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# Main Project Proposal:

Parking Assistant Complex Using IoT

## Motivation

Current parking management designs are very outdated and inefficient. Although a lot of cars already have automated parking, people must first find an open parking spot first before the car can start the automated parking, which could end up taking a lot of time. Even if a car can look for a parking spot automatically, due to traffic, the car may take a long time to find a parking spot and potentially waste a lot of gas or electricity. As such, we propose a parking assistant complex which will result in saving a great amount of time and space. Firstly, the cars can be more tightly parked which will allow malls to receive more customers and thus help stores increase their business. Secondly, as can be seen from Figure 1 in the Appendix, the U.S. on average spends 17 hours a year looking for parking space, while in more urban cities, people on average spend as much as 107 hours a year searching for parking spots [1]. A system that can monitor the closest open parking spot can save a significant amount of time, resulting in more foot traffic and customers for businesses.

## Technical description of the product/service

This project is mainly to present an API and system/standard for parking assistant systems and complexes. The parking complex will be split into two sections; The lower section, which is designated for non-automated vehicles, aims to save as much time as possible for visitors, whilst the upper section will be designated for automated vehicles and saves more space.
The main components of the system revolve around the actual parking complex, and the vehicle. The vehicle will need an API that will allow it to communicate with the parking complex Internet of Things (IoT) to find and navigate to the closest free parking space and be able to park automatically. The car will also need to be able to detect lines on the ground that will be drawn throughout the parking complex to map the routes in the complex and parking spaces. As can be seen from Figure 2, the red line represents the route used to navigate through the complex itself, while the green line is used to help the car navigate into the parking spot. The car will also need to have Lidar sensors to prevent car accidents. The parking complex will need an IR sensor on each parking spot to detect whether a vehicle is parked there or not. Users may also need an application on their phone to locate or retrieve their vehicle from the parking complex.

## Why would it succeed?

As mentioned previously, people spend a lot of their precious time looking for a parking space instead of spending their time shopping and promoting businesses. It is often said that time is money, in New York City, “report estimates as much as $2,243 in wasted time, fuel, and emissions per driver, plus $4.3 billion in costs to the Big Apple” [1]. Our system would thus save not only a significant amount of time, but a significant amount of money. Additionally, following technological advancements, management of parking space also needs to be reimagined. By adding parking complexes to the IoT family of services, peoples’ quality of life will greatly increase. Data and statistics will allow the process of finding a parking space more streamlined and efficient. Due to all of the financial, business, and social benefits, this product is guaranteed to be a success.

## Appendix

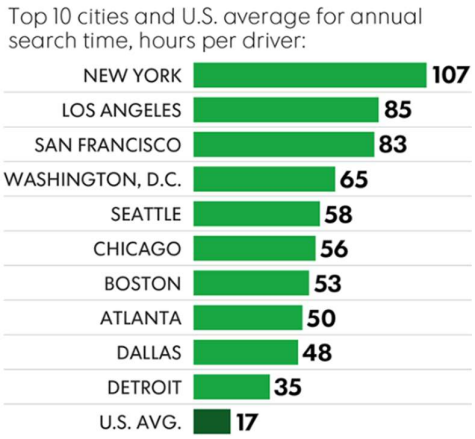


*Figure 1: Top 10 cities and U.S. average for annual search time in hours per driver [1]*

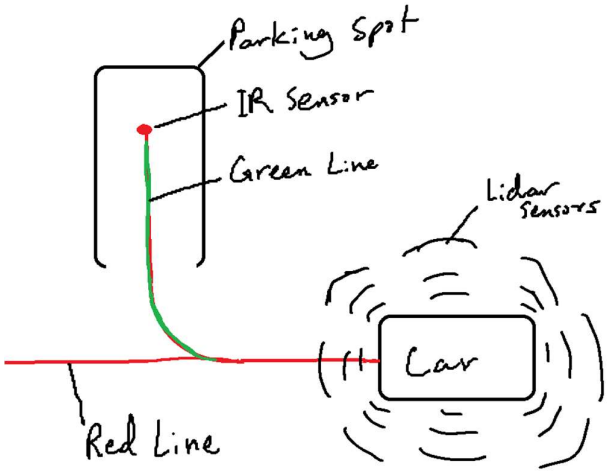


*Figure 2: Primitive Diagram of Parking System*