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The Connected Conversation

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Smart Parking Makes Cities Friendlier & Richer

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Did you know that, on average, 30% of traffic congestion downtown can be attributed to drivers looking for parking? In fact, US motorists drive an excess of 950,000 extra miles per 15-block area and waste 47,000 gallons of gas every year to find the best spot. That translates to 730 tons of carbon dioxide greenhouse gases being released into the atmosphere. Reducing traffic congestion wouldn't just be good for the environment, it would also promote better partnerships between cities, citizens, local businesses, and law enforcement officers responsible for managing traffic. If traffic were smoother and parking easier to find, more people would visit downtown areas and support local downtown businesses.

For decades, city planners thought creating more parking was the best strategy to reduce cruising and idling. In fact, it is estimated that more than 25% of vehicles driving round cities are simply looking for a parking space. It's hard to argue with their logic- increasing supply should decrease demand- but the problem proved to be a bit more complicated. Simply increasing the parking supply fails to address one of the root causes behind drivers' cruising for parking.

Part of the reason drivers spend so much time cruising, is that they're competing to get the cheapest spots in the busiest areas. Finding a good parking spot is about negotiating price and proximity to your destination, and curb-side parking is usually the cheapest parking you can find downtown.

Pricing models could cure congestion

For years, cities have underpriced curbside parking and unwittingly created traffic congestion stemming from drivers' cruising and over-competing for these cheaper spots. Although a few drivers are able to save a few dollars in the short run, on the whole, cities and motorists end up paying big for it in the long run. Not only does cruising for parking waste time and gas, but it also leaves drivers feeling frustrated and leads to higher incidences of crime, from illegal parking (at best) to road rage-induced violence (at worst).

When the most desirable parking locations are also the cheapest, competition can get pretty stiff. A demand-based pricing model (aka "directional pricing") would remove the illusion of "lottery" parking spaces, while still allowing drivers to make the choices that best suit them.

Reducing downtown traffic could be approached in two ways. The first would be to give drivers a picture in advance of the parking landscape. Eliminate their search for parking by empowering them to

plan beforehand where they want to park. Google Maps already does this by providing motorists with RT traffic data and the likelihood of parking in these areas. The second would be to use directional pricing.

> *"In one year, drivers looking for parking drive an excess of 950,000 extra miles per 15-block area"*

Directional pricing decreases traffic congestion by disincentivizing drivers away from crowded areas and offering them lower rates in less crowded areas. So, if a downtown parking lot were too crowded and another nearby nearly deserted, then directional pricing would be used to lure drivers away from busier, more expensive lots (thereby reducing traffic) and towards emptier, cheaper ones.

That way, drivers whose time held more monetary value than the savings gained from cheaper parking would be at a loss if they didn't pay more parking, and vice versa, the savings other drivers gained from paying less for parking, would make up for the monetary value of the time lost in walking to their destination.

Introducing Smart Parking

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Los Angeles implemented its smart parking solution, LA Express Park, in 2012. LA Express Park operates in Realtime (RT) with wireless sensors positioned in 6,300 public parking spaces. The data gathered by these sensors is fed into an algorithm-based supply-and-demand pricing model, which in turn regulates parking prices and informs drivers in RT about available parking spaces and pricing.

In 2010 San Francisco launched a pilot run of its current smart parking solution, SF park. Deployed in 7,000 of San Francisco's 28,000 metered spaces and 12,250 spaces in 15 of its 20 city-owned parking garages, SF park was evaluated for four years before the San Francisco Municipal Transportation (SFMTA) delivered a verdict on its performance. The SFMTA reported that SF park had been highly effective and had achieved: lower average parking rates; improved parking availability; greater driver ease in finding parking and in avoiding or paying for parking citations; decreased greenhouse gas emissions; and an overall reduction in vehicle miles traveled.

LA Express Park and SF park are just two examples – there are many more that have

emerged in recent years: Cisco's Smart+Connected Parking smart parking solution, Smart Park (employed in the UK), Pango (which has found its footing in cities around the world), and the list goes on. Each is unique, yet specifically designed to meet the needs of its respective municipality.

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It's enough to make one ask, what makes a smart parking solution smart? There are seven core components that characterize smart parking solutions: purpose, connected-ness, strategy, data analytics, payment options, law enforcement, and maintenance).

Component #1: Purpose

Smart parking solutions first and foremost exist to reduce traffic caused by drivers looking for parking. With the goal of keeping downtown traffic flowing, San Francisco city planners wanted to ensure that on-street parking was never more than 85% occupied at any given time. This goal was derived from a study done by Donald Shoup, professor of urban planning at UCLA. In this study, Shoup demonstrated that capping on-street parking at 85% occupancy could effectively reduce traffic congestion and trigger a "cascade of positive effects" for city-wide transportation, the environment, and the economy.

Component #2: Connected-ness

IoT technology and sensors are fundamental to smart parking. They are used to either provide precise estimates of a block's average occupancy or to indicate exactly how many and which parking spaces are available in a lot.

Component #3: Strategy

A smart parking strategy relieves drivers from having to search for parking spaces by either guiding them to available spots or to more promising lots. Both approaches benefit drivers by informing them in RT which blocks have parking that suit both their proximity and pricing needs. Some go a step further by incorporating directional pricing into their solution in order to further manage and reduce downtown traffic congestion.

Component #4: Data Analytics

Owing to the massive amount of data incidentally accrued from using sensors, administrators can perform data analytics and glean valuable insight which city officials can use when forming

long-term plans and/or implementing directional pricing as a part of their smart parking solution. Using data analytics, cities can plan for variable peaks and valleys in traffic congestion. With better data analytics and information about parking space/lot usage, cities can also make better decisions when forming long-term construction plans. Cisco's Smart+Connected Parking provides visibility into parking analytics, including usage and vacancy periods.

Beyond the already-discussed benefits that directional pricing is capable of delivering, directional pricing may also be used to boost city revenues. Parking analytics would yield useful information about trends in parking occupancy, revenue, enforcement reports, and parking space usage on time of day or day of week to assist in pricing decisions.

The Los Angeles Department of Transportation uses info provided by inground vehicle detection sensors, along with rate, time limit, vehicle detection, sensors, and operating hour information from smart parking meters to analyze demand for parking and adjust rates as appropriate. Aside from maximizing revenue, directional pricing could very well effect a behavioral change in drivers by incentivizing ridesharing and carpooling-practices which also cut down on carbon dioxide emissions.

Component #5: Payment Options

Smart parking solutions offer various methods of payment. Some smart parking solutions offer the option of online prebooking and payment. Still others also allow users to remotely extend their meter time if necessary.

Component # 6: Law Enforcement.

Smart parking enables law enforcement to more effectively detect and issue tickets to drivers who violate parking regulations. By keeping such close tabs on which parking spaces are occupied and for how long, smart parking solutions could dispel much of the ambiguity that often surrounds parking violations. Law enforcement would only need to access photo/video and or other types of sensor-gleaned evidence to clearly demonstrate whether or not a driver has committed a parking violation. Smart parking systems, in fact, could be used to detect and report parking violations to officers, ensuring a higher capture rate. Cities would benefit from greater revenue through improved capture rates and tickets issued for parking violations.

Using sensors integrated with meters, Cisco's Smart+Connected smart parking system would enable law enforcement to

more easily detect and report payment, overstay, no-parking zone, and loading zone violations. It would also show officers the optimum routes they can take to most effectively fulfill their duties. Cisco uses sensor-integrated meters and IP cameras to provide officers with clear-cut video evidence of parking violations, eliminating any possibility of dispute. Other cities have begun using Cisco's Smart+Connected Smart Parking system. Smart+Connected parking has a foundational Wi-Fi infrastructure with IP cameras, sensors, and smartphone apps. It also integrates with law enforcement—warning traffic officers when drivers' have either violated parking restrictions or about to violate parking restrictions.

Component # 7: Maintenance

Smart parking solutions regularly report equipment (i.e. sensor) maintenance status or "health" when need be, so that administrators will know when to have preventative or reactive maintenance done. In terms of parking administration, smart parking would allow users/admins to view maps of parking occupancy, notifications, policies, and equipment maintenance status. It allows for the configuration and management of sensors, advanced nodes, and grouping of sensors, and it also informs policy management for all parking spots and events.

Final Thoughts

It takes time for new systems like smart parking to gain acceptance and begin creating behavioral change. Studies have shown that in order for smart parking systems to effect change, they must create substantial price differences between crowded and less crowded parking areas. A recent study conducted by Access magazine evaluated the changes SF park effected in San Francisco. The study demonstrated that cruising was only really a problem when it came to non-metered parking areas. They also found that small changes in pricing didn't have much im- pact on driver behavior. An effect only became noticeable on occupancy and cruising after individual meter rate changes combined to form much larger price change differences among blocks that are close to each other.

Smart parking solutions have to fit the needs of their cities. Few cities would be able to set up the same expansive and expensive sensor network of in-street sensors that San Francisco did. So, much like the drivers in this narrative, cities have to find the solutions which best fit them. Considering just how many smart parking solutions are beginning to emerge, prospects look hopeful that there is, indeed, a match for everyone.

We would love to hear what you think. Contact us at info@jbrehm.com

Come see us in 2022 at:

AOTMP Engage 2022: April 24-27 in Orlando, Fl
IoT Evolution Expo: June 21-24 in Ft Lauderdale, FL
LoRaWAN ® World Expo: July 6-7, 2022, in Paris France

Contact us at info@jbrehm.com to get time on the schedule.