

What Is Claimed Is:

1. A payment-processing apparatus, comprising:

a camera module;

a first communication interface configured to receive, from a standalone point-of-sale (POS) terminal, a start-up command for starting up the payment-processing apparatus; and

a second communication interface configured to:

request, from a remote computing device, a type of facial information needed to perform a facial-recognition operation at the remote computing device, in response to the first communication interface receiving the start-up command from the standalone POS terminal;

receive, from the remote computing device, facial-recognition parameters specific to the type of facial information needed to perform the facial-recognition operation, wherein the received facial recognition parameters comprise at least a liveness-detection parameter;

wherein the camera module is configured to turn on to collect facial information of a customer based on the received facial-recognition parameters in response to the first communication interface receiving the start-up command from the standalone POS terminal; and

wherein the second communication interface is further configured to send the collected facial information to the remote computing device, thereby allowing the remote computing device to perform the facial-recognition operation to identify a customer account based on the collected facial information.

~~a facial-information-collection module configured to collect facial information of a customer;~~

~~—— a first communication interface configured to communicate with a point-of-sale (POS) terminal; and~~

~~—— a second communication interface configured to communicate with a remote computing device and send the collected facial information to the remote computing device, thereby allowing the remote computing device to identify a customer account based on the collected facial information.~~

2. The payment-processing apparatus of claim 1, wherein the first communication interface comprises a universal serial bus (USB) interface, a Bluetooth™ interface, or a WiFi™ interface.

3. The payment-processing apparatus of claim 1, wherein the second communication interface is configured to receive, from the remote computing device, a transaction-authorization code, which is generated by the remote computing device based on the identified customer account.

4. The payment-processing apparatus of claim 3, wherein the first communication interface is configured to forward, to the standalone POS terminal, the transaction-authorization code to allow the standalone POS terminal to submit a payment request to the customer account based on the transaction-authorization code and a payment amount.

5. The payment-processing apparatus of claim 1, wherein the type of facial information comprises one or more of:

a two-dimensional (2D) image ~~of the customer's face;~~

a three-dimensional (3D) image ~~of the customer's face;~~

a feature vector ~~extracted from an image of the customer's face.~~

6. The payment-processing apparatus of claim 1, further comprising an input module configured to receive additional security information from the customer.

7. The payment-processing apparatus of claim 6, wherein the second communication interface is further configured to transmit the additional security information to the remote computing device, thereby allowing the remote computing device to verify the customer's identity based on the additional security information.

8. The payment-processing apparatus of claim 1, further comprising a display module configured to:

display information associated with the identified customer account; and

display a payment result.

9. The payment-processing apparatus of claim 1, wherein the remote computing device comprises a facial information database storing facial information of a plurality of customers.

10. _____ The payment-processing apparatus of claim 1, wherein the standalone POS terminal is a standard POS terminal configured to perform one or more of:

~~10.~~

determining price;

calculating payment sum; and

processing a coupon.~~standard POS operations.~~

11. A computer-implemented payment-processing method, comprising:

receiving, by a payment-processing device from a standalone point-of-sale (POS) terminal, a start-up command for starting up the payment-processing device, wherein the start-up command is received via a first communication interface between the payment-processing device and the standalone POS terminal.;

in response to receiving the start-up command, requesting, by the payment-processing device, from a remote computing device, a type of facial information needed to perform a facial-recognition operation to be performed by the remote computing device;

receiving, via a second communication interface between the payment-processing device and the remote computing device, facial-recognition parameters specific to the type of facial information needed to perform the facial-recognition operation, wherein the received facial recognition parameters comprise at least a liveness-detection parameter;

in response to receiving the start-up command and the facial-recognition parameters, obtaining, by a camera associated with the payment-processing device, facial information of a customer based on the received facial-recognition parameters;

transmitting, by the payment-processing device, the facial information to the remote computing device via the second communication interface to allow the remote computing device to perform the facial-recognition operation to identify a customer account based on the facial information;

receiving, from the remote computing device via the second communication interface, a transaction-authorization code associated with the customer account; and

forwarding, via the first communication interface, the transaction-authorization code to the standalone POS terminal, thereby facilitating the standalone POS terminal to complete a transaction based on the transaction-authorization code.~~obtaining, by a facial-information collection device, facial information of a customer;~~

~~transmitting the facial information to a remote computing device;~~

~~receiving, from the remote computing device, a transaction-authorization code,~~

~~which is generated based on the facial information of the customer; and
 — forwarding the transaction authorization code to a point-of-sale (POS) terminal,
 thereby facilitating the POS terminal to complete a transaction based on the transaction-
 authorization code.~~

5 12. The computer-implemented method of claim 11, wherein the ~~facial information-~~
~~collection device comprises a communication interface configured to communicate with~~
~~the POS terminal, and wherein the first communication interface comprises a universal~~
 serial bus (USB) interface, a Bluetooth™ interface, or a WiFi™ interface.

10 ~~13. —The computer implemented method of claim 11, wherein the remote computing
 device is configured to perform a facial recognition operation based on the facial
 information of the customer in order to identify an account associated with the customer.~~

~~14.~~13. The computer-implemented method of claim ~~11~~13, wherein the standalone POS
 terminal is configured to submit a payment request to the account associated with the
 customer based on the transaction-authorization code and a payment amount.

15 ~~15.~~14. The computer-implemented method of claim 11, wherein the type of facial
 information comprises one or more of:

- a two-dimensional (2D) image ~~of the customer's face;~~
- a three-dimensional (3D) image ~~of the customer's face;~~
- a feature vector ~~extracted from an image of the customer's face.~~

20 ~~16.~~15. The computer-implemented method of claim 11, further comprising receiving
 additional security information from the customer.

25 ~~17.~~16. The computer-implemented method of claim ~~15~~16, further comprising
 transmitting the additional security information to the remote computing device to allow
 the remote computing device to verify the customer's identity based on the additional
 security information.

~~18.~~17. The computer-implemented method of claim 11, further comprising:
 displaying information associated with the identified customer account; and
 displaying a payment result.

~~19.~~18. The computer-implemented method of claim 11, wherein the remote computing device comprises a facial information database storing facial information of a plurality of customers.

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19. The computer-implemented method of claim 11, wherein the standalone POS terminal is ~~a standard POS terminal~~ configured to perform one or more of:

determining price;

calculating payment sum; and

processing a coupon.~~standard POS operations.~~