BUILDING AND TENANT MANAGEMENT SYSTEM

For Youth Hostel Applications

About Hong Kong Communications

For over forty years since its founding, HKC has been tirelessly providing professional consultation, implementation and maintenance services for voice, data, IP telephony, workflow automation, security, smart building, RTLS and RFID solutions to government agencies, public institution, and business of all sizes.

Our commitment to research & development, customer satisfaction and technical excellence enables our customers new capabilities and enhanced processes in their operations. Notable long-term customers include Hong Kong Public Library, Hong Kong Housing Society, Singapore IRAS, SingHealth, Singapore NLB, Land Transport Authority and many others.

To date, HKC's innovative approach to technical problems has resulted in the adoption of its Spotrack® platform in many key sectors such as library, healthcare services, logistic, real estate and other industries.

Building and Tenant Management System

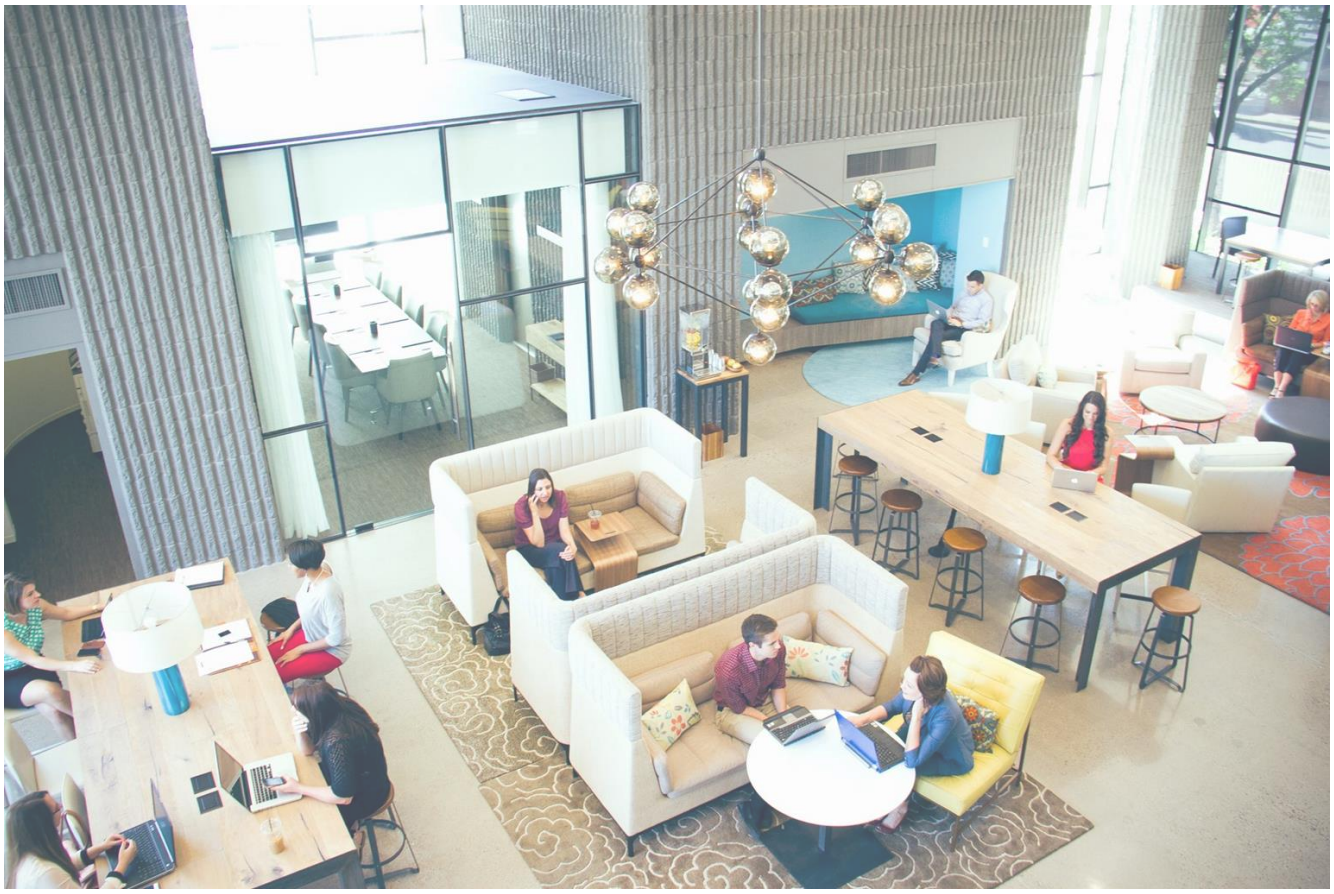
Using Autonomous technologies, AI, and internet of things

Our corporate mission is to improve the quality of life through Information and Communication Technologies. We endeavor to make use of innovation and technology to improve people's quality of living as well as delivering sustainability, efficiency and safety; hence our continuing and extensive investment into the research and development of autonomous systems and internet-of-things applications.

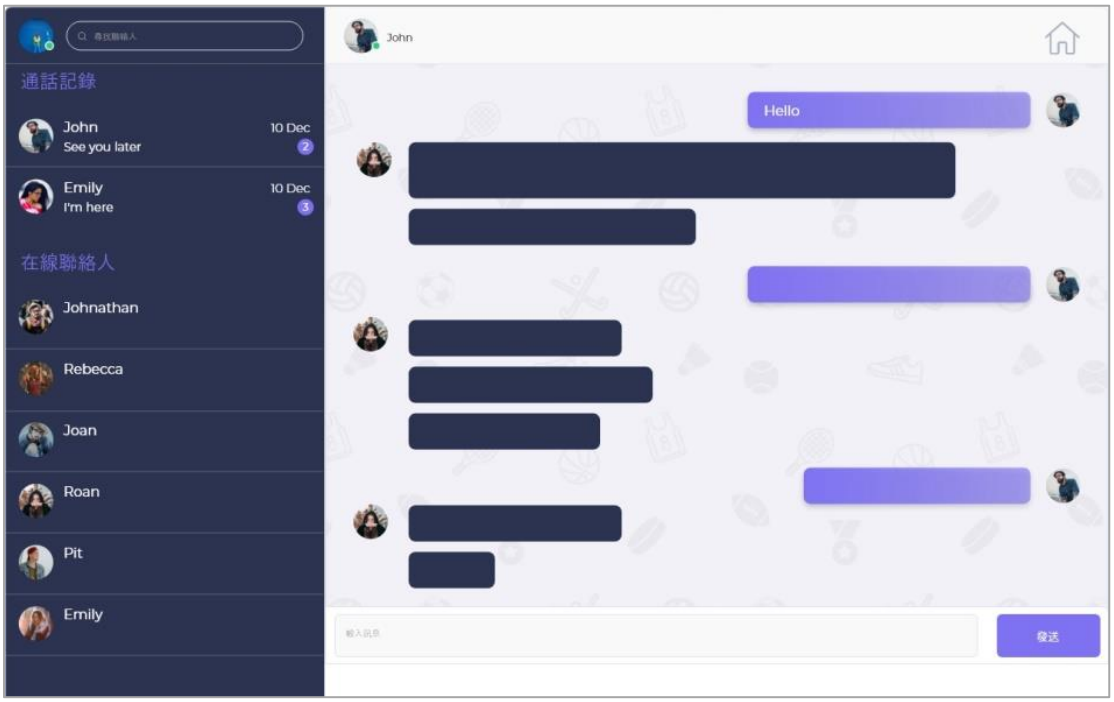
Making products people-centric is our central mission. Going beyond connecting people, we strive to automate the mundane to **free up human spirits** for tasks that truly require the **human attention**, **interaction** and **creativity**.

In this paper, we will present the latest **Building and Tenant Management System (BTMS)** from us that aim to achieve the above mission. The System is composed of the followings:

1. Smart Community Portal
2. Smart Display System (built on our most acclaimed Spotrack ®)
3. Utility Consumption and Payment System
4. Waste Recycling using Smart Bins
5. Air Quality Monitoring System
6. Smart Security & Access Control System (built on award-winning Carrot Home Solutions)



Smart Community Portal (SCP)



The chatroom app for the Smart Community Portal is where tenants can meet to organize communal activities and discuss topics of common interests, as well as help manage and maintain the hostel.

The Smart Community Portal is the social platform on the BTMS to facilitate the interactions and communication among tenants, as well as between tenants and hostel management team. It consists of these main functions:

- Community news and electronic bulletin board
- Online booking system for hostel facilities
- Online forum and chatroom
- Membership point system

The community news and electronic bulletin board is the front page of the Smart Community Portal where a curated collection of news and public notices for all tenants are posted and updated by the management team. It also has a search function for looking up old postings. It also can link to other online forms and booking pages for signing up activities or scheduling shared tasks.

The Online Booking System for Hostel Facilities can help the community manage the booking of common facilities and resources automatically. The manager can define new facilities and give them different booking rules and charges. At the time of the booking, the system can send unlock command to the smart lock to let in the tenants. The system is also linked to one or more payment services.

The membership point system establishes an award and penalty system to incentivize the tenants to take on the responsibility of management the hostel themselves. Points can be granted to those who contribute to the maintenance and management, as well as for organizing community activities. Members who are in breach of the house rules or otherwise behave in undesirable manners will be subject to point deductions. Severe cases can lead to expulsion from the facility.

Smart Display System (SDS)

The main purpose of the Smart Display System is to provide a Graphical User Interface (GUI) platform to display useful and relevant information throughout a Smart Building. The Smart Display System shall provide built-in graphic rendering libraries and database connections to data sources at various locations throughout the building. The SDS allows different users to access their data according to their access privileges in a secure way.

Smart Mirror can be used as a Smart Display anywhere within the Smart Building, common areas or inside the flat units.

More specifically, every SDS comes standard with the following mobile apps, custom designed for each project:

- Graphical User Interface for BTMS that can run on wall-mounted Smart Displays or as separate mobile iOS and Android applications
- Primary User Interface for Smart Community Portal
- Automatic calculation of critical parameters such as carbon footprint, energy billings, domestic waste data, and present the results graphically
- Dynamic graphic and charting capability for Real-time, daily, monthly and yearly information dashboard for these parameters and setting alert levels when any of the preset levels is exceeded
- Apps for other building security systems, such as Video Door Phones, Lift Control, CCTV Cameras

Another popular implementation is to integrate the Smart Display System (SDS) with a Video Door Phone inside the flat unit.

The complete SDS includes presentation graphical applications for the Smart Displays in in-Home displays (wall-mounted iPad, Smart Mirror or Android based Video Door Phone), Lift Displays, Main Entrance Hall Displays, and Clubhouse Displays, including all necessary power supplies and network connectivity.

Since the SDS app can be run on iOS device, the developer can choose to pair SDS on iPad with a well-designed wall mount charger in a high-end offering.

Utility Consumption Management and Payment System (UCM)

SDS front page features icons for UCM for energy information.

The UCM provides smart metering of electricity consumption for each individual flat unit. It tracks and collects real-time consumption data and present them in easy-to-understand infographics for the resident. By making use of this information from the system judiciously, the residents can change their usage pattern and reduce the use of electricity, resulting in saving in their utility bills.

The UCM can also be interface to one or more payment services to allow real-time settlement of account balance or the purchase of prepaid credits.

The UCM can also be operated in prepaid or postpaid modes:

1. Prepaid Mode: Users deposit cash into their accounts for spending on electricity, other value-added services and for the use of designated facilities. They can pay at the counter during office hours or transfer the fund from **other online payment services**. Electricity supply to major appliances, such as air conditioners, will be controlled by UCM based on whether there is credit remaining in the

2. Postpaid Mode: Users can make use of the electricity, other value-added services and for the use of designated facilities by booking and opening the services at the SDS. The consumption will be logged by the system for monthly billing.

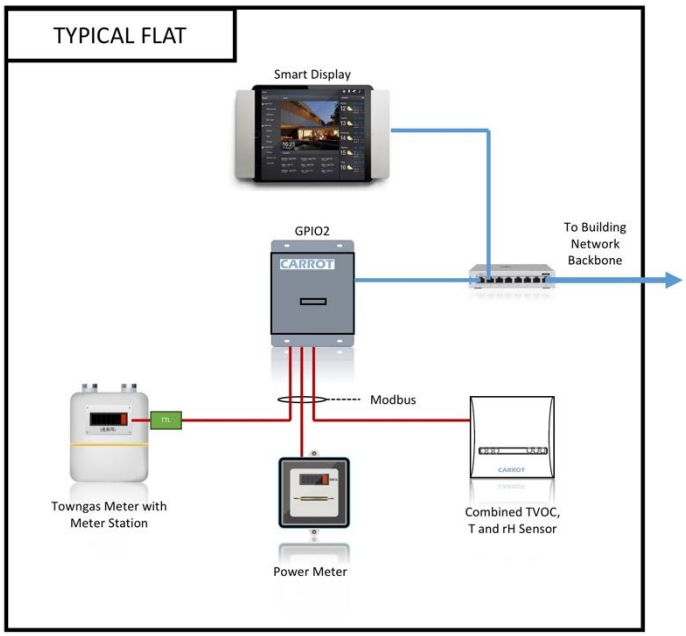
- Interfaces with smart meters for electricity to collect **real-time** consumption data
- Interface to washing machine and drying machines in the Laundry (if any)
- Display consumption in monetary terms at a glance
- Dynamic charting capability for real-time, daily, monthly and yearly energy information dashboard on Smart Displays
- Automatic calculation of carbon footprint and present the result graphically
- Comparison with baseline and other households in the community
- Setting alert levels when preset consumption level is exceeded
- Offer advice (called Smart Tips) on energy conservation, based on consumption real-time data and history

This Power Consumption function shows the current month's total power consumption and its corresponding carbon emission value. You can display the data for each of the last 12 months by selecting from the drop-down box. You can also set the alert level for over-consumption by selecting the Tool Icon.

Internet of Things (IoT) Interconnections

All of our solutions are designed from the ground up using this IoT architecture. Our IoT solution consists of three layers of technologies — the cloud backend (or a local backend running on an on-premise server), embedded platform services, and edge computing devices, customized fully to offer the end-to-end development of your business specific solutions.

IoT solutions require secure, bidirectional communication between numerous physical devices, and a solution back end. For example, a solution might use automated, predictive analytics to uncover insights from your device-to-cloud event stream.



Equipment configuration for a typical residential flat for HECIS and HHWIS.

The following diagram shows the key elements of a typical IoT solution architecture. The diagram is agnostic of the specific implementation details such as the cloud services used, devices deployed, and operating systems the solution is running on. In this architecture, IoT devices collect data that they send to a cloud gateway. The cloud gateway makes the data available for processing by other back-end services. These back-end services can deliver data to:

- Other line-of-business applications (such as hotel room control, facility monitoring for property manager, or smart home/building applications, etc.)
- Other predictive analytics using machine learning (Home Energy Consumption Information System, etc.)
- Human operators through a dashboard App or other presentation device or software (such as Home Health and Wellness Information System, or Waste Management Information System, etc.)

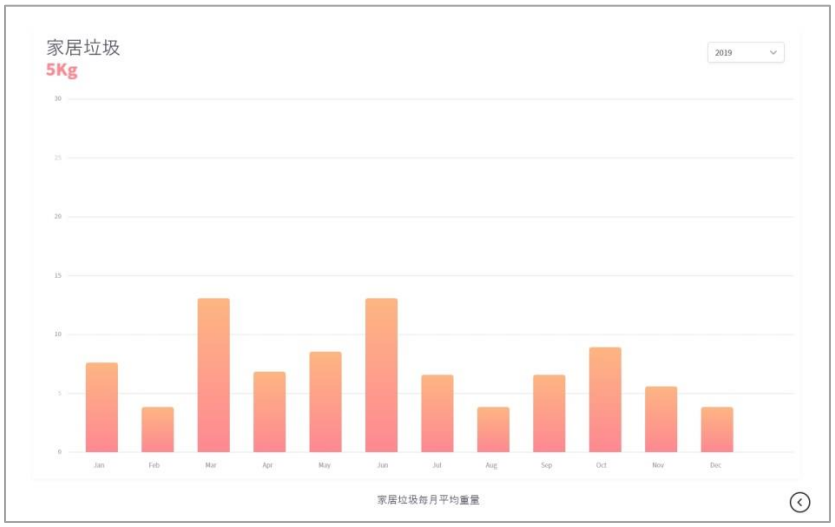
Waste Recycling using Smart Bins (Smart Bins)

Smart Bin for general waste is shown above with automatic door open function. There are different versions for General Waste, Paper, Paper Box, Glass, Plastic and Aluminum.

- Smart garbage bin integrated with RFID reader, sensors and communication interface
- RFID reader for logging the identity of the tenant using the smart bin
- Smart bin ultrasonic **fill-level sensors** indicating refuse fill levels
- Smart bin with **automatic open actuator** using Infrared and motion detection to improve **hygiene and reduction of foul smells**
- Built-in **electronic weight system** to report weight of contents for general refuse and for each of the recycling compartments; by using the RFID reader, the waste disposal data can be traced to individual tenants
- Refuse recycle report to summarize % of household being recycled for each floor and each building
- Dynamic charting capability for real-time, daily, monthly and yearly information dashboard on Smart Displays
- Efficiency enhancing application for optimizing the **garbage collection schedule** based on inputs from fill-level sensors

- To encourage recycling, good behaviors in recycling (i.e. proportion of recycled waste is higher than general waste) will be awarded with membership points

This Garbage Collection Information allows you to view current monthly totals for the various types of waste collected/recycled from this floor. By selecting each of the waste type (General, Paper, Paper Box, Glass, Plastic and Aluminum), you can view the month-by-month collection history the type selected.



This graph shows the month-by-month waste collection history for the last 12 months.

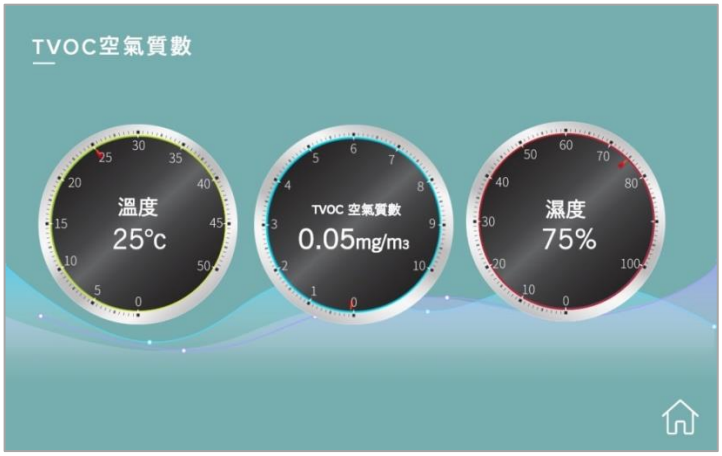
The complete Smart Bin system includes presentation graphical applications for the Smart Displays in in-Home displays and also provides automatic garbage collection scheduler to reduce the manpower and enhance the efficiency for the collection process, based on the sensor inputs and historical patterns of collection data.

Air Quality Monitoring System (AQMS)

A Carrot Multi-sensor for indoor TVOC, temperature and relative humidity.

- Combined TVOC, T, rH Sensor (multi-sensors)
- Dashboard Application for displaying the dynamic graphics monitoring and control parameters
- Setting alert levels for indoor air quality when preset level (using EPD values as default) is exceeded
- Dynamic trending history report functions
- Optional automatic control of filtration fan to improve indoor air quality

The AQMS is comprised of an indoor TVOC, temperature and relative humidity multi-sensor and corresponding application.



This Air Quality function shows the current total volatile organic compound (TVOC), air temperature and air humidity in the room. The red dots along the rim of the three dials indicate the temperature, TVOC, and humidity, respectively. You can set the alert level for each of these measured values by selecting the corresponding Tool Icon under each dial. The face of each dial changes color to indicate the severity of the measurement. The possible colors are blue (Low), yellow (Normal) and red (Severe).

Smart Security & Access Control System

One of the significant costs in operating any building is the provision of security. To lower this cost, the Smart Security & Access Control System is provided to automate many of the security services:

More specifically, the following sub-systems are implemented:

1. *Smart Visitor Panel (SVP)*
2. *Smart Visitor Registration System*
3. *Smart Key Mobile App (S-Key) & Smart Lock For Flat Door*

Smart Visitor Panel (SVP)

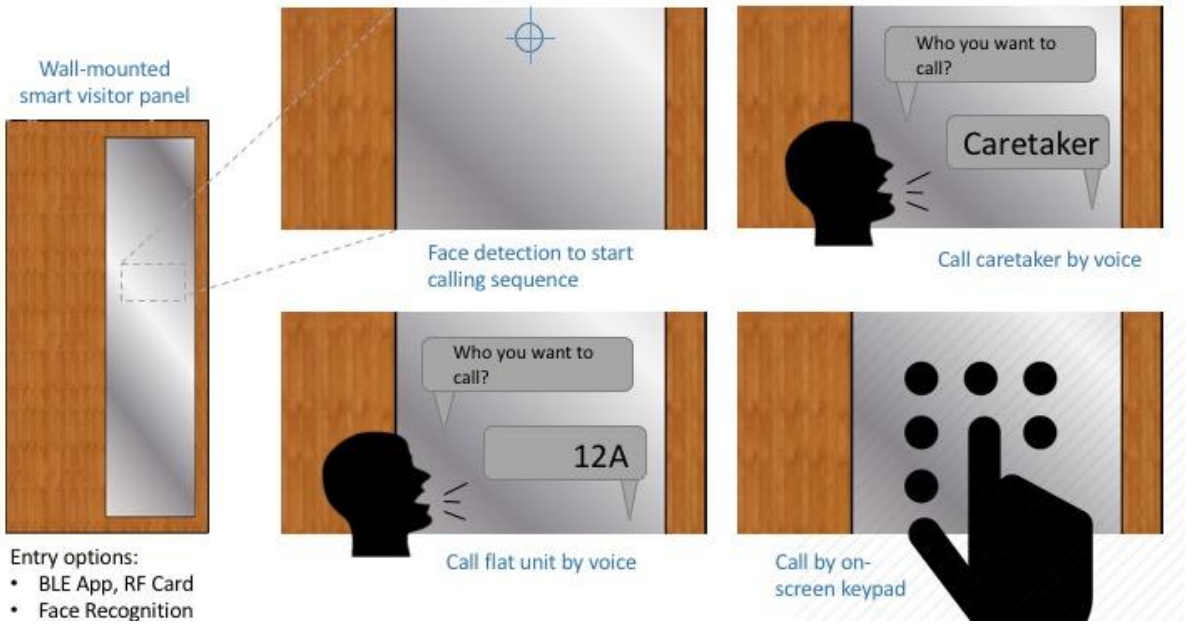
- Tenants receive video call via SDS or smartphone App
- Standalone visitor panels with mirror finish and touch screen
- On-screen keypad and voice recognition to enter call address or say “caretaker” or “management” to connect directly to property management at a remote location
- Optional Face recognition to open door for tenants
- Optional interface to lift system and caretaker station
- Optional QR code printer for visitor registration

SVP’s primary function is to provide access control for a fixed entry point into a premise. Its extensive use of AI technologies enables it to provide the most user-friendly user experience for the residents and visitors going into a building, while at the same time, minimize or eliminate the needs for stationing of personnel solely for watching the entrance.

The tenants can choose to use RF cards or face recognition to unlock the entrance by standing in front of the SVP.

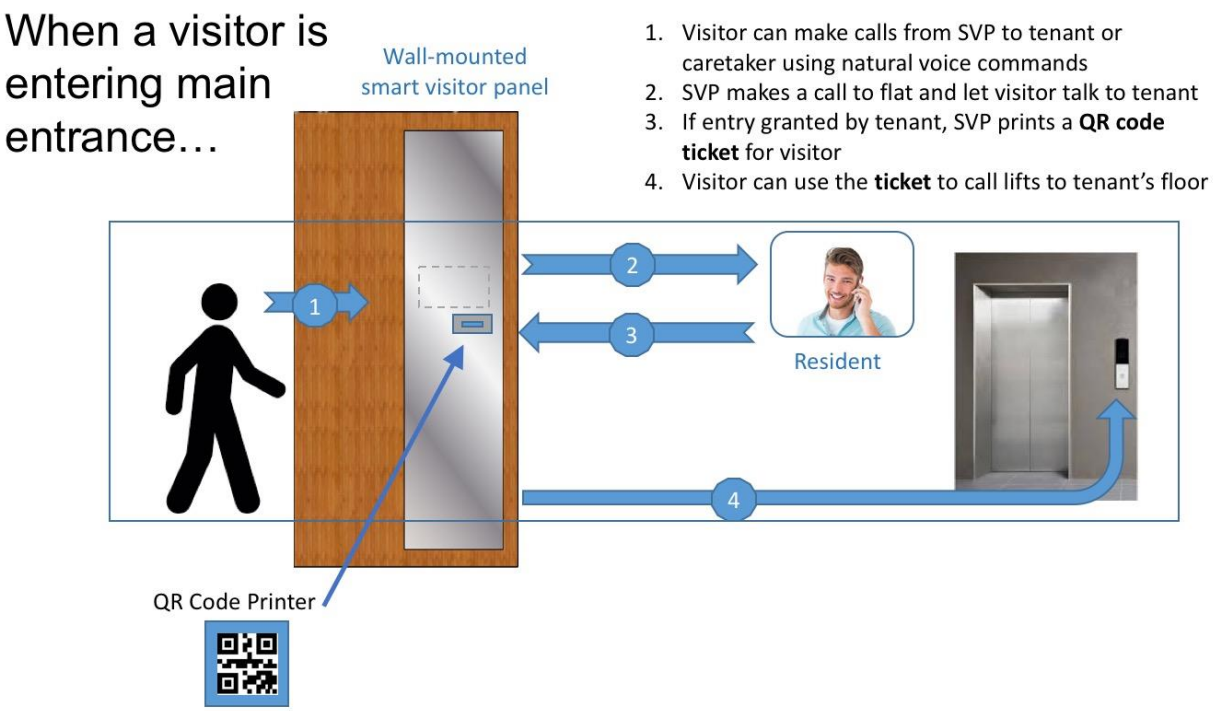
For visitors entering the premise, they will stop in front of the SVP, which normally just display a welcome message over its stylish mirror surface. Upon detection of a face, the SVP will pop up a UI prompting the visitors for either a flat unit address to call or be connected to the management office. Natural voice can be used, so the visitor can just say 12A, caretaker, management, reception and the system will understand automatically.

Alternatively, they can also present a pre-registration QR code given to them by the resident to grant entrance or they can select the on-screen icon for a keypad mode where the SVP will work much similar to a traditional system.



Here is the use scenario for visitor calling the residents at the main entrance.

Smart Visitor Registration System



Smart Key Mobile App (S-Key)

- Built-in Mobile App Client for Video Door-phone to SVP
- Work with Main Entrance Access Control
- Work with Integrated Lift Control System
- Can be integrated with automated facility booking system
- Work with Smart lock for release of facility using Bluetooth

With Smart Locks installed at the front doors of the flat units, the S-Key App can be used to open flat door wirelessly. Alternatively, the smart locks can be opened with RF Card as well.

- Can be used by resident for pre-registration of visitors **(using QR code)**
- Optional Panic Alarm function

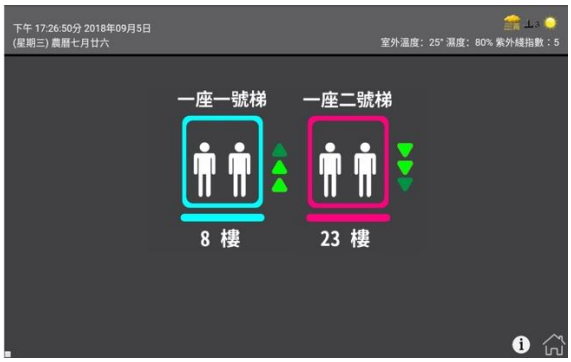
The S-Key is a mobile App that can be used as a video door-phone system.

S-Key is also used as Key Card that can unlock main entrance door, call lift or raise vehicle barrier gate over long range wireless connection.

S-Key also offer value-added functions such as booking system, panic alarm and e-notice services.

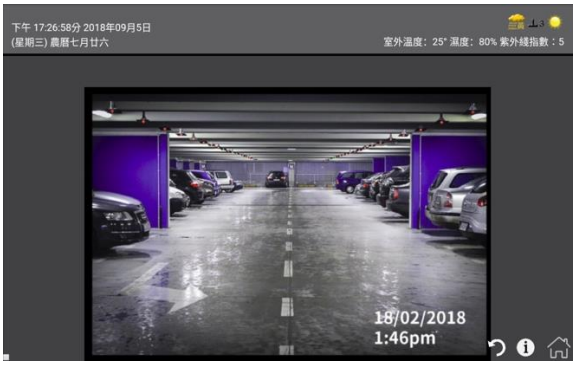
Other Security Features:

1. Application for displaying the real-time lift positions and directions



This screen shows the current locations and travelling directions of the lifts. The lifts can be called by Tenants to bring visitors to their floors.

2. CCTV camera viewers



By selecting any of the CCTV camera locations shown, you can view the real-time video from that camera from SDS.

Contact Us

香港通讯有限公司

地址: 香港黃竹坑道29号维他大厦B座14楼

电话: +852 2528 3936 传真: +852 2865 6016

电邮: contact_hkcgroup@hkc.net

网址: http://www.hkc.com.hk

Carrot Home Solutions Limited

地址: 香港黃竹坑道29号维他大厦B座14楼

电话: +852 2876 2198 / +852 2530 3784

传真: +852 2876 2199

电邮: enquiry@carrot-home.com

网址: http://www.carrot-home.com/index.php

December 2019

Carrot Home Solutions Limited

Address:
14/F, Block B, Vita Tower,
29 Wong Chuk Hang Road,
Hong Kong

Telephone: +852 2528 3936
Email: manlam@carrot-home.com
Web: www.carrot-home.com