

# ***ParkSIM:*** A Hybrid Agent-Based Simulation and Optimization Approach for Statewide Truck Parking Capacity Expansion

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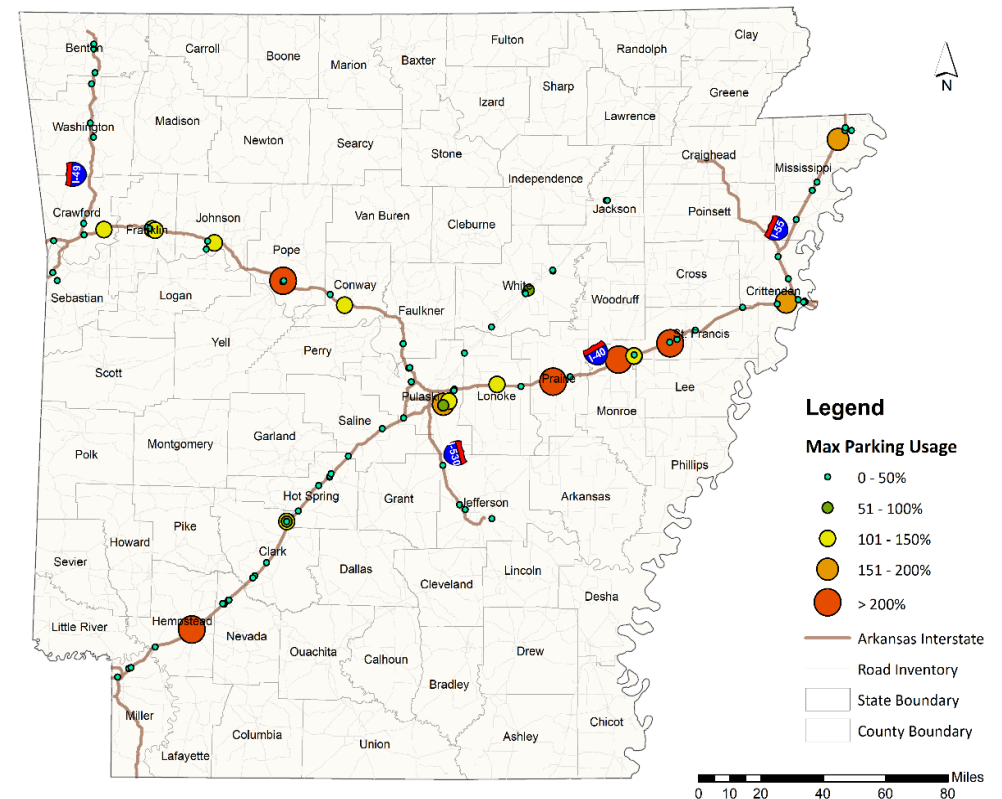
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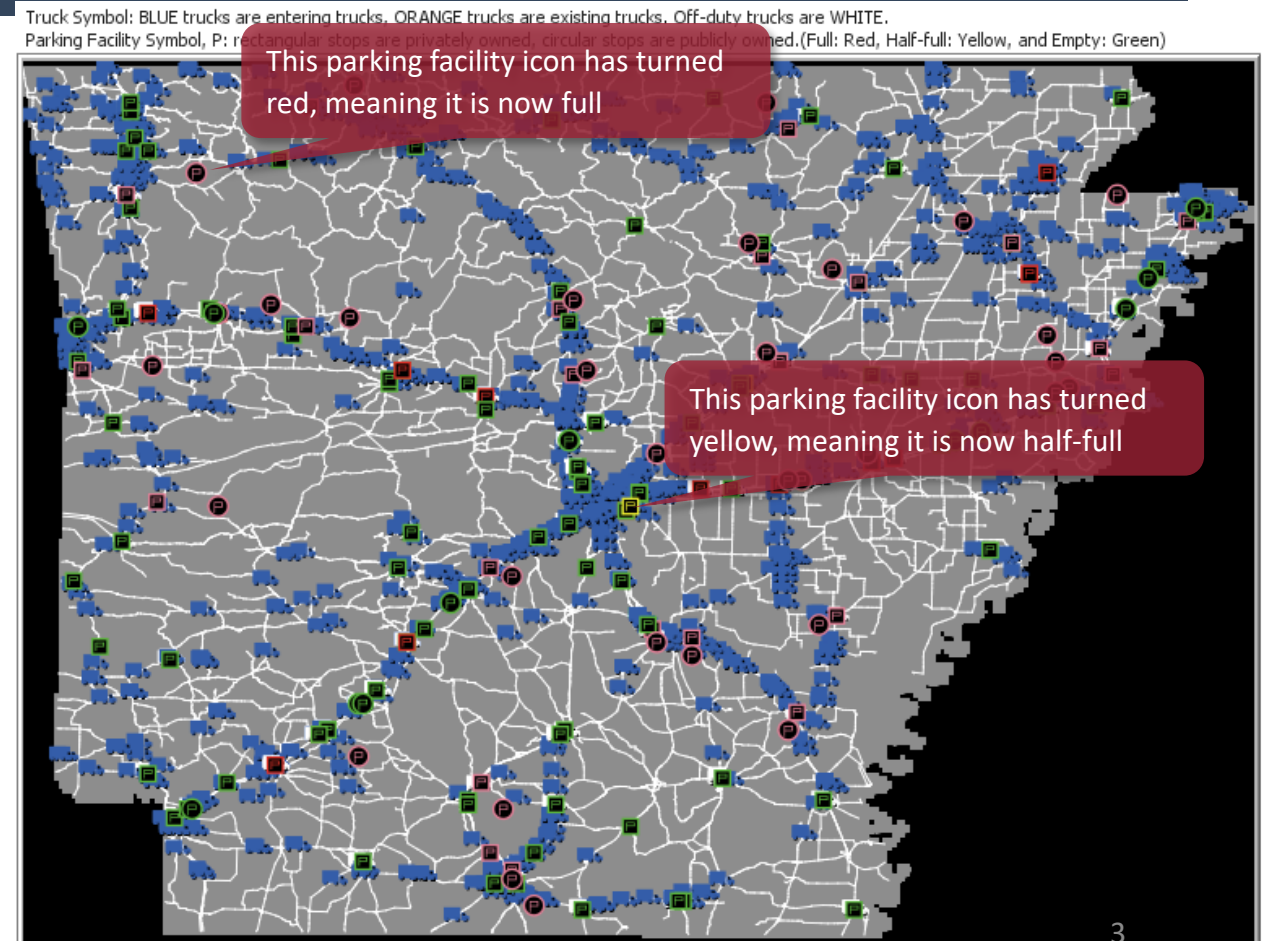
# Where should truck parking capacity be expanded to provide the most relief for overcrowding?

- **Should we only improve the most crowded facilities in a state?**
  - Does this **ignore** the spatial relation among parking demands for long-haul trips
  - How far can the **budget** go, do we consider only the most overcrowded facility?
  - Do we only consider **new** facilities or **expansion** of existing facilities?
- **How do Hours of Service (HOS) regulations impact the demand for truck parking?**
  - What if the daily or weekly **driving limits** are increased or reduced?
  - How can **emergencies** like the COVID-19 pandemic impact parking needs?
  - What if **team driving** practices become more or less popular?



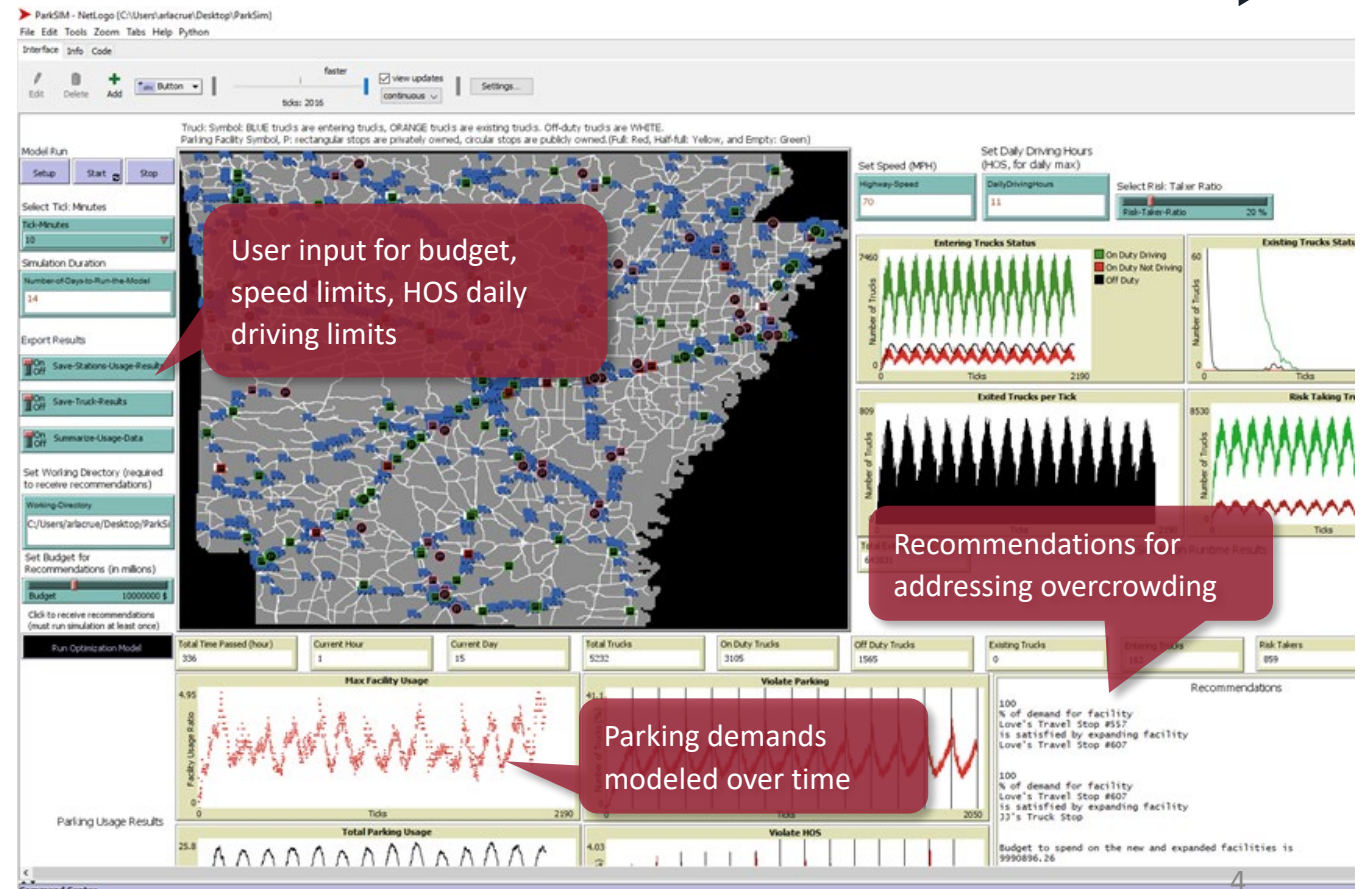
# ParkSIM- Simulation model of truck parking movements and driver behaviors

- Truck movements **by hour** are generated with unique **origins/destinations**, driving **histories**, tolerance for speeding/resting
- Drivers follow **HOS regulations** and rest when needed
- **Decision model** determines how best to allocate user-specified budget to meet parking overcrowding
- **Open-source** software package



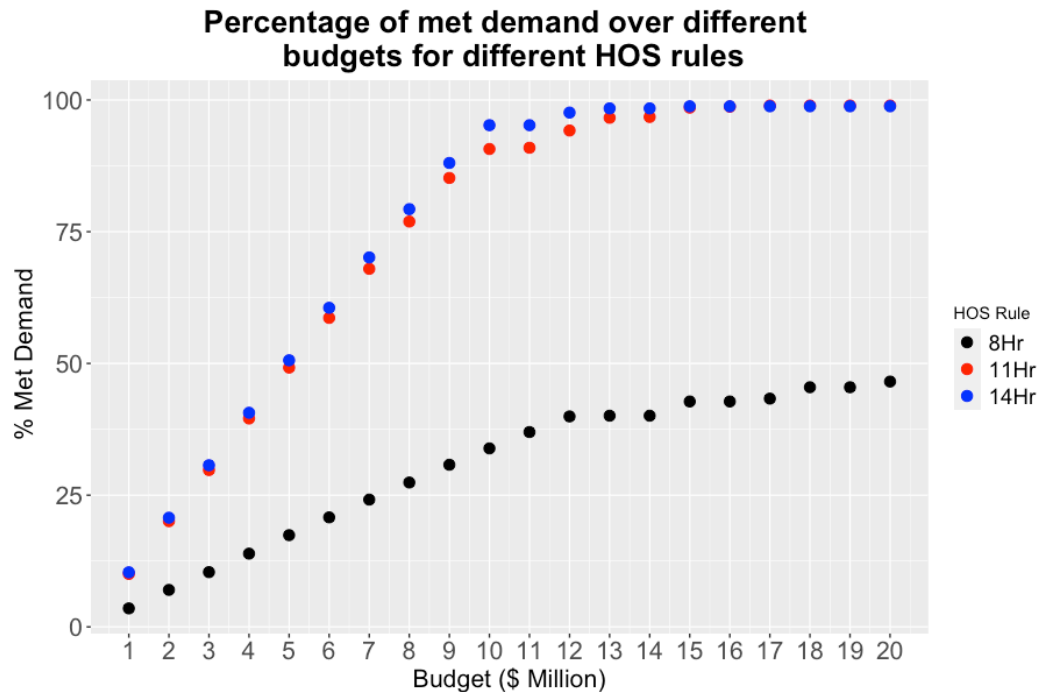
# Model recommends where and how many parking spaces to add

- User can specify
  - Budget
  - HOS daily driving limits
  - Driver preferences
    - Willingness to park on ramps
    - Willingness to go past daily HOS limit
- Calibrated and validated with truck GPS data



# ParkSIM was applied to the 168 existing and 42 new facilities in Arkansas

- Hours of Service
  - Relaxing the 11-hour HOS daily driving limit to 14 hours leads to a slight decrease in the number of drivers unable to find parking (1.5% or 29 drivers).
  - Restricting HOS from 11 hours to 8 hours significantly increases the percentage of parking demand (44.3%, or 205 drivers).
- Parking capacity
  - For budgets less than \$11 million **incremental capacity** (7-28 spaces each) at existing parking facilities.
  - A budget over \$11M allows for the addition of three **new facilities**.



Available Budget	Number of new facilities to be built	Number of existing facilities to add capacity	Number of added parking spaces	Average met demand (%)
\$1 M	0	5	26	9.4
\$2 M	0	7	52	18.7
\$3 M	0	9	77	27.7
\$4 M	0	12	102	36.7
\$5 M	0	16	127	45.7
\$6 M	0	20	152	54.7
\$7 M	0	22	176	63.3
\$8 M	0	27	198	70.9
\$9 M	0	26	221	79.5
\$10 M	0	31	244	86.7
\$11 M	0	35	268	88.1



*Thank you!*

*Contact me for more information.*

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