GoPark

An innovative solution to parking, traffic and pollution

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Using IoT and SmartCity technologies to:

Help improve air quality & promote healthy living in the community.
Help resolve the extremely congested traffic around the tunnel area.
Enhance community connectivity among neighboring areas.

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Executive Summary

GoPark is a groundbreaking project aimed at transforming parking in Hong Kong. Our innovative approach utilizes advanced technology and real-time data to guide drivers to available parking spaces, reducing congestion, and pollution and enhancing community connectivity. With a focus on efficiency, sustainability, and community well-being, GoPark is set to revolutionize the way we park and live in our vibrant city.

One of the primary problems being addressed by the Green Deck project is the extremely congested traffic around the tunnel area. To alleviate this issue, GoPark proposes the installation of sensors in the deck to provide real-time guidance to drivers, helping them locate available parking spots. This innovative system can be expanded beyond the deck to other areas in the city, offering a comprehensive solution to parking difficulties and reducing traffic congestion.

In addition to addressing traffic congestion, the GoPark project strives to improve air quality and promote healthy living in the community. By encouraging drivers to quickly find parking spots, the project reduces unnecessary idling, thereby minimizing vehicle emissions and enhancing air quality. The project's focus on sustainability aligns with global environmental goals and supports the local government's efforts to combat pollution.

Reducing circling for parking
One major contributor to traffic congestion is the time spent by drivers circling around the area in search of an available parking spot. By providing real-time guidance to drivers about nearby available parking spaces, GoPark helps minimize the need for extensive searching, reducing the number of vehicles on the road and easing congestion. This reduces instances of vehicles idling, which is a major contributor to air pollution. Decreasing unnecessary idling time leads to reduced emissions, improving air quality in the surrounding area.

Streamlining parking processes
Efficient parking systems, such as the one proposed in GoPark, can optimize the parking process itself. By utilizing technology like sensors and data analysis, the system can guide drivers to vacant spots quickly and effectively, ensuring that parking spaces are utilized efficiently. This streamlined approach minimizes the time spent entering and exiting parking facilities, reducing congestion and emissions near entry and exit points.

Reducing double parking and illegal parking
In congested areas, drivers often resort to double-parking or parking in unauthorized zones due to limited available spaces. These actions can further impede traffic flow and contribute to congestion. By providing real-time information about available parking spaces, GoPark helps discourage double-parking and illegal parking by guiding drivers to legitimate and convenient parking options, thereby reducing disruptions to traffic flow.

Promoting alternative modes of transportation
Efficient parking systems can also encourage the use of alternative modes of transportation, such as public transit, walking, or cycling. By providing drivers with accurate information about parking availability, they may be more willing to park their vehicles in convenient locations and utilize other modes of transportation for their daily commutes. This shift reduces the overall number of vehicles on the road, leading to decreased congestion in the tunnel area.

Supporting sustainable urban planning
GoPark's focus on integrating green spaces, recreational areas, and cultural venues within parking facilities contributes to sustainable urban planning. By optimizing space utilization, the project encourages the development of green infrastructure, which helps absorb pollutants, enhance biodiversity, and create healthier urban environments.

Problem Statement

GoPark aims to address several critical challenges that are currently impacting the community and the surrounding districts. Below are the key concerns that we figured out.

Poor Air Quality and Health Impacts

Hong Kong suffers from severe air pollution due to high levels of pollutants such as PM2.5 and nitrogen dioxide (NO2) [1]. The densely populated Hung Hom district, which is adjacent to the main thoroughfares, has poor air quality, which harms people's health. Long-term air pollution exposure has been associated in studies with respiratory ailments, cardiovascular problems, and even early death.

Vehicle emissions are a major contributor to air pollution, with over 50% of the polluted air in Hong Kong. The roadways are notorious for having the highest car density in the world, with an estimated 275 vehicles per kilometer [1]. Vehicle emissions, such as nitrogen oxides (NOx), particulate matter (PM), and volatile organic compounds (VOCs), contribute to the creation of smog and other dangerous air pollutants. This can bring a negative impact on the environment and the well-being of the citizens.

Inadequate Community Facilities and Public Spaces

The lack of public places and community centers in the area not only restricts access to outdoor activities, cultural events, and social contacts but also exacerbates the negative impact on citizens' mental health and well-being. Living in urban areas, where public space is scarce, has been linked to a 40% higher risk of depression and over a 20% higher risk of anxiety compared to rural areas [2]. Thus, the availability of public space plays a crucial role in promoting mental health and overall well-being in urban environments.

In comparison to other cities, Hong Kong's urban public space - open to the public outdoor recreational space - is particularly limited. Hong Kong only provides 2.7 square meters of space per person, whereas Singapore, despite being half the size of Hong Kong, offers 7.4 square meters of urban public space per capita [2]. This stark contrast highlights the shortage of accessible outdoor recreational areas in Hong Kong, further emphasizing the need for additional public places and community centers to meet the diverse needs of its residents.

Congested Traffic around the Tunnel Area

The area around the Hung Hom Cross Harbour Tunnel Toll Plaza is notoriously congested, especially around rush hour. The high volume of traffic is a major cause of delays, additional pollution, and global warming. Ineffective traffic management and a lack of alternate transit options make the situation worse, threatening the district's ability to function. The continuous traffic congestion also adds to the frustration and stress experienced by commuters, highlighting the urgent need for comprehensive traffic management strategies and improved transportation infrastructure in the Hung Hom district.

The overwhelming presence of private cars in the Hung Hom district of Hong Kong is the primary factor that contributes to the city's chronic traffic problems in this area [3]. The high number of private vehicles in the area is a big contributor to the persistent congestion, the delays, and the environmental problems that are present there. The widespread use of personal automobiles also makes a contribution to the acceleration of global warming. In addition, the current transportation infrastructure and tactics for managing traffic are not adequate enough to successfully address this important problem.

Proposed Solution

GoPark is an innovative cutting-edge solution to the parking and congestion problems faced by urban cities worldwide. GoPark aims to optimize parking space, reduce parking time and therefore reduce carbon emissions while simultaneously providing a hassle-free experience to millions of vehicle drivers daily.

At the heart of our solution is a network of advanced sensors and real-time data analysis, which enables us to provide accurate and up-to-date information on parking availability from private and public parking spaces. This information can be accessed remotely by drivers through our user-friendly mobile application which allows them to pre-plan whether using their vehicle would actually be better than utilizing public transport.

Additionally, GoPark aims to provide its users with an automated guiding system that is built on top of Google Maps which would lead drivers directly to their designated empty parking slot and would update them if any change occurs to the availability of that space. Additionally, GoPark would provide automatic re-routing and would use Google's shortest route technology to ensure that driving and parking time is kept to a minimum.

Finally, GoPark is built to be an all-in-one platform which also covers the payment for the parking and therefore getting rid of the physical need to pay using NFC and instead relying on faster mobile and online paying systems including FPS.

To make all of this possible the GoPark solution also includes an IoT service that would be sold to local governments and private parking institutions in order to prepare their parking space for use on the platform. This IoT service would cover the installation of the sensory and IoT devices, the maintenance of the devices and connecting them with out servers and databases. The private parking institutions would see increased revenue through our platform guiding drivers to them, while GoPark would increase the number of parking spots available to users.

The three-story Green Deck would also be utilized as it would be transformed to a smart and eco-friendly parking space that is space and energy optimized. Specifically, GoPark plans to install solar panels, miniature road-side wind turbines, sensors and automatic energy saving systems across the entirety of the Green Deck. The stated energy-saving system would rely on automatically turning off the power to the upper floors if the number of cars entering the Green Deck can fit in the first / second floor(s) alone.

Ultimately, GoPark will reduce driving and parking time, therefore reducing carbon emissions, congestion near parking spaces, driver discontent, and given the unique position of the Green Deck right next to the cross-harbour tunnel, GoPark would also reduce traffic in this area as it would give incoming (from Central to TST) drivers a parking space that is closer to TST and MTR therefore reducing their driving time as well.

GoPark would also be able to decrease the number of drivers in the first place as it would allow users to re-consider using the MTR instead of their car if the aviability of parking spaces is low.

Market Analysis

Hong Kong's urban population has been experiencing rapid growth, resulting in increased vehicle ownership and demand for parking spaces.

Target Market & User Demographics

1. Individual vehicle owners - Individuals who own private cars and motorcycles and face daily challenges in finding parking spaces.
2. Commercial vehicle owners - Owners of taxis, delivery trucks, and company-owned vehicles that require parking spaces during operational hours.
3. Parking facility operators - Companies and organizations that manage parking lots, garages, and on-street parking spaces.
4. Government authorities - Local government authorities aim to reduce traffic congestion, emissions, and overall parking issues within the city.

The user demographics for the IoT parking solution primarily consist of middle and upper-class working-age adults (25-60 years old) who own vehicles and frequently commute within Hong Kong using cars instead of public transport. This solution is especially important for those living in more remote areas that don't have broad MTR coverage such as in new territories, south HK Island, Sai Kung, and Lantau Island.

Market Trends Specific to our solution

1. Increase in smart city initiatives - As Hong Kong works to become a smart city, more and more attention is being paid to leveraging the Internet of Things and other digital technologies to enhance urban living conditions, including parking and transit.
   ➔ Under the Hong Kong smart city government blueprint (2.0), our solution would be promoted under the smart mobility [https://www.smartcity.gov.hk/mobility.html] plan and under the smart environment [https://www.smartcity.gov.hk/environment.html] plan. Thus, promotion, and aid from entities such as the government is highly expected.

➔ Our solution targets initiatives 3, 4, and 5 from the smart mobility plan. Initiatives 4 and are labeled as 'New Initiatives' and thus get increased aid from the HK government.
➔ All of these smart initiatives are still 'Ongoing'.
➔ Work done by the public sector includes the installation of over 10,700 parking meters which could be directly integrated with our smart solution.

2. Growing demand for sustainability - The city's dedication to environmental sustainability has sparked an increase in interest in programs that can assist cut down on energy use, traffic, and car emissions.
    ➔ Under the smart environment smart city blueprint initiative, the HK government is directly promoting decarbonization efforts under the Climate Action Plan 2050 scheme.
    ➔ Initiative 4 focuses on promoting energy efficiency, especially within buildings which is directly related to our energy saving parking solution within the Greek Deck.
    ➔ Another important initiative outlined is to 'optimize the use of city resources' showcasing the importance of solutions like GoPark since land is one of the most limited resources in Hong Kong.

3. Increasing acceptance of cashless payment systems - Due to Hong Kong's extensive adoption of cashless payment systems, it is now simpler for customers to pay for parking services using mobile applications or digital wallets.
    ➔ According to research done by the Hong Kong government, 95% of residents use Octopus and other cashless systems for travel and other services.
    ➔ Hong Kong is extremely car-dense with 373 *licensed* vehicles per kilometer of road on average. Our solution aims to decrease this number by decreasing total commute time by allowing users to get to their parking slot directly and effortlessly.

Other market trends are also in favor of the development of our solution including:

➔ The Hong Kong government setting a target to cut carbon emissions by 50% by the year 2025.
➔ The size of the smart city market set to reach HKD60,000,000,000 with transportation being named as a key area of development.
➔ In the transportation sector, there has been growing interest in smart transportation solutions such as intelligent traffic management systems, and real-time parking availability systems.
➔ Hong Kong has an incredibly low ratio of parking space to vehicles of just 1.05, with a trend going downwards.

The Hong Kong government has been actively promoting the development of these technologies and has launched several pilot projects in recent years to help promote solutions such as GoPark.

Competitive Landscape

1. Parkxper: A US-based business that provides smartphone apps for drivers as well as parking advice systems, license plate recognition, and other smart parking solutions.
    ➔ Strengths: An established client base and industry knowledge
    ➔ Weaknesses: Lack of interaction with other smart city technologies, limited local presence, copied innovation.

2. Nedap Identification Systems: A business located in the Netherlands that provides parking management and vehicle identification solutions, such as long-range RFID and license plate recognition systems.
    ➔ Strengths: Advanced technology, a global presence, and expertise in carrying out significant projects.
    ➔ Weaknesses: Limited local presence and the need for integration with other IoT solutions.

Market Growth Opportunities

1. Integration with other smart city initiatives - Working with other smart city initiatives, such as the parking meter program offered by the Hong Kong government and the plan by the transport department to offer real-time parking vacancy information in both the private and public sectors, will enable us to offer a more complete solution that is robust and evolving [https://www.smartcity.gov.hk/mobility.html#8&2].
2. Stressing sustainability - GoPark can stand out in the market by providing ecologically friendly features like automatic energy saving in parking spots, which will also attract additional support and investment from the public and private sectors.
3. Tapping unexplored markets - There are no established large or medium-sized companies in the Hong Kong market. absence of any significant worldwide monopolies or conglomerates in the market.

Revenue Model

There are four key factors that can be contributed to our revenue model.

1. Advertising - As the first step, we are planning to run advertisements from Google AdMob. Also, we are planning to partner with local businesses such as nearby restaurants, shopping malls, theaters or cinemas so they can use our app as an advertising platform.
2. Subscription Plans - Subscription Plans give access for customers to use additional benefits and features. These features and benefits include:
    ● Access to reserved parking slots
    ● Faster updates on available parking slots
    ● Offer discounts at partnering parking slots
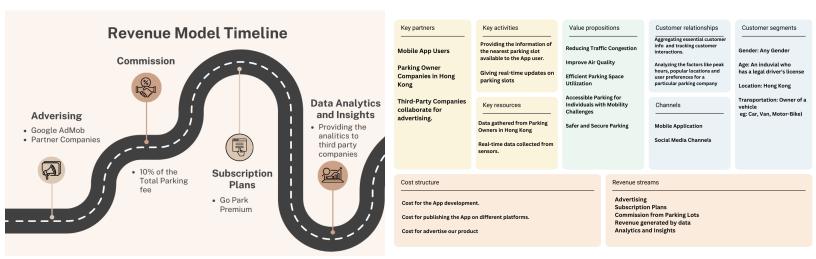   ● No interruption from advertisements

    Users can get a free trial period of 2 weeks and then monthly or an annual subscriptions to benefit from the advanced features.

3. Commission from Parking Lots - Since we are collaborating with parking lot owners, we are planning to charge them a commission for each booking made through the app. This commission will be 10% of the total parking fee that the user pays for a particular parking owner.

    To name a few Parking Owner Companies in Hong Kong:

    ● Wilson Parking (Hong Kong) Limited
    ● Sun Hung Kai Properties Limited
    ● The Link Management Limited
    ● New World First Parking Services Limited

- CP Park (Hong Kong) Limited
4. Data Analytics and Insights - Go Park has the ability to track down the analytics such as peak hours, popular locations and user preferences. We are planning to use these analytics to enhance city planning and transportation management. As a result these analytics can be used by transportation agencies, city planners and businesses and we can charge a fee for providing the data.

Business Model Canvas (See Appendix A for full-sized versions)

Impact Assessment

Go Park gives several benefits and outcomes for the community. However these positive impacts depend on factors such as user adoption, effective implementation and collaboration with existing parking infrastructure. Go Park's main objective is to reduce traffic congestion in urban areas which helps to save time and increase the convenience to search parking slots. We believe the implementation of Go Park will improve the quality life of users and give Hong Kong a sustainable, user friendly parking ecosystem. Below we will discuss key impacts and objectives of Go Park.

Reducing Traffic Congestion

Hong Kong is known for its dense population and heavy traffic. Go Park aims to help drivers quickly to locate the nearest available parking slot so that it reduces the time spent circling around the city for parking slots. Consequently, the city achieves a smoother traffic flow and lessens the number of vehicles on the road network.

Improve Air Quality

As mentioned, Go Park will reduce the traffic flow which will decrease vehicle emissions. By reducing the CO_2 emissions and improving air quality Go Park can help to reduce the air pollution in Hong Kong.

Efficient Parking Space Utilization

Since Hong Kong has limited land availability, Go Park can help to maximize the utilization of existing parking facilities by guiding users to available parking slots reducing the need for constructing new parking spaces. As a result, it preserves the green spaces in Hong Kong.

Accessible Parking for Individuals with Mobility Challenges

Go Park can provide information for people who have mobility challengers and disabilities, and prioritize their needs. This helps to promote inclusivity and support the social groups with particular mobility needs.
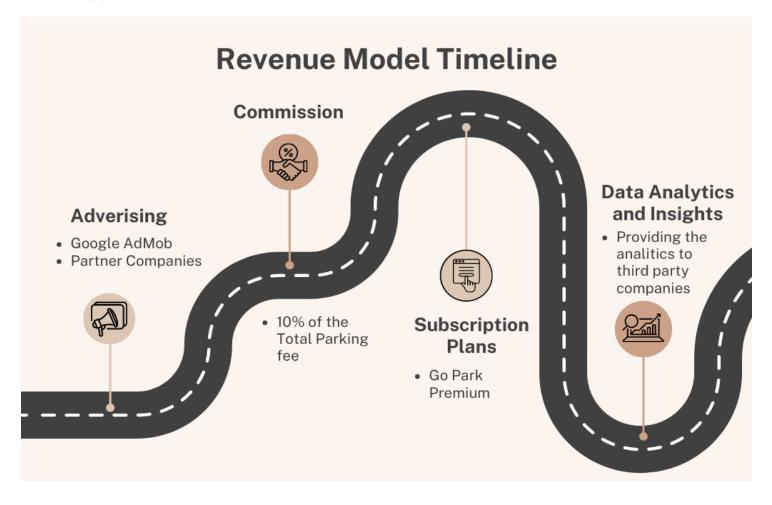
Safer and Secure Parking

The App can provide information to the user about the security of parking slots so customers can make decisions based on their personal safety. As a country where security and safety is highly important, Hong Kong can get the maximum benefit from this feature.

REFERENCES
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Appendix A

Revenue Model Timeline

Commission

Adverising
- Google AdMob
- Partner Companies

- 10% of the Total Parking fee

Subscription Plans
- Go Park Premium

Data Analytics and Insights
- Providing the analitics to third party companies

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Key partners

Mobile App Users

Parking Owner Companies in Hong Kong

Third-Party Companies collaborate for advertising.

Key activities

Providing the information of the nearest parking slot available to the App user.

Giving real-time updates on parking slots

Key resources

Data gathered from Parking Owners in Hong Kong

Real-time data collected from sensors.

Value propositions

Reducing Traffic Congestion

Improve Air Quality

Efficient Parking Space Utilization

Accessible Parking for Individuals with Mobility Challenges

Safer and Secure Parking

Customer relationships

Aggregating essential customer info and tracking customer interactions.

Analyzing the factors like peak hours, popular locations and user preferences for a particular parking company

Channels

Mobile Application

Social Media Channels

Customer segments

Gender: Any Gender

Age: An induvial who has a legal driver's license

Location: Hong Kong

**Transportation: Owner of a vehicle
eg: Car, Van, Motor-Bike)**

Cost structure

Cost for the App development.

Cost for publishing the App on different platforms.

Cost for advertise our product

Revenue streams

**Advertising
Subscription Plans
Commission from Parking Lots
Revenue generated by data
Analytics and Insights**