



## Takeaways

- ***Distance to the nearest ramp, AADT and number of through lanes*** play a critical role in the estimation of spatiotemporal impacts of traffic crashes.
- Random Forest model is associated with improved performance.

# Conclusion

- **Project #1 - West Central Alabama ACTION Initiative (USDOT ATCMTD Grant)**

- A framework to develop a Digital Twin to monitor network-wide traffic
- A method to reconstruct complete vehicle routes in network
- Implementation in SUMO for real-time traffic simulation
- Traffic signal optimization for connected vehicles
- Future work
  - Large network implementation of SUMO simulation
  - Network-wide signal optimization and implementation
  - Simulation capturing traffic events (e.g., congestion and road closure)
  - Vehicle route reconstruction accuracy & installation of sensors

**Data + Simulation + Machine Learning**  
*for Transportation Systems Management and Operations*

- **Project #2 - Proactive Traffic Incident Management (ALDOT RAC Award)**

- Machine learning models to predict crash risk based on probe data.
- Machine learning models to estimate the spatiotemporal impacts of traffic crashes.
- Future work
  - Model validation
  - Testing more models
  - Expand the investigation to entire arterial and interstate network, and all incidents (non-crash incidents)
  - Predictability of risk for different types of crashes or incidents

# Acknowledgements

- Authors would like to acknowledge agencies for funding the research.
  - USDOT's ATCMTD Program.  
([https://www.fhwa.dot.gov/pressroom/fhwa1906\\_alabama.cfm](https://www.fhwa.dot.gov/pressroom/fhwa1906_alabama.cfm))
  - ALDOT's Research Advisory Committee.  
(<https://www.dot.state.al.us/programs/ResearchProgram.html>)
- Authors would also like to thank:
  - [Department of Civil, Construction and Environmental Engineering \(CCEE\)](#)
  - [Center for Transportation Operations, Planning, and Safety \(CTOPS\)](#)
  - [Alabama Transportation Institute \(ATI\)](#)
- The following individuals made contributions to the research:
  - Dr. Weike Lu, Postdoctoral Researcher, ATI
  - Dr. Josh Bittle, Associate Professor, Mechanical Engineering
  - Mr. Maxwell Schrader, PhD Candidate, Mechanical Engineering
  - Ms. Naima Islam, PhD Candidate, Civil Engineering
  - Mr. Chenxuan Yang, PhD Candidate, Civil Engineering
  - Dr. Steven Jones, James R. Cudworth Professor of Civil Engineering, Dupty Director of ATI
  - Dr. Randy Smith, Associate Professor of Computer Science, Director of CTOPS



Thank you! 😊





# Thank You! Questions?

## Contact Information:

Jun Liu, [jliu@eng.ua.edu](mailto:jliu@eng.ua.edu)

Alex Hainen, [ahainen@eng.ua.edu](mailto:ahainen@eng.ua.edu)