VEHICLE RECOGNITION TECHNOLOGY FOR AGE OLD PARKING ENFORCEMENT CHALLENGES

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Since the horse and buggy age, personal and commercial vehicle parking has preoccupied city planning, operations and enforcement. Politicians and city managers have argued, compromised and hashed out laws and bylaws guiding who can park, for how long, and where, using signage and other means for communicating rules to sometimes unruly citizens.

And, for the most part, the application of bylaws to control timed parking has remained unchanged for at least 70 years, namely parking enforcement officers (PEOs) equipped with a chalk stick to mark tires. Two hours later, typically, our dutiful PEO revisits their beat looking for telltale chalk on unmoved vehicles. Tickets are issued, disputes resolved and the PEO moves on.

But what exactly is the city trying to accomplish through time limited parking?

Typically cities, large and small, are trying to solve these challenges:

- Ensure substantial on-street parking is available
- Small business, a core constituency of city commerce, culture and taxes critically relies on street parking for customer convenience and patronage
- Fees collected from street parking provide supplementary revenue for city coffers (but often discourage customers from patronizing downtown merchants)
- Competition and conflict between stakeholders (for example shop owners versus home owners)
- Reserved parking for high demand enterprises such as hotels
- Traffic flow

Arriving at optimal solutions to these disparate and conflicting challenges is difficult.

For example, small businesses are particularly vulnerable to poor parking turnover, suffer greatly during recessionary times yet have a direct and profound impact on city viability. Vibrant main streets always have eclectic shops, excellent lighting, adequate security and readily available and abundant parking. Vibrant districts are easy to see. The streets and sidewalks are full of people! Typically, these businesses would prefer to see:

- No parking fees
- Regular vehicle turnover
- Soft treatment on first offenders but harsher treatment on scofflaws
- Spill over onto side streets (typically residential)
- Invisible enforcement (so as not to scare off other customers)

autoChalk mounted on Fredericksburg's Toyota Highlander Hybrid

Contrast these goals with many cities that do wish to see revenue from the streets or homeowners that do not want any commercial parking on their laneways. The city has to pick what is important and apply consistent rules and enforcement to achieve their goals.

Vehicle Recognition Technology in Fredericksburg

Take for example Fredericksburg, Virginia. An historic town, home to George Washington, locale to pivotal civil war battles, Fredericksburg is a delightful old city, very popular with tourists, and has eclectic shops and restaurants. But here, as elsewhere, parking is a problem. Parkers not moving, or cheating, limited resources for enforcement, only the downtown being patrolled – all of the classic challenges, but with a twist.

Fredericksburg downtown relies heavily on tourism and the (then) current method of enforcement (penalize all violators, chalk stick and paper tickets) alienated tourists to such an extent that they would angrily declare their intention to never come back in written submissions to the chief of police and the mayor! Clearly this was the tip of an iceberg since countless other visitors wouldn't even bother to write.

Fredericksburg decided on a different tack. They reviewed and set their priorities to accommodate commerce and visitors. These goals were:

- No on-street parking fees
- Regular turnover
- Soft treatment on first offenders but harsher treatment on local scofflaws
- Push all day parkers into new city run garages
- Employ technology to improve productivity of PEO staff

After reviewing various technologies, Fredericksburg approached Tannery Creek Systems to pilot and purchase autoChalk. This product uses digital cameras and lasers to perform vehicle recognition (shape, size and color) and combined with accurate GPS, automatically detects and notifies the PEO of unmoved vehicles. Pictorial evidence is presented to the PEO for violation assessment. AutoChalk is also capable of performing License Plate Recognition (LPR) for Scofflaw searches. Despite its sophisticated technology, autoChalk is very reliable in every day operation and in all temperatures and weather.

Fredericksburg also requested:

- escalating ticket fines starting from a warning, then increasing fine amounts
- mail out tickets with photographs and return payment form
- ability to discern where the car owner lives to potentially avoid mailing tickets to tourists and in-state visitors
- interface to the treasury computer system

Fredericksburg has realized tremendous benefits with the application of autoChalk and revamping their parking enforcement focus.

1. Since tourists typically receive cautions, the rate of complaints to the police chief and mayor has dropped to virtually zero. Benefits include increased tourism, shoppers and more favorable visiting experiences.
2. Mailed tickets with initial warnings have been favorably received, and parkers overwhelmingly follow bylaws. Mailed tickets typically include a map of where to park and the reason for the ticket.
3. Productivity has increased about three-fold. For example, a PEO using the old manual methods takes about five hours to patrol the entire city. An autoChalk equipped PEO takes 40 minutes. PEO's now have more time for enforcing other high priority activities (e.g. handicapped).
4. Parking space availability has improved by about 20%.
5. Overall revenue from tickets is up even though the initial ticket is a warning.
6. Cost of the system is half that of handheld ticket writers and additional staff.
7. Cheating is markedly decreased.
8. Vehicle photos facilitate quicker and more accurate appeal resolution.
9. Enforcement is possible in all weather.

Fredericksburg's implementation of the autoChalk system garnered the city an "Achievement Award for 2008" from the Virginia Municipal League. Chosen from dozens of entries, the award recognized the merits of both the autoChalk system and the process with which it was applied by the city.

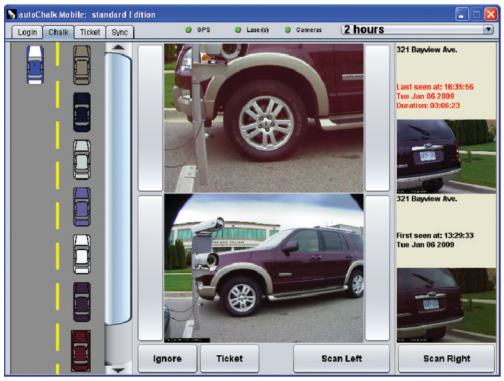

Figure 2: User Interface exclusively uses touch screen interaction. Enlargement and inspection of the photos is quick and easy.

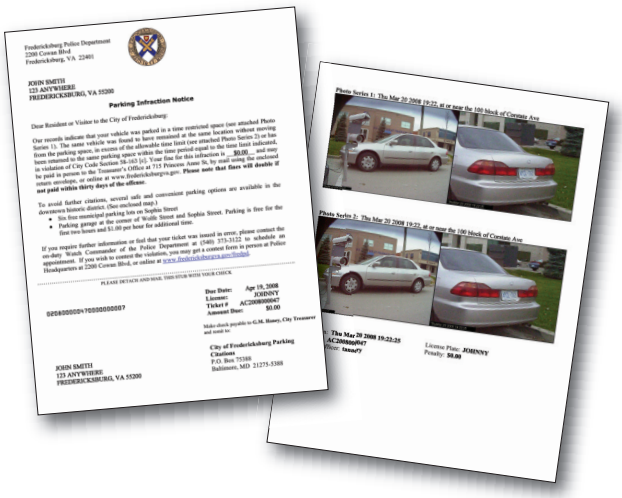

Figure 3: Example of a mail out ticket

Deploying tough easy-to-use vehicle recognition systems can make your city more vibrant, attractive to visit, and greener.

Lessons Learned

Deployment of autoChalk, although reasonably smooth has surfaced important lessons:

1. Escalating tickets can be a challenge. Although it's tempting to have lots of features, it's better to pick a simple model. Fredericksburg's sophisticated escalating ticket system works well, but it consumed considerable management and implementation effort due to disparate systems (new autoChalk, older financial computer system), confusion over escalation rules and applicable fees when voiding tickets. However, escalating fees increased ticket revenue and recurring abuse (scofflaw) dwindled.
2. Interfacing to the Department of Motor Vehicles in real time proved difficult, requiring alternate and slower methods for locating car owners.
3. Surprisingly, overall ticket revenue is up even though the first issued ticket is a warning. Extra revenue is due in part to productivity gains, escalating tickets, decreased parker cheating and extra time available for other enforcement activities.
4. Productivity gains are significant. Since chalking activities take a smaller proportion of the day, the PEO has more time to perform other activities such as handicap, permits and commuter lots enhancing enforcement and contributing considerable ticket revenue.

Future Uses of Vehicle Recognition

Vehicle recognition technology has potential for shaping and solving other parking challenges. For example, autoChalk has the ability to accurately measure vehicle size to typically one inch (3 cm). Cities can use this functionality to increase street parking at little or no cost and to fulfill green initiatives. In Calgary (population of one million), vehicle owners receive a 25% discount off parking rates downtown when they use small vehicles (under a certain length). Typically up to 10% more small vehicles can be parked when compared to the average.

Figure 4: autoChalk Enforcement in action in Calgary (photo courtesy *Calgary Parking Authority*)

A second benefit of vehicle recognition technology is quick and accurate parking studies. Often the studies can be turned around in one week starting from gathering of data to the final report. For example a city using vehicle recognition technology surveyed a popular eating and entertainment district suspecting that two hour limits were being widely ignored. In fact, the survey (completed within two weeks) showed that only a small percentage of parkers were staying past two hours and virtually none past three hours. This factual evidence leads to better policy decisions.

A third benefit is more nuanced parking management. It is self evident that whacking people with tickets increases annoyance and diminishes visitor shopping experience. With mail out tickets, tourists and out of town visitors are gently reminded to park appropriately while hard core abusers get legitimately fined.

Cell phone parking is a fourth benefit. Cell phone parking replaces pay and display machines and meters. Typical improvements in overall parking management productivity are significant with enforcement productivity in particular increasing by about four times.

Summary

Age old methods of chalk and walking still do the job. But deploying vehicle recognition technology can radically improve PEO productivity, improve parking utilization, decrease cheating, and provide all weather operation. Parker acceptance can be greatly improved by using warnings and other material with mail out tickets.

Deploying tough easy-to-use vehicle recognition systems can make your city more vibrant, attractive to visit, and greener. As Fredericksburg has found, even historic cities take kindly to judicious application of appropriate technology. ■

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