

# A Remarkable Day

By Paul Wessel

**H**ANGING OUT WITH THE CHICKENS at my Airbnb in upstate New York and reflecting upon my day at Cornell University, I had an epiphany: I had just seen the future of mobility emerging before my eyes!

## Let me explain.

I was invited to talk about sustainable mobility and Parksmart by Cornell's Center for Transportation, Environment, and Community Health, otherwise known as CTECH. Specifically, I was joining Cornell's parking and transportation wizards Bridgette Brady, CAPP, and Reed Huegerich, to speak at CURIE Academy, a summer residential program for high school girls who excel in math and science.

It's always good to get a sense of your audience, so Bridgette, Reed, and I arrived during the morning session.

I walked into a classroom of 50 young women from across the U.S. discussing "systems engineering and systems

design thinking for urban mobility" with Cornell engineering professor Samitha Samaranyake, who did his PhD work on "efficient algorithms for stochastic route planning and dynamic network flow allocation." Though it took me a few minutes to grasp it, they were talking about Uber, Lyft, and taxis; mathematical modeling and optimization; and information technologies. I was clearly not in Kansas anymore.

It quickly dawned on me that these were the kids I'm going to be working for in 10 years when they've got their PhDs. If, as Parksmart visionary John Schmid is apt to say, "no one is as smart as everyone," then standing in that room, my IQ went up 50 points.

Our job was to talk with these young women about how we turn academic theories, formulas, and data visualizations into something real. We shared what parking and transportation professionals do and how Parksmart ([parksmart.org/parksmart](http://parksmart.org/parksmart)) is a tool to inspire adoption of the technologies and approaches they were learning about.

We explained that while our generation didn't create a lot of the negative externalities of transportation—pollution and congestion among them—we certainly exacerbated the problem and, for better or worse, are leaving it to their generation to resolve.

We wrapped up by sharing heat maps and drone videos showing how Cornell uses GIS (graphic information system) to reduce vehicle accidents and single-occupant vehicle trips and then prepped them for a walking tour of a new green parking lot under construction.

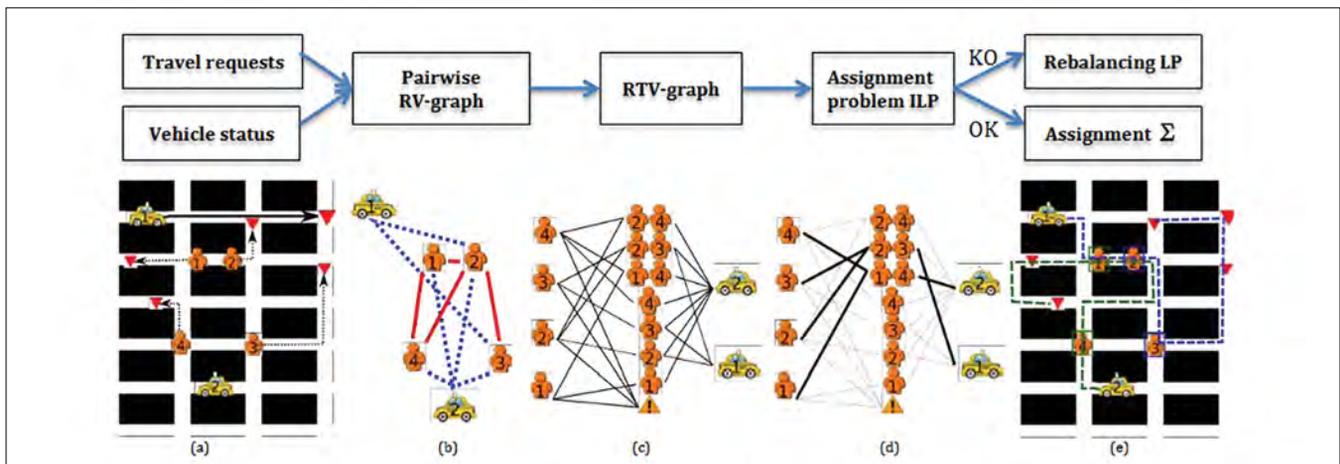


Fig. 1. Schematic overview of the proposed method for batch assignment of multiple requests to multiple vehicles of capacity  $\nu$ . The method consists of several steps leading to an integer linear optimization which provides an anytime optimal assignment. (a) Example of a street network with four requests (orange human = origin, red triangle = destination) and two vehicles (yellow car = origin, red triangle = destination of passenger). Vehicle 1 has one passenger and vehicle 2 is empty. (b) Pairwise shareability RV-graph of requests and vehicles. Cliques of this graph are potential trips. (c) RTV-graph of candidate trips and vehicles which can execute them. A node (yellow triangle) is added for requests that can not be satisfied. (d) Optimal assignment given by the solution of the ILP, where vehicle 1 serves requests 2 and 3 and vehicle 2 serves requests 1 and 4. (e) Planned route for the two vehicles and their assigned requests. In this case no rebalancing step is required since all requests and vehicles are assigned.

GRAPHIC FROM ON-DEMAND HIGH-CAPACITY RIDE-SHARING VIA DYNAMIC TRIP-VEHICLE ASSIGNMENT - SUPPLEMENTAL MATERIAL, BY JAVIER ALONSO-MORA, SAMITHA SAMARANAYAKE, ALEX WALLAR, EMILIO FRAZZOLI AND DANIELA RUS



CURIE Academy, a summer residential program at Cornell University for female high school students who excel at math and science.

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## A Green Lot

The Peterson lot, designed by landscape architecture students at Cornell, funded by the transportation department and grants, managed by a host of Cornell experts, and being constructed by the university's engineers, is a leading example of green surface parking design. It is expected to be certified by SITES, the LEED (Leadership in Energy and Environmental Design) and Parksmart sister program recognizing sustainable-landscaped site development.

After our walk past the intersection being reconstructed to reduce the pedestrian, bike, bus, and vehicle conflicts and past a series of bioswales built to reduce water pollution, we landed at the Peterson parking lot. Among other things, we learned about "structural soil," a Cornell-developed combination of stone and soil that is stable enough to support pavement but penetrable enough to allow for tree root growth.

The Peterson lot integrates and applies more than a decade of research by Cornell faculty and students into a teaching landscape, interpretation, and outreach tool for multiple college programs and campus green infrastructure. Using SITES, a robust monitoring plan, and a comparison to a nearby traditional lot, students and faculty will document the water quality improvements and quantity reduction achieved by their thoughtful surface parking design and construction.

## Takeaways

It was a full day, so I was happy that the increasingly frequent 90-degree weather broke, that my Airbnb hosts had some lawn chairs, and that the chickens were quiet in their pen. Reflecting back on the past seven hours, I was struck by how the combination of academics modeling transportation with arcane formulas, crackerjack-smart high school girls on the way to becoming our next

generation of problem solvers, parking and transportation leaders building tomorrow's infrastructure today, structural soil, backhoes, and French drains all wrapped up an Ivy-league land-grant university driven to do research that changes the world.

This was the essence of leadership: In secluded upstate New York, I was in the presence of people who Parksmart certified the first university parking structure, were on the path to SITES to certify the first university parking lot, were pushing my organization to reach beyond the parking structure to promote integrated parking and transportation systems, were doing seminal research and roll-your-sleeves-up development on the mobility infrastructure that might just save us, and were building the young minds that are going to have to pick up the mantle.

It was all there. And for an instant, I got to be part of it. 



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