



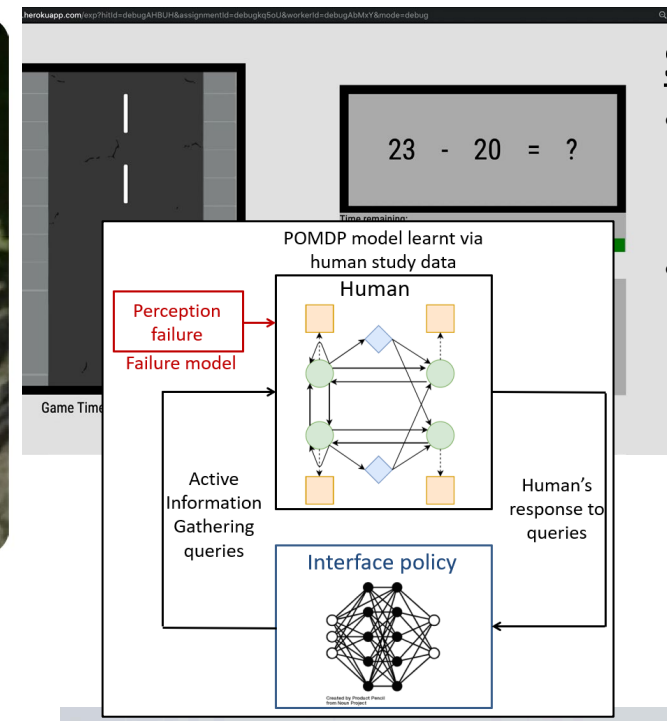
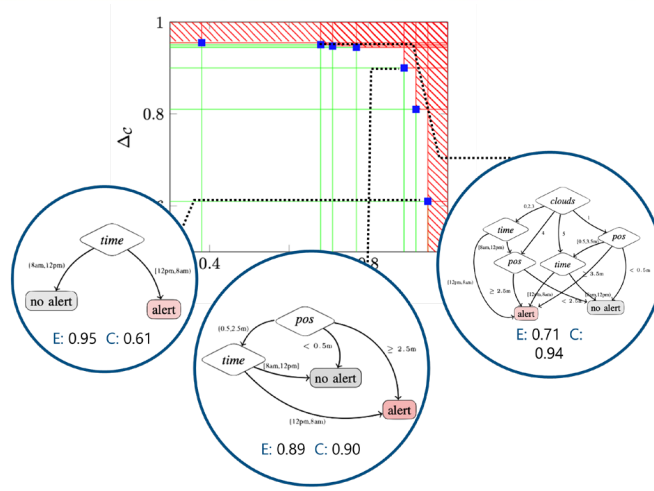
# VeHICaL: Verified Human Interfaces, Control, and Learning for Semi-Autonomous Systems

## Challenge:

- Co-design human interfaces and control for human-cyber-physical systems with *provable guarantees*
- Apply to semi-autonomous vehicles (ground and air)

## Solution:

- Integrate Human Modeling, Machine Learning, Formal Methods and Control
- *Perception Hand-Off*: Involving humans in perceptual tasks for autonomous driving via active information gathering queries and POMDP model
- *Operational Design Domain* learning and monitoring
- Synplicate framework for interpretable ML components



Self-Driving Cars

## Scientific Impact:

- Developing a Science of Co-Design of Human Interfaces and Control
- Bridging Model-Based and Data-Driven Design of CPS

## Broader Impact:

- Significantly improve safety, security, and performance of systems where humans interact closely with automation
- Involve middle/high-school and undergraduate students in VeHICaL activities
- Open-source tools Scenic and VerifAI demonstrated on industrial case studies and integrated with commercial simulators
- US-India collaboration

CPS Awards 1545126, 1544714, 1544924, Award Period: 09/2016-08/2023

S. A. Seshia, R. Bajcsy, B. Hartmann, S. S. Sastry, C. Tomlin (UC Berkeley), T. Griffiths (Princeton), R. Murray (Caltech), C. Sturton (UNC).

