Overcoming Complexity to Model and Optimize Complex Mission Scenarios

> "Bringing together models and data—cyber-physical systems, environments, mapping data sets—in System Composer allowed us to develop and simulate a full-autonomy stack while **reducing development and testing time.**"
>
> John K. Coleman II, Ph.D. Student, Clemson Automotive Engineering Department

Project Goal

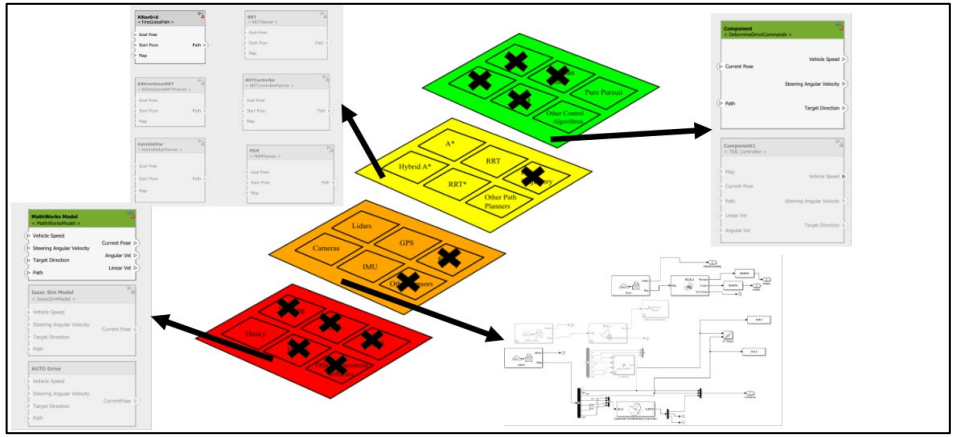
In collaboration with Clemson VIPR-GS Research Center, Ph.D. students supporting the U.S. Army DEVCOM Ground Vehicle Systems Center developed a mission engineering workflow to address increasingly complex scenarios featuring complex terrain, dynamic environments, autonomous air and ground platforms, and a range of threat variables.

Components

MATLAB, Simulink, System Composer, Navigation Toolbox, NVIDIA Isaac Sim, AutoDRIVE

Solution

- Developed an extensible framework for autonomous navigation and system architecture modeling.
- Demonstrated accurate path planning and following code for the Clearpath Husky platform in a randomly generated off-road environment.
- An executable system architecture connects with third-party 3D simulators for high-fidelity simulation.



Layers of complexity in the design space: System Composer helped bring together multiple layers (vehicle platform, sensors, algorithm) into one space and increased the team's ability to simulate and test scenarios.

Accelerated Development

Using MATLAB to model cyber-physical systems and environments, combined with its interoperability with third-party tools, **accelerated development by approximately 5x compared with using Isaac Sim.**

Simplified Approach

Cyber-physical systems involve multiple layers of design and complexity; the System Composer framework helped manage complex requirements and tests to support **traceability and validation.**

Extensibility

Teams can easily add or replace platforms, algorithms, requirements, and other variables to continue building on capabilities and addressing new challenges.

» **Learn more about System Composer**