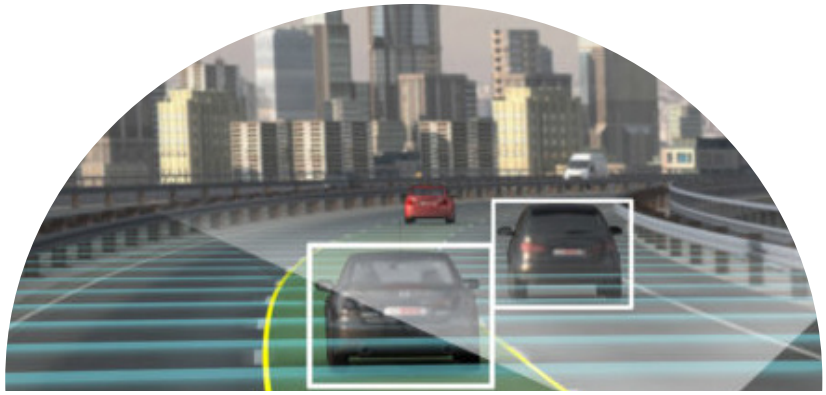


IT CONNECTIVITY IN THE AGE OF AVs

An overview created by Walker Parking Consultants

Image Source http://www.cbronline.com/news/internet-of-things/autonomous-cars-connectivity-will-fuel-future-auto-industry/

SUMMARY

The emergence of autonomous vehicles (AVs) has accelerated recently and expectations and investments in this technology are increasing. Media reports abound and it is difficult to know what to expect in terms of how and when these changes might impact infrastructure.

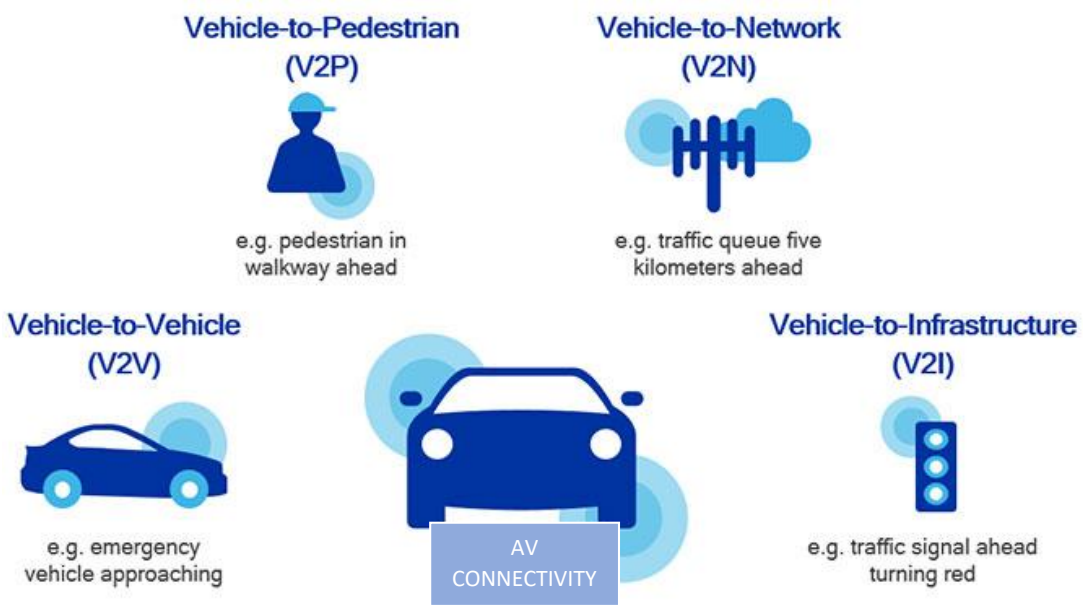
Fully autonomous vehicles are being tested today and most industry experts believe these vehicles may be introduced to consumers in the next three to five years. There are several ways that AVs could impact parking planning, design, and construction, including accommodations for IT connectivity in parking structures. Such accommodations would need to account for AV communication with each other, the road infrastructure, and with parking structures.

5G NETWORK CABAILITY

AVs may ultimately rely upon communication network capabilities for vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I) and vehicle-to-everything (V2X) communications. V2X may be necessary for AVs to learn the location of other vehicles as well as the location of physical infrastructure in order to avoid accidents and operate safely. Therefore, the network capabilities needed to accommodate these systems will potentially have to improve.

5G has not yet been defined, but it could be 100 times faster than current 4G speeds, handling 10gb/s, compared to 4G's 100mb/s. The infrastructure needed to support 5G may need to be intensive.

There is no estimate yet on when to expect widespread, mobile 5G service. This will be an important timeline to watch because for AVs to become widespread, 5G service may need to be ubiquitous and reliable.



Source: Qualcomm, https://www.qualcomm.com/news/onq/2016/06/07/path-5g-paving-road-tomorrows-autonomous-vehicles

INFRASTRUCTURE READINES

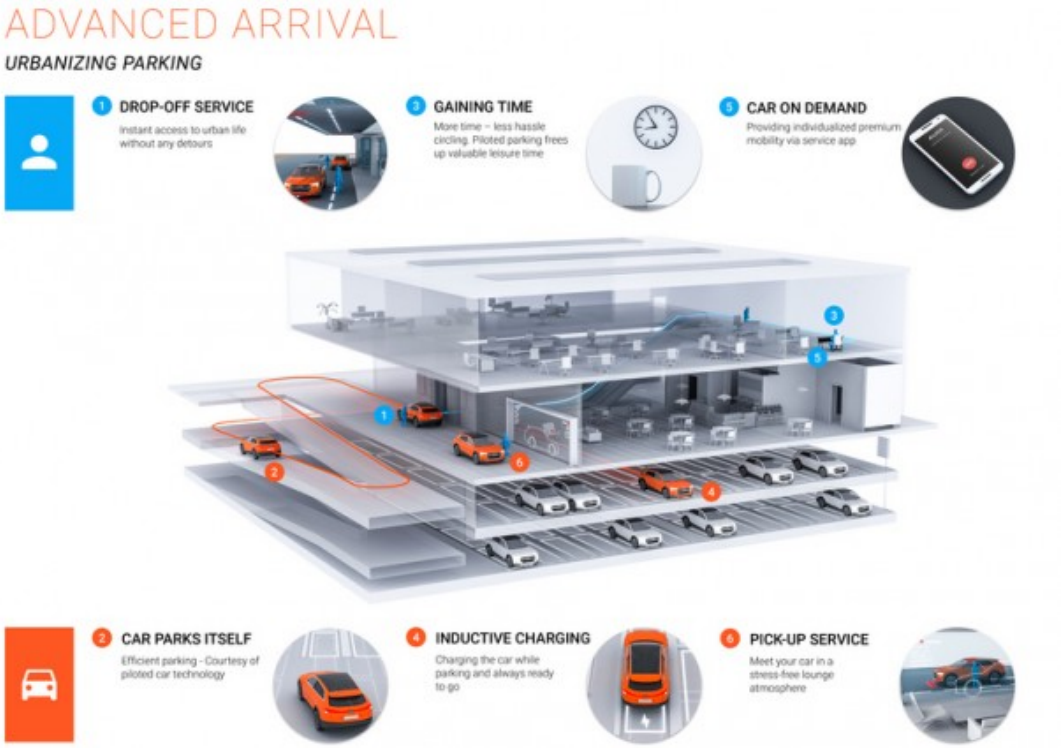
Even more intensive investments to public infrastructure would likely be needed to support vehicle-to-infrastructure (V2I) connectivity. V2I connectivity would help AVs navigate landscapes by connecting the vehicle to the surrounding infrastructure. For example, a stop light would transmit the status to the vehicle, or a chip in the road would alert the vehicle to come to a stop. This would especially allow the AVs to navigate in adverse conditions, a challenge AV companies are working to overcome. In this case, the vehicle would know when to stop without having to "see" a stop sign, which AVs cannot currently do when a sign is obstructed, or when it is raining. Likewise, even privately owned infrastructure such as parking garages may need to consider communications readiness.

IT GARAGE INTEGRATION

Once AVs are being developed with the technology to park themselves, parking designs may need to change, perhaps in support of a scenario described as follows:

- Vehicles arrive at a drop-off location, and the passenger initiates an automatic-park mode, and leaves the vehicle.
- The vehicle listens to transmissions from the garage, or solicits for nearby parking opportunities using either its vehicle-to-vehicle (V2V) network, or a cellular network.
- Selection of the parking space is determined by information that may include cost, subscriptions, ratings, distance, charging capability, charging cost, duration of stay, vehicle size, autonomous capabilities, and possibly more information.
- The parking location is then transmitted to the vehicle and the vehicle arrives to the space. It is possible the vehicle would need to charge at this time.
- Parking payment is automated. The vehicle owner's account is debited for the parking fee.
- The garage could include a barrier gate at the entry to prevent uninvited vehicles from entering, while using some kind of authentication for entry, like a sensor at the entrance connected to the V2V network.

In this scenario, parking is dynamic and optimized to maximize space utilization and speed of exit. It is also possible that no extra information technology infrastructure will be necessary in the self-parking scenario given AVs create V2V networks and may use GPS to navigate. However, parking structures, particularly underground structures, often block GPS signals and cellular network signals, and the vehicle operator may want to summon the vehicle using the cellular network. Therefore, it is possible that parking structures may need to adapt.



Source: Care and Driver, http://blog.caranddriver.com/parking-garages-poised-for-big-makeover-in-autonomous-age/

CONCLUSION

Ultimately it is not possible to know the exact effects that AVs and TNCs will have on parking planning and design, or when they will happen. However, given that structured parking projects have lifetimes of 50 years or longer, it is important for parking planning and design professionals to consider planning and flexibility as a priority.

ABOUT THE AUTHOR

Walker Consultants is the global leader in providing parking consulting and parking design services. Founded in 1965, we pioneered the field of parking consulting. Today the firm has over 300 employees delivering a wide range of parking planning, design, engineering, and restoration services.

The firm is based in the U.S. with 17 domestic offices and 1 in the United Arab Emirates, is ranked #240 in Engineering News Record's Top 500 Design Firms and #13 in Building Design + Construction's Giants 300 Engineering/Architecture Firms.

We serve a broad spectrum of markets including healthcare, education, government, aviation, residential, retail and commercial development, entertainment, hospitality and athletic venues. This diversity allows our staff the luxury of collaborating with a large cross section of client types and developing best practices for their specific development needs, helping them unlock the potential of their projects.

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