

SPECIFICATION AND DETAILS

BUTTON-LESS ELEVATOR CONTROL AND ACCESS SYSTEM

BASIC IDEA OF THIS INVENTION

With the popularity of Destination Control System (DCS) growing in demand, this invention will further enhance current system and bring elevator's riding experience to the next era. In the past, DCS, which many lift companies have developed has eliminated the needs to have a destination floor calling panel in the lift. Destination floor calling panel is essential for every floors' lobby. However, this invention will further eliminate the needs to have a destination floor calling panels at each floor's lobby.

BACKGROUND OF THIS INVENTION

In the present situation, the user has to register his/her destination floor on DCS at each lobby. This causes a queuing problem especially during the peak hours such as morning rush, lunch time, etc. Architects, developers and elevator companies have always spent time to improve the calling time but they do not address to the issue on the queuing problem. Additionally, by placing poles or stands that are built to house these calling panels, it makes the lift lobby unsightly. For further security measures, there will be additional card reader access systems that are implemented side by side with the DCS. Coupled both DCS and card reader access system, this means the cost of production will be high and there will be additional maintenance for both systems to the building owner. During the time of virus outbreak such as SARS, hygiene becomes another problem when many users are using the same DCS at the same time.

SPECIFICATION AND OPERATION

This invention will eliminate the needs of having calling buttons both at lift interiors and lift lobbies. Moreover, it will address to some of the problems mentioned above and revolutionize the lift and elevator industry. This new invention uses the smart phone technology, which is booming faster than any other electronic appliances everywhere in the world. We have removed the need of destination call panel by packaging this functionality into a mobile app

and deploying to user's smart phone. When user enters the lift lobby, they do not have to queue up for making a destination call during peak hours. They can simply pick up their smart phone and launch an application. For users that have only one authorized floor, he or she will only need to enter their current floor. The application will automatically send both the current floor and authorized floor as a signal to the DCS Server in the lift machine room via Wi-Fi or 3G/4G/LTE or other applicable networks. DCS server will then send this request to the lift management controller where the best suitable lift will be assigned. In the reverse direction, lift controller will send the assigned lift to DCS server and whereas DCS server will respond back to the user mobile via Wi-Fi or 3G/4G/LTE or other applicable networks. User will walk to the assigned lift and wait for the lift to arrive. When the lift arrives, user will enter the lift and their destination floor is already registered for them automatically.

TECHNICAL ASPECTS OF INVENTION

The embodiment of the system will be explained in details according to the below listed drawings.

Fig.1 presents a simplified and diagrammatic view of the whole system consists of critical parts.

Fig.2 presents the application's user interface for tenant, in which not all of 2a, 2b, 2c are necessary for some cases, which are illustrated in the OPERATION section.

Fig.3 presents the application's user interface for visitors, the mode is selected as visitor access and the destination is pre-defined ground floor by the building management group. Not all of the 3a, 3b, 3c are necessary for all the cases, which are illustrated in the OPERATION section.

Fig.4 presents the application's interface for first time registration, to input the password to enable the uploading of user's specification and building information in the backend.

Fig.5 presents the flowchart of the lift calling process.

Fig.1 presents a special elevator registration system with the invention applied, which is differing from the traditional design of DCS using keypads (2) to register. The elevator system comprises four elevators(maximum eight elevators in one group) located next to each other, which are represented by

each column of elevator doors (1) and lift controller (15), operating in a group under control of the management controller (9). The DFRS server (8) is connected with the management controller (9) and its main function is to receive signals including the user's request for a service lift from the smart lobby app, send the signal to the management controller (9), and receive corresponding results calculated by the management controller (9), e.g. the assigned lift information for the user's request, reformat or directly send the results back to the smart lobby app on user's phone. The building information including the building name, service floor pattern, SSIDs for each floors if Wi-Fi network is applied, and any other special information e.g. secured floors, operation mode of lifts, and the user information including the user IDs, user accessible floors and any other special information e.g. VIP, disabled, are recorded in the DFRS server(8). So the DFRS server is a communication interface and data provider between the user's phone and the management controller of the elevators. The backend portal (16) is the control portal in each building whose main function is to monitor the system operation, upload user information, request lift for visitors or for tenants in special cases, de-registration user's ID, and it is directly connected to the DFRS server with rights to update the database of users' information for the building.

Fig.2 presents the user's interface upon launching of the apps for tenants who have authorized by the building's management parties, the appearance of the screen may be further developed and new features e.g. group calling may be added upon feedbacks from users.

Fig.3 presents the user's interface for tenants to order a lift for the visitors who may not have authorization to return to the ground floor or other rest floor defined by the buildings' management parties. The appearance of the screen may be further developed and new features e.g. group calling may be added upon feedbacks from users.

Fig.4 presents the screen layout of the registration interface, which allows the management parties to activate the apps for the tenants using the pre-defined building password.

REGISTRATION/DE-REGISTRATION PROCESS

The tenants have to do a one-time registration with the buildings' management parties to upload their information into the DFRS server before they can use the app to request for lifts in any buildings that use the new invention. The information required to upload including a unique user ID, which is tight up together with the user's smart phone number, the accessible floor pattern which may affect the operation of the apps, and special request if any including disabled, VIP. Etc. To register the user information, the management party of the building will use a password to enable the registration process and will be input to the user's smart lobby app as shown in figure 4. Once the registration process is enabled, the management party of the building has to upload all other user information e.g. the accessible floor pattern through the backend of the system into the DFRS server. In other word, there is no other information needs to upload into the system from the user's smart phone except the enabling password.

For users with the right to access more than one building, they will have to do the same registration process in each new building.

In the case when de-registration of tenants is required, the users' information is deleted through the backend portal by the building's management parties, and the users will not be authorized to access to any controlled floors even they still have smart lobby app installed in their smart phones.

OPERATION ASPECTS

TENANT MODE

- OPERATION PROCESS FOR TENANTS IN THE BUILDING:

The process of the operation should be divided into four stages, listed as below.

STAGE 1: Initialization.

The initialization stage starts with the launching of the smart lobby app on user's smart phones. Once the app is activated, the app will first determine if the smart phone is connected with the Internet. If the phone is not connected, the app will display a warning message to the user, to inform that the Internet connection is necessary for the app to operate and ask the users to access to

Internet through Wi-Fi or 3G/4G/LTE or other applicable networks. If the Internet is available, the app will automatically check if the location service is turned on. If not, the app will recommend the user to turn on the location service. If the location service is enabled, the app will determine the user's located building, set the building's name as default, and send an initialization package, which include the user ID, available Wi-Fi SSID list in range, to the specified building's DFRS server through Internet to request for the user's information. If the location service is disabled by the user or the determined building is incorrect, the users can also choose the building name manually. Once the initialization package is received by the DFRS server (8), the DFRS server will confirm the user's located building by verifying the Wi-Fi SSID list available in range and reply the accessible floor patterns to the user's mobile app if the user is authorized. Otherwise the DFRS server will reject the request for the user specification data and send an acknowledged data package to indicate the failure of initialization. In this case, the located floor selection tag is disabled until the user selects the correct building. This feature is to prevent the users from making calls at any other unauthorized lift but not the authorized lift of the building.

STAGE 2: located floor selection.

Once the initialization stage is completed, the app is fully launched and is ready to use. In this situation, fig 2a is presented on the screen for users to choose their current located floor, and the number of passengers in optional. The number of passengers is set to 1 as default and can be changed from the drop down list if more than 1 tenant requires service lift at the same time. For single accessible floor users, they can only access one more floor besides the ground floor or other non-controlled floors. For multiple accessible floor users, all the available floors are listed in the down list once the location selection area is pressed. The current location may also be auto chosen by the system e.g. by determining the access point's SSID of the Wi-Fi signals as an optional feature. Once the user selects the location or auto selected by the system, the app will automatically move to the next stage for users to choose the destination.

STAGE 3: destination selection

Fig 2b presents the example screen layout of the destination selection stage. As the current location is successfully selected, it is displayed on the upper area of the screen. (If the location is selected with mistake, the user can return to stage 2 to re-select by press the <back> mark at the top left). For single accessible floor users, the system will skip this stage because of the unique destination floor besides the current location. For multiple accessible floors users, the system will list out all the accessible floors for users to choose. After selection of the destination floor by users, the <ok> mark has to be pressed to confirm the choice and the app will send the users' request to the DFRS server.

STAGE 4: lift assigned

Upon completion of the destination selection stage, the DCS will reply the identifier of assigned lift, which is presents automatically as in fig 2c. The location and destination selected are indicated at the top area of the screen for user's reference. The user will move to the assigned lift and the operation is complete.

VISITOR'S MODE

- OPERATION PROCESS FOR VISITORS TO THE BUILDING

- Operation into building for visiting of tenants in the building

For security purpose, the visitor has to proceed to the registration counter to register the visit and provide the information of the tenant to be visited. The registration counter officer will then issue a one-time password, which will be expired within a certain time, to the visitor. The visitor should then proceed to the lift lobby, launch the Internet explorer or apps with similar functions on their smart phones, and open the URL of the building's DFRS server given by the officer. After inputting the one-time password in the DFRS server home page, a service lift will assign to the visitor to the destination floor and the lift identifier will be displayed.

- Operation out of building for visiting to single authorized floor tenants

The visited tenant should have to assist the visitor to call for a lift to send the visitor to the ground floor. The initialization stage is the same as for the tenant mode, and the user's interface when the app started is presented in fig 3a. In

this situation, the current location is not required as the location is unique and same to the accessible floor of tenant. Once the tenant decides to call a service lift and the <request for lift> mark area is pressed, a service lift is assigned and the lift identifier is indicated on the smart phone as shown in fig 3c. The visitor should proceed to the assigned lift and the operation is completed.

- Operation out of building for visiting to multiple authorized floor tenants
The visited tenant should have to assist the visitor to call for a lift to send the visitor to the ground floor. The initialization stage is the same but the user has to select the current location from the available locations indicated in the down list, as presented in figure 3b and press the <request for lift> mark area. A service lift is assigned and the identifier is indicated on the smart phone as shown in fig 3c. The visitor should proceed to the assigned lift and the operation is completed.

SECURING PROTECTION FOR USERS INFORMATION

To protect the user's privacy from been divulged and the communication safety during the operation, the below features are implemented in the system.

1. Smart phone data protection. The users' information is registered through the backend portal of the system, which located in each individual invention applied buildings. The app can only be used after the registration process is completed and user's information has been inputted into the backend portal. The backend system will issue a token to the smart phone for future use. Only with the valid token, the app is allowed to communicate with the specified DFRS server. The app will not be able to access or extract any private information from the specified DFRS server via the user's smart phones itself.
2. Backend portal information protection. To prevent unauthorized login to the backend, a user name and a password are required to access each backend portals, which can be changed and maintained by the building's management parties. In addition, the user's information is segregated for different buildings, and the backend portal is connected with the DFRS server through internal networks hence there is no way to access the user information via other

network. The backend portal cannot access to users' information from any other buildings.

MAIN ADVANTAGES OF THIS INVENTION

1. Great reduction of the registration time for users during peak hours. In traditional DCS, every user has to register their destinations one by one before entering the lift. The process takes long time when there are a large number of passengers and they have to queue up in front of the registration devices. However, with the invention applied, the authorized tenants can register their destination through their smart phones at the same time, which will greatly reduce the waiting time for multiple tenants registration compared to a single tenant registration.
2. Embedded security system by default. With the invention applied, no card reader system or any other security system is required due to the pre-registration stage of user's information. The users have to register their information into the DFRS server of the smart lobby system and get the permission from the building's security department before they can access any of the invention applied lifts.
3. Lower cost. With the invention applied, no keypads or touch panels are required in the hall side, so the addition cost on them and the related cables, PCBs is deducted. The additional cost on security system such as card reader system can be avoided as well.
4. Easy installation and maintenance, environmental friendly. As stated in point 3, with the absence of the keypads, the touch panels and the card readers, it reduces the number of devices to be installed and maintained, which simplifies and speeds up these procedures. The reduction of the materials and energy usage make the overall system more environmental friendly.
5. Hygiene. Due to the invention, it allows every tenant to use their own smart phones as registration device instead of sharing the common keypads or touch panels. This will prevent those contact infection diseases to be spread. As tenants do not need to gather together in front of the registration devices such as keypads or touch panels, aerial infection risks can be reduced.

CLAIMS

1. Registration system for calling of a service lift in the DCS, which comprises at least one elevator, an elevator car of which serves at least two floors, one management controller, one smart phone, which downloaded and installed with the smart lobby app, two Wi-Fi access point with specified SSIDs, one DFRS server and one backend portal, characterized in that the system comprises the phase: a plurality of operation for calling of a service lift is determined; the procedure of user's information registration is determined; the view to be presented on the users' smart phone interface is selected from the aforementioned plurality of operation on the basis of the aforementioned user selected mode.

2. System according to claim 1, characterized in that visitors using one time password issued by the backend portal to access to the service lift to the destination floor.

3. System according to claim 1, characterized in that an operation in which a tenant of the building calling for a service lift to the destination floor for single user or for group of users if group calling function is enabled by the buildings management party.

-For single access users, they only have to choose the current location.

-For multi access users, they have to choose both of the current location and the destination.

4. System according to claim 1, characterized in that an operation in which a visited tenant of the building calling for a service lift to assist his/her visitor(visitors if group calling function is enabled by the building management party) to leave the building.

-For single access users, they only have to launch the app and request for service lift.

-For multiple access users, they have to choose the current location.

5. System according to any of claim 1, characterized in that first time users should carry out a one-time registration process which will determine the authorization of users.
6. System according to claim 2-4, characterized in that the assigned lift identifier will be indicated on the user's interface(user's mobile).
7. System according to any of claim 1, claim 3-5, characterized in that a view of the user's interface is selected based on the Internet connection status of the users' smart phones, via Wi-Fi, 3G/4G/LTE or other applicable network connections.
8. System according to any of claim 1, claim 3 or claim 4, characterized in that a view of the user's interface is selected based on the location of the phone.
9. System according to any of claim 1, claim 3 or claim 4, characterized in that a view of the user's interface is selected based on the authorization of the users, which determined by the operation parties of the buildings.
10. System according to any of claim 1, claim 3 or claim 4, characterized in that a view of the user's interface is selected based on the previous action of the users.
11. System according to any of claims 1-9, characterized in that additional information and choices are presented on the user's interface.