehicle(s) which may be queuing behind that vehicle (i.e., which cannot be successfully validated). Such undue obstruction could potentially lead to traffic congestion.

In view of the above, the present disclosure contemplates that there is therefore a need for an improved parking system.

Summary of the Invention

In accordance with an aspect of the disclosure, there is provided an electronic system which can be associated with a parking facility for parking one or more vehicles.

The electronic system can include a validation portion which can be configured to generate at least one verification signal.

The electronic system can further include a processing portion which can be configured to communicate with the validation portion. The processing portion can be further configured to generate and communicate control signals for facilitating entry into the parking facility and exit from the parking facility.

The control signals can include at least one entry activation control signal (i.e., in the context of activating the entry gantry) and at least one exit activation control signal (i.e., in the context of activating the exit gantry).

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Moreover, the processing portion can be configured to generate at least one entry activation control signal based on driver data (e.g., facial features) associated with a driver driving a vehicle into the parking facility

10 Based on the entry activation control signal, passage of the vehicle into the parking facility can be allowed. Conversely in the absence of the entry activation control signal, passage of the vehicle into the parking facility can be impeded. The vehicle driven into the parking facility can be associated with vehicle data (e.g., vehicle registration number).

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Furthermore, the processing portion can be configured to generate at least one exit activation control signal based on at least one verification signal, and one or both of driver data and vehicle data.

20 Based on the exit activation control signal, passage of the vehicle out of the parking facility can be allowed. Conversely, in the absence of the exit activation control signal, passage of the vehicle out of the parking facility can be impeded.

25 Additionally, the validation portion can be configured to generate a verification signal based on the driver data. The verification signal can be communicated from the validation portion to the processing portion.

In accordance with an embodiment of the disclosure, the electronic system
30 can further include a data capture portion which can be configured to communicate with the processing portion. The data capture portion can

be configured to capture driver data (e.g., facial features of a driver of a vehicle). In one example, the data capture portion can be configured to capture driver data at the entrance of the parking facility. Specifically, the data capture portion can, for example, be positioned at the entrance of the parking facility.

Furthermore, the electronic system can include an entry gantry (i.e., which can correspond to the entrance of the parking facility) and an exit gantry (i.e., which can correspond to the exit of the parking facility). The entry gantry can be configured to communicate with the processing portion. Additionally, the exit gantry can be configured to communicate with the processing portion.

Specifically, the entry gantry can, for example, be capable of being activated based on the entry activation control signal and the exit gantry can, for example, be capable of being activated based on the exit activation control signal.

In accordance with an embodiment of the disclosure, the validation module can correspond to a payment kiosk which can be configured for accepting payment from a payer paying a parking fee. Moreover, the payment kiosk can be configured for capturing payer details. Captured payer details can correspond to one or more detection signals. The detection signal(s) and the data signal(s) can be processed in a manner so as to determine whether the payer is the driver of the vehicle.

In accordance with an aspect of the disclosure, there is provided a control method which can be associated with an electronic system. The electronic system can be associated with a parking facility for parking one or more vehicles. A vehicle can be associated with vehicle data.

The control method can include capturing driver data (e.g., facial features) associated with a driver of a vehicle. The control method can further include allowing the vehicle entry into the parking facility based on successful capture of driver data. The control method can yet further
5 include generating at least one verification signal indicative of successful payment of a parking fee made in connection with the vehicle. Moreover, the control method can include allowing the vehicle exit from the parking facility based on the verification signal, and one or both of driver data and vehicle data.

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Brief Description of the Drawings

Embodiments of the disclosure are described hereinafter with reference to the following drawings, in which:

15 Fig. 1 shows an electronic system which includes a data capture portion, according to an embodiment of the disclosure;

Fig. 2 shows the data capture portion of Fig. 1 in further detail, according to an embodiment of the disclosure; and

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Fig. 3 shows a control method in association with the electronic system of Fig. 1, according to an embodiment of the disclosure.

Detailed Description

25 The present disclosure contemplates that in a situation where vehicle recognition becomes an issue (i.e., a vehicle cannot be properly validated), driver recognition can be considered in lieu of and/or in conjunction with vehicle recognition.

30 Driver recognition can, for example, be by manner of facial recognition.

Broadly, the present disclosure contemplates that in a situation where even if a vehicle cannot be properly validated at an entry gantry of a parking system, the entry gantry can still be activated to allow passage of that vehicle through (i.e., into the carpark) if driver data can be captured.

5 Driver data captured can relate to facial feature(s) of the driver. Such captured facial feature(s) can be useful for the purpose of the aforementioned facial recognition. Moreover, vehicle data (e.g., vehicle registration number albeit not capable of being properly validated, make of the vehicle, physical appearance of the vehicle, or any combination
10 thereof) can be captured.

Upon successful capture of driver data and vehicle data, the entry gantry can be activated so as to allow the vehicle into the carpark. At that time, the driver of the vehicle can be prompted (i.e., at the entry gantry) to make
15 payment at a payment kiosk prior to exiting the carpark later. Appreciably, activation of the entry gantry to allow a vehicle into the carpark can essentially be based on driver based recognition (e.g., facial recognition of driver).

20 After the driver has successfully made payment (i.e., prior to driving out of the carpark) at the payment kiosk, the exit gantry can be activated to allow exit based on record on successful payment in combination with one or both of driver data and vehicle data.

25 The foregoing will be discussed in further detail with reference to Fig. 1 to Fig. 3 hereinafter.

Referring to Fig. 1, an electronic system 100 is shown, according to an embodiment of the disclosure. The electronic system 100 can, for
30 example, correspond to a parking system which can be suitable for use in

connection with a parking facility (open-air carpark, underground carpark, multistorey carpark etc.) for parking one or more vehicles.

The electronic system 100 can include a processing portion 102, an entry gantry 104, an exit gantry 106, a data capture portion 108 and a validation portion 110.

The processing portion 102 can be coupled to each of the entry gantry 104, the exit gantry 106, the data capture portion 108, the validation portion 110 or any combination thereof. In one embodiment, the processing portion 102 can be coupled to the entry gantry 104, the exit gantry 106, the data capture portion 108 and the validation portion 110. Moreover, an element (e.g., the entry gantry 104) of the electronic system 100 can be coupled to another element (e.g., the data capture portion 108) of the electronic system 100 as required/desired.

In an exemplary operation, as will be discussed in an exemplary context of a foreign registered vehicle, when a vehicle (i.e., a foreign registered vehicle) entering the parking facility cannot be properly validated (e.g., a vehicle with a foreign vehicle registration number which cannot be recognized by local parking systems), the entry gantry 104 will initially be configured to impede such a foreign registered vehicle from entering the parking facility. As the, for example, foreign vehicle is blocked from entering the parking facility, the data capture portion 108 can be configured obtain/capture one or both of driver data (e.g., facial feature(s)) associated with the driver of the foreign registered vehicle) and vehicle data (e.g., vehicle registration number such visibly perceivable on the vehicle registration plate, make of the foreign registered vehicle, physical appearance of the foreign registered vehicle, or any combination thereof) associated with the foreign registered vehicle. After driver data has been successfully obtained, the entry gantry 104 can be activated so as to allow

passage of the foreign registered vehicle into the parking facility. At that time/before passage into the parking facility is allowed, the driver of the foreign registered vehicle can be prompted to make payment at the validation portion 110 (e.g., a payment kiosk) prior to exiting the parking facility. One or both of driver data and vehicle data can be communicated to one or both of the processing portion 102 and validation portion 110. Subsequently, when the driver wishes to leave the parking facility, the driver should, as prompted earlier, proceed to first make payment (i.e., for a parking fee). One or both of the processing portion 102 and the validation portion 110 can be configured to recognize the driver (i.e., a payer) and, optionally, associate the driver with the foreign registered vehicle. Driver recognition can, for example, be by manner of facial recognition and association with the foreign vehicle can, for example, be by manner of matching driver face with the vehicle data (e.g., vehicle registration number). After the requisite payment (i.e., for the parking fee) has been made, verification data (e.g., being indicative of a confirmation that payment has been made) can be generated. Thereafter (e.g., within a predetermined grace period of 5/10 minutes), when the foreign registered vehicle approaches the exit gantry 104, the exit gantry 104 can be activated, based on verification data in combination with one or both of driver data and vehicle data, in a manner so as to allow the foreign vehicle to exit the parking facility. The present disclosure contemplates that combination of verification data, and driver data and/or vehicle data could be useful in a situation where, for example, the foreign registered vehicle exceeded the predetermined grace period in view of heavy traffic flow within the parking facility (i.e., the exit gantry 106 can still be activated based on one or both of driver data and vehicle data as long as the verification data is available/present).

Control signal(s) can be generated and communicated from the processing portion 102 for controlling (e.g., activation) the entry gantry 104

and/or the exit gantry 106. Moreover, the processing portion 102 can be configured for recognition based processing (e.g., facial recognition of a driver) and/or matching based processing (e.g., associate/match a driver with a vehicle). These will be discussed in further detail hereinafter.

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Earlier mentioned, in one embodiment, the processing portion 102 can be coupled to the entry gantry 104, the exit gantry 106, the data capture portion 108 and the validation portion 110. Coupling can generally be by manner of one or both of wired coupling and wireless coupling.

10 Appreciably, the processing portion 102 can be configured to communicate with the entry gantry 104, the exit gantry 106, the data capture portion 108 and the validation portion 110 in one or both of a wired manner and wireless manner.

15 Generally, the processing portion 102 can be configured to communicate one or more control signals to the entry gantry 104 and/or the exit gantry 106. In one example, control signal(s) can be communicated from the processing portion 102 to the entry gantry 106 for controlling the entry gantry 106 in a manner so as to either allow passage or impede passage
20 of a vehicle into the parking facility. In another example, control signal(s) can be communicated from the processing portion 102 to the exit gantry 106 for controlling the exit gantry 106 in a manner so as to either allow passage or impede passage of a vehicle from the parking facility. Communication of control signal(s) from the processing portion 102 can be
25 by manner of one or both of wired communication and wireless communication. In this regard, the processing portion 102 can be coupled to the entry gantry 104 and/or the exit gantry 106 by manner of one or both of wireless coupling and wired coupling.

Control signal(s) for controlling the entry gantry 106 can be generated by the processing portion 102 based on one or more data signals communicated from the data capture portion 108.

5 In one embodiment, the data capture portion 108 can include a capturing apparatus which can be configured to capture driver data associated with the driver of a vehicle entering the parking facility. Based on the driver data captured, one or more data signals can be generated and communicated from the data capture portion 108 to the processing portion
10 102. The processing portion 102 can be configured to receive and process the data signal(s) to generate control signal(s) which can be communicated to the entry gantry 106 for controlling the entry gantry 106. Driver data captured can, for example, correspond to facial details of the driver. As will be discussed later in further detail with reference to Fig. 2,
15 the capturing apparatus can, for example, correspond to an image capturing device such as a camera.

In another embodiment, the data capture portion 108 can include a capturing apparatus which can be configured to capture vehicle data
20 associated with a vehicle entering the parking facility. Based on vehicle data captured, one or more data signals can be generated and communicated from the data capture portion 108 to the processing portion 102. The processing portion 102 can be configured to receive and process the data signal(s) to generate control signal(s) which can be
25 communicated to the entry gantry 106 for controlling the entry gantry 106. Vehicle data captured can, for example, correspond to the vehicle registration number (e.g., as presented on the vehicle registration plate of a vehicle) associated with the vehicle entering the parking facility. The capturing apparatus can, for example, correspond to an image capturing
30 device such as a camera.

In yet another embodiment, the data capture portion 108 can include a first capturing apparatus and a second capturing apparatus. The first capturing apparatus can be configured to capture driver data associated with the driver of a vehicle entering the parking facility. The second capturing apparatus can be configured to capture vehicle data associated with a vehicle entering the parking facility. Each of the first and second capturing apparatuses can, for example, correspond to an image capturing device such as a camera.

In yet a further embodiment, the data capture portion 108 can include a capturing apparatus which can be configured to capture driver data associated with the driver of a vehicle entering the parking facility and capture vehicle data associated with the vehicle entering the parking facility. The capturing apparatus can, for example, correspond to an image capturing device such as a camera.

Additionally, the data capture portion 108 can, for example, include a display portion (not shown) capable of displaying one or more prompts, one or more messages and/or a graphics user interface (GUI). For example, after driver data has been captured, the display portion can be configured to display a prompt to the driver to make payment (e.g., at the validation portion 110) before driving the vehicle to the exit gantry 106.

The processing portion 102 can, for example, be configured to process captured driver data and captured vehicle data by manner of association. More specifically, the processing portion 102 can be configured to associate driver data with vehicle data. In one example, the processing portion 102 can be configured to match a driver with the vehicle driven by the driver (i.e., matching a face with a vehicle registration number).

Control signal(s) for controlling the exit gantry 106 can be generated by the processing portion 102 based on one or more verification signals communicated from the validation portion 110 in combination with one or both of driver data and vehicle data communicable from the data capture
5 portion 108.

The validation portion 110 can correspond to, for example, a payment kiosk configured to inform the aforementioned driver of the parking fee payable and receiving requisite payment for the parking fee. After the
10 requisite payment has been received, the validation portion 110 can be configured to generate one or more verification signal(s) (i.e., corresponding to the aforementioned verification data) which can be communicated to the processing portion 102. The verification signal(s) can be indicative that the requisite payment (i.e., in association with the
15 parking fee for a vehicle) has been made and exit (i.e., for that vehicle) can be permitted. In this regard, based on the verification signal(s) received, the processing portion 102 can be configured to generate control signal(s) for controlling the exit gantry 106.

20 In one embodiment, the validation portion 110 can include one or more detection portions (e.g., one or more cameras) configured to capture payer details. Payer details can be captured and communicated from the validation portion 110 in the form of one or more detection signal(s). The detection signal(s) can, for example, correspond to one or more image(s)
25 captured in association with the facial details of a payer.

The detection signal(s) and the data signal(s) can be computed in a manner so as to determine if a person wishing to make payment (i.e., a payer) for a parking fee is a driver. For example, when a person
30 approaches the validation portion 110 to make a payment, the detection portion(s) can be configured to capture one or more images associated

with the facial feature(s) of the approaching person (i.e., a payer). Detection signal(s) indicative of the payer can subsequently be communicated from the validation portion 110 for further processing (e.g., by the processing portion 102) to determine whether the person
5 approaching the validation portion 110 is a driver of a vehicle (e.g., a foreign registered vehicle) which has earlier entered the parking facility.

Determination concerning whether the person approaching the validation portion 110 is a driver can be by manner of processing by association.
10 Processing by association can correspond to matching based on the aforementioned data signal(s) and the aforementioned detection signal(s). More specifically, determination can be by manner of facial recognition (i.e., matching facial features of a payer and earlier captured facial features of a driver). Yet more specifically, the processing portion 102 can
15 be configured to receive and process the data signal(s) and the detection signal(s) by manner of facial recognition based processing techniques to determine whether the payer is a driver of a vehicle which entered the parking facility earlier.

20 Specifically, the validation portion 110 can include a display portion (not shown). Moreover, the validation portion 110 can, for example, be configured to present, via the display portion, vehicle data based on matching based processing in association with the aforementioned data signal(s) and the aforementioned detection signal(s).

25 Earlier mentioned, the processing portion 102 can be configured to process captured driver data and captured vehicle data by manner of association (e.g., matching a face with a vehicle registration number). Moreover, it is appreciable that the processing portion 102 can be further
30 configured to process data signal(s) and the aforementioned detection

signal(s) by manner of association (e.g., matching facial features of a payer and earlier captured facial features of a driver).

5 In this regard, it is appreciable that the processing portion 102 can be configured to perform processing based on one or more association based operations which can, for example, include one or both of a first association based operation and a second association based operation. The first association based operation can be in relation to processing captured driver data and captured vehicle data by manner of association
10 (e.g., matching a face with a vehicle registration number). The second association based operation can be in relation to processing data signal(s) and the aforementioned detection signal(s) by manner of association (e.g., matching facial features of a payer and earlier captured facial features of a driver).

15 It is further appreciable that even if a vehicle cannot be properly validated (e.g., if the vehicle registration plate of a foreign registered vehicle cannot be properly recognized) at the parking facility entrance, passage of that vehicle into the parking facility can still be allowed based on capture of one
20 or both of driver data and vehicle data.

It is yet further appreciable that a vehicle which cannot initially be properly validated at the parking facility entrance can, after parking, be allowed to exit from the parking facility based on the verification signal(s) in
25 combination with one or both of earlier captured driver data and earlier captured vehicle data. In this regard, the processing portion 102 can be configured to perform one or more authentication based processing operations. Specifically, the processing portion 102 can be configured to determine whether a vehicle can be validly allowed to exit from the parking
30 facility and/or determine whether a payer is indeed the driver of a vehicle. By one or both of determining that a vehicle can be allowed to exit from

the parking facility and determining whether a payer is indeed the driver of a vehicle, the processing portion 102 can be considered to be authenticating a vehicle for valid exit from the parking facility. An authentication based processing operation can be in association with the processing portion 102 generating, and communicating to the exit gantry 106, one or more control signal(s) based on the verification signal(s) in combination with one or both of earlier captured driver data and earlier captured vehicle data. Upon receipt of the control signal(s) from the processing portion 102, the exit gantry 106 can be activated in a manner so as to allow a vehicle to exit from the parking facility.

In the above discussed manner, it is appreciable that the electronic system 100 can facilitate favorable traffic flow in that occurrence(s) (i.e., frequency) of obstruction (i.e., which could lead to traffic congestion) at an entry gantry and/or exit gantry of a parking facility can be reduced/substantially reduced.

Specifically, given that capture of driver data and/or vehicle data can be considered to relate to real-time obtention of reliable information which can be used for the purposes of authenticating a payer in respect of whether the payer is indeed a driver of a particular vehicle and facilitating payment of requisite parking fee(s) and, in turn/subsequently, further authenticating a vehicle for exit from the parking facility (i.e., based on the verification signal(s) in combination with one or both of earlier captured driver data and earlier captured vehicle data), over-reliance on vehicle registration number recognition for the purpose of vehicle validation (i.e., per conventional validation solutions used in conventional parking systems) can be avoided. Moreover, by authenticating whether a payer is indeed a driver of a vehicle, it is appreciable that additional security can be provided.

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In this regard, the electronic system 100 can present a more robust form of verification, identification and/or authentication as compared with conventional parking systems.

5 Earlier mentioned, the data capture portion 108 can include a capturing apparatus which can be configured to capture, for example, driver data associated with the driver of a vehicle entering the parking facility. Further earlier mentioned, the capturing apparatus can, for example, correspond to an image capturing device such as a camera.

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The data capture portion 108 will now be discussed in further detail with reference to Fig. 2 hereinafter.

As shown in Fig. 2, the data capture portion 108 can correspond to an
15 apparatus 200, according to an embodiment of the disclosure.

The apparatus 200 can include a casing 201 which can be configured to carry a data capturing part 202, a display part 204 and one or more input parts 206, or any combination thereof. The apparatus 200 can optionally
20 further include a transceiver part (not shown) for facilitating wireless communication with the processing portion 102.

The data capturing part 202 can be configured to capture at least driver data. Moreover, the data capturing part 202 can include one or more
25 capturing apparatuses such as a visual based capturing apparatus 202a (e.g., a camera for capturing facial feature(s) of a driver) and/or an audio based capturing apparatus 202b (e.g., a microphone for capturing audio input from the driver).

30 In one embodiment, the visual based capturing apparatus 202a can be positioned in a manner so as to be optimally angled (e.g., at a 45⁰ angle

so as to be facing the driver's window when a vehicle stops at the entry gantry 104) for the purpose of capturing an image of a driver's face. It is contemplated that the driver may be prompted (i.e., via the display part 204) to wind down the driver's window in a situation where the image
5 captured is not of optimal quality (e.g., of a quality unsuitable for use for the purpose of the aforementioned facial recognition).

The input part(s) 206 can, for example, correspond to card payment based module(s)/card communication based module(s). In one example, an
10 input part 206 can be configured for near contactless/contactless based communication with a card (e.g., a "tap and go" based communication module/ a near field communication based module).

To put the foregoing in perspective, the present disclosure generally
15 contemplates, according to an aspect of the disclosure, an electronic system 100 which can be associated with a parking facility for parking one or more vehicles.

The electronic system 100 can include a validation portion 110 which can
20 be configured to generate at least one verification signal.

The electronic system 100 can further include a processing portion 102 which can be configured to communicate with the validation portion 110. The processing portion 102 can be further configured to generate and
25 communicate control signals for facilitating:

- 1) entry into the parking facility, and
- 2) exit from the parking facility.

30 The control signals can include at least one entry activation control signal (i.e., in the context of control signal(s) being communicated for activating

the entry gantry 104) and at least one exit activation control signal (i.e., in the context of control signal(s) being communicated for activating the exit gantry 106).

- 5 Moreover, the processing portion 102 can be configured to generate at least one entry activation control signal based on driver data (e.g., facial features) associated with a driver driving a vehicle into the parking facility.

10 Based on the entry activation control signal, passage of the vehicle into the parking facility can be allowed. Conversely in the absence of the entry activation control signal, passage of the vehicle into the parking facility can be impeded. The vehicle driven into the parking facility can be associated with vehicle data (e.g., vehicle registration number, make of vehicle and/or physical appearance of the vehicle).

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Furthermore, the processing portion 102 can be configured to generate at least one exit activation control signal based on at least one verification signal, and one or both of driver data and vehicle data.

- 20 Based on the exit activation control signal, passage of the vehicle out of the parking facility can be allowed. Conversely, in the absence of the exit activation control signal, passage of the vehicle out of the parking facility can be impeded.

- 25 Additionally, the validation portion 110 can be configured to generate a verification signal based on the driver data. The verification signal can, for example, be communicated from the validation portion 110 to the processing portion 102.

- 30 In accordance with an embodiment of the disclosure, the electronic system 100 can further include a data capture portion 108 which can be

configured to communicate with the processing portion 102. The data capture portion 108 can be configured to capture driver data (e.g., facial feature(s) of a driver of a vehicle). In one example, the data capture portion 108 can be configured to capture driver data at the entrance of the parking facility.

As mentioned earlier, the electronic system 100 can include an entry gantry 104 (i.e., which can correspond to the entrance of the parking facility) and an exit gantry 106 (i.e., which can correspond to the exit of the parking facility). The processing portion 102 can be configured to communicate with one or both of the entry gantry 104 and the exit gantry 106. Specifically, the entry gantry 104 can be configured to communicate with the processing portion 102 and the exit gantry 106 can be configured to communicate with the processing portion 102. More specifically, the entry gantry 104 can, for example, be capable of being activated based on the entry activation control signal and the exit gantry 106 can, for example, be capable of being activated based on the exit activation control signal.

In accordance with an embodiment of the disclosure, the validation module 110 can correspond to a payment kiosk which can be configured for accepting payment from a payer paying a parking fee. Moreover, the payment kiosk can be configured for capturing payer details. Captured payer details can correspond to one or more detection signals. The detection signal(s) and the data signal(s) can be processed in a manner so as to determine whether the payer is the driver of the vehicle.

Referring to Fig. 3, a control method 300 in association with the electronic system 100 is shown according to an embodiment of the disclosure.

The control method 300 can include an entry control step 302, a capture step 304, a processing step 306, a validation step 308 and an exit control step 310.

5 With regard to the entry control step 302, one or more control signal(s) (i.e., referable to as “entry activation control signal(s)” in the context of activating the entry gantry 104) can be communicated from the processing portion 102 for activating the entry gantry 104 for allowing a vehicle passage into a parking facility. The control signal(s) can be generated by
10 the processing portion 102 based on one or both of driver data and vehicle data when, for example, the vehicle cannot be properly validated (e.g., a vehicle with a foreign vehicle registration number which cannot be recognized by local parking systems).

15 With regard to the capture step 304, in one embodiment, driver data can be captured using the data capture portion 108. In another embodiment, one or both of driver data and vehicle data can be captured.

With regard to the processing step 306, the processing portion 102 can be
20 configured to perform processing based on the earlier mentioned one or more association based operations. The processing portion 102 can be further configured to perform one or more authentication based processing operations.

25 With regard to the validation step 308, one or more verification signals can be generated by the validation portion 110. As mentioned earlier, the verification signal(s) can, for example, be communicated from the validation portion 110 to the processing portion 102.

30 With regard to the exit control step 310, one or more control signal(s) (i.e., referable to as “exit activation control signal(s)” in the context of activating

the exit gantry 106) can be communicated from the processing portion 102 for activating the exit gantry 106 for allowing a vehicle passage out of parking facility. The control signal(s) can be generated by the processing portion 102 based on the verification signal(s) in combination with one or both of driver data and vehicle data. Appreciably, the driver data and vehicle data can be associated with the vehicle which cannot be properly validated (e.g., a vehicle with a foreign vehicle registration number which cannot be recognized by local parking systems) at the entrance (i.e., at the entry gantry 104) of the parking facility.

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Generally, the present disclosure contemplates, according to an aspect of the disclosure, a control method 300 which can be associated with an electronic system 100. The electronic system 100 can be associated with a parking facility for parking at least one vehicle. The vehicle can be associated with vehicle data.

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The control method 300 can include capturing driver data (e.g., facial feature(s)) associated with a driver of a vehicle. The control method 300 can further include allowing the vehicle entry into the parking facility based on successful capture of driver data. The control method 300 can yet further include generating at least one verification signal indicative of successful payment of a parking fee made in connection with the vehicle. Moreover, the control method 300 can include allowing the vehicle exit from the parking facility based on the verification signal, and one or both of driver data and vehicle data.

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It should be further appreciated by the person skilled in the art that variations and combinations of features described above, not being alternatives or substitutes, may be combined to form yet further embodiments.

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In one example, although various embodiments and/or examples are discussed in the context of a foreign vehicle which vehicle registration number can be in a format not recognized by local parking systems, it is appreciable that such various embodiments and/or examples can be in one or more other context(s). An exemplary context can be where the vehicle registration number can although be in a format capable of being recognized by local parking systems, the vehicle registration plate of that vehicle could be damaged to such extent that proper validation is not possible.

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The present disclosure contemplates that, in an exemplary situation where a part of a vehicle registration plate cannot facilitate proper validation (e.g., a dented vehicle registration plate could cause a number on the plate to be visually deformed to an extent that the number cannot be visually perceived properly), the processing portion 102 can be configured to generate, based on predictive/corrective processing, a list based on possible registration numbers which can be displayed on the screen of the validation portion 110 for selection by a payer.

20 For example, the vehicle registration number of a vehicle can be "SKK1234C". However, the vehicle registration plate could be dented such that the number "4" cannot be visually perceived (i.e., in which case, the vehicle registration number may appear to be "SKK123-C" and vehicle data captured can, for example, correspond to "SKK123-C"). The processing portion 102 can be configured based on predictive/corrective processing to generate a list of possible vehicle registration numbers (i.e., "SKK1230C," "SKK1231C," "SKK1232C," "SKK1233C," "SKK11234C," and so on, ending with "SKK1239C") to be presented at the validation portion 110 for a payer to identify and select. The present disclosure contemplates that if desired, random vehicle registration numbers can further be generated (e.g., in view of privacy concerns)

In one example, although various embodiments and/or examples are largely discussed in the context of facial recognition, the present disclosure contemplates that other recognition options can also be useful.

5 For example, voice recognition can also be useful (i.e., in which case, driver data can correspond to voice data of the driver and the data capture portion 108 can include an audio capture part such as a microphone for capturing audio signals associated with the voice of the driver).

10 In another example, the processing portion 102 can, in one embodiment, correspond to a processor. In another embodiment, the processing portion 102 can correspond to a plurality of processors, each of which capable of being carried by an element (e.g., the validation portion 110) of the electronic system 100. In yet another embodiment, a part of the

15 processing portion 102 can be carried by an element (e.g., data capture portion 108/entry gantry 104) of the electronic system 100 and another part of the processing portion 102 can be carried by another element (e.g., validation portion 110/exit gantry 106) of the electronic system 100.

20 In the foregoing manner, various embodiments of the disclosure are described for addressing at least one of the foregoing disadvantages. Such embodiments are intended to be encompassed by the following claims, and are not to be limited to specific forms or arrangements of parts so described and it will be apparent to one skilled in the art in view of this

25 disclosure that numerous changes and/or modification can be made, which are also intended to be encompassed by the following claims.

Claim(s)

1. An electronic system associable with a parking facility for parking at least one vehicle, the electronic system comprising:
- 5 a validation portion configurable to generate at least one verification signal; and
- a processing portion communicable with the validation portion and configurable to generate and communicate control signals for facilitating entry into and exit from the parking facility, the control signals include at least one entry activation control signal and at least one exit activation control signal, the processing portion configurable to:
- 10 generate at least one entry activation control signal based on driver data associated with a driver driving a vehicle into the parking facility,
- 15 wherein based on the entry activation control signal, passage of the vehicle into the parking facility is allowable,
- wherein in the absence of the entry activation control signal, passage of the vehicle into the parking facility is impeded, and
- 20 wherein the vehicle driven into the parking facility is associable with vehicle data,
- generate at least one exit activation control signal based on at least one verification signal and at least one of driver data and vehicle data,
- 25 wherein based on the exit activation control signal, passage of the vehicle out of the parking facility is allowable, and

wherein in the absence of the exit activation control signal, passage of the vehicle out of the parking facility is impeded,

5 wherein the validation portion is configurable to generate a verification signal based on the driver data, the verification signal being communicable from the validation portion to the processing portion.

2. The electronic system as in claim 1 further comprising a data
10 capture portion, the data capture portion being communicable with the processing portion, wherein the data capture portion is configurable to capture driver data.

3. The electronic system as in claim 2 further comprising an entry
15 gantry and an exit gantry, each of the entry gantry and the exit gantry being communicable with the processing portion.

4. The electronic system as in claim 3, the entry gantry capable of
20 being activated based on the entry activation control signal and the exit gantry capable of being activated based on the exit activation control signal.

5. The electronic system as in claim 3,
25 wherein the data capture portion is configured to capture driver data at the entry gantry, and wherein driver data captured corresponds the facial features of the driver.

6. The electronic system as in claim 1,
30 wherein the validation module corresponds to a payment kiosk configurable for accepting payment from a payer paying a

parking fee and for capturing payer details, captured payer details corresponding to at least one detection signal, and

wherein the detection signal and the data signal are capable of being processed in a manner so as to determine whether the payer is the driver.

7. A control method in association with an electronic system associable with a parking facility for parking at least one vehicle, the vehicle being associable with vehicle data, the control method comprising:
- capturing driver data associated with a driver of a vehicle;
 - allowing the vehicle entry into the parking facility based on successful capture of driver data;
 - generating at least one verification signal indicative of successful payment of a parking fee made in connection with the vehicle; and
 - allowing the vehicle exit from the parking facility based on the verification signal and at least one of driver data and vehicle data.