

**Vision and Key  
Challenges**

# Winter AV Stochastic Simulation Platform

## Modeling Challenges

- (1) Simulating vehicle behaviors on slippery pavement
- (2) Predicting AVs' crash risks in winter seasons

## Cyberinfrastructure Challenges

- (1) Dealing with noisy data in engineering applications
- (2) Incorporating new data streams from users

### Vehicle Behaviors

- \* Physics regularized Gaussian process
- \* Microscopic vehicle behavior learning

**Thrust 1**

### Vehicle Dynamics

- \* Pavement condition prediction
- \* Vehicle crash probability prediction

**Thrust 2**

### Stochastic Simulation

- \* System Integration and data format standardization
- \* Incremental online learning with new data streams

**Thrust 3**

### Transition-to-Practice

- \* Validation of the stochastic simulation model
- \* Promote applicability, sustainability, and extensibility

**Thrust 4**