Reliability and Lifetime Improvement in Next Generation Vehicular Communication Networks using IoT and AI/ML Based Coded Cooperation

Presented by :

Anandhu Ashok

2022eem1006

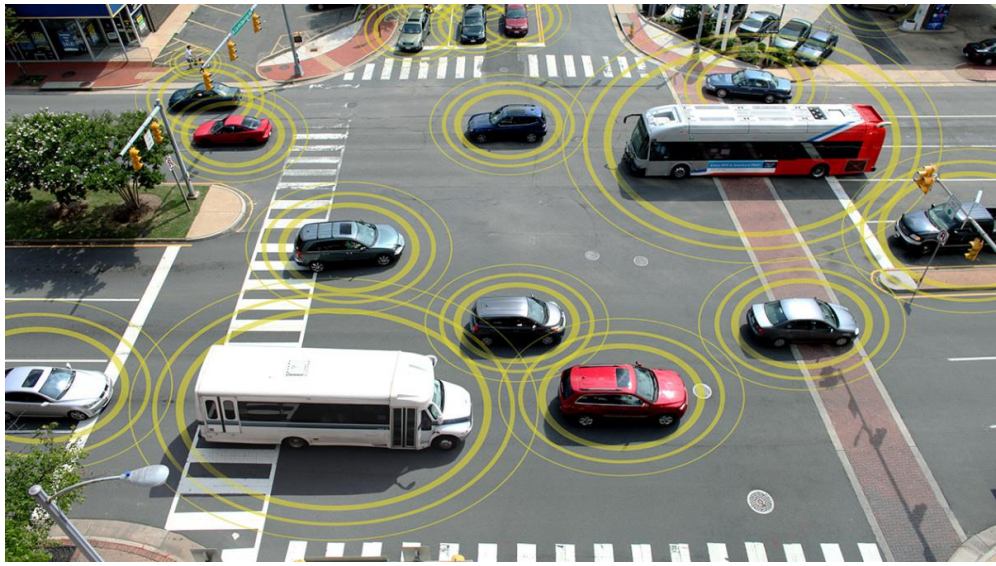
Supervised by :

Dr. Sam Darshi and Dr. Brijesh Kumbhani

Motivation

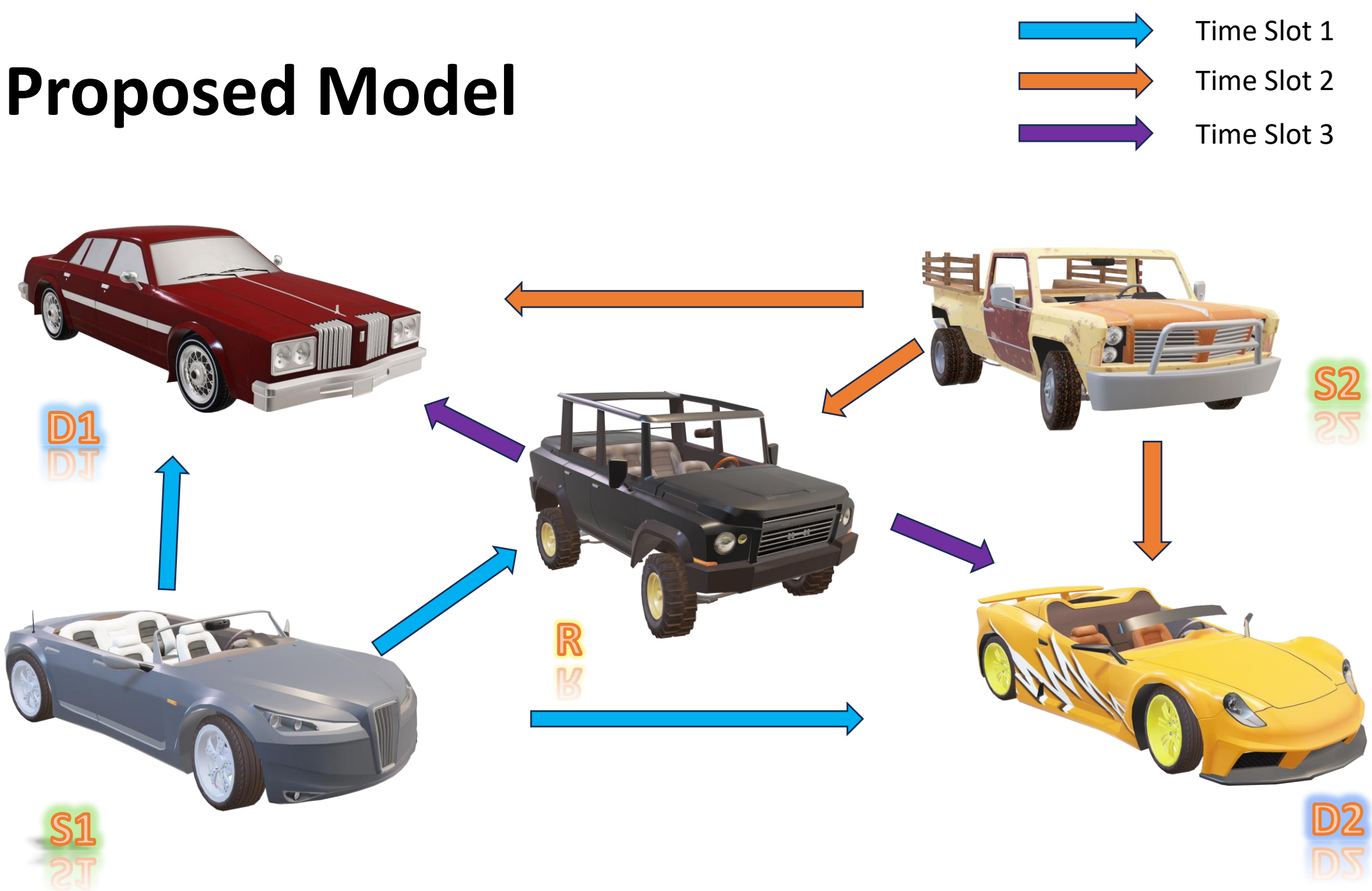
- Safety
- Reducing Accidents
- Traffic Efficiency
- Environmental Impact
- Mobility for All
- Efficiency & Productivity
- Economic Benefits
- Future of Transportation
- Innovation & Technology

Project Objectives



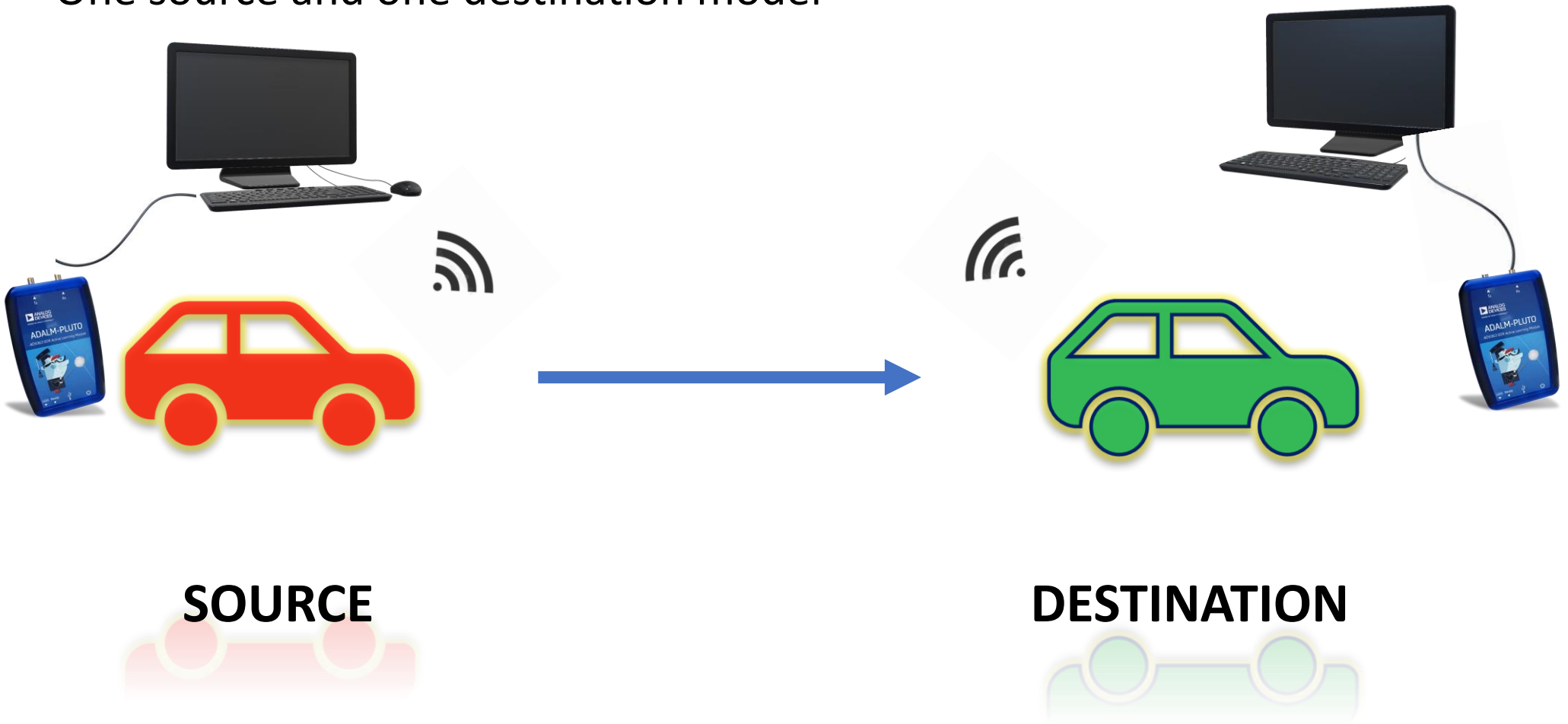
- **Objective 1:** Create algorithms for implementing coded collaboration among IoT vehicle gateways to enhance reliability and throughput.
- **Objective 2:** Develop a protocol for deploying a Machine Learning (ML)-enabled Multi-Threshold Hybrid Relaying Scheme with Energy Harvesting (MTH-EH) at the IoT gateway of a relay vehicle to optimize data forwarding and energy harvesting.

Proposed Model

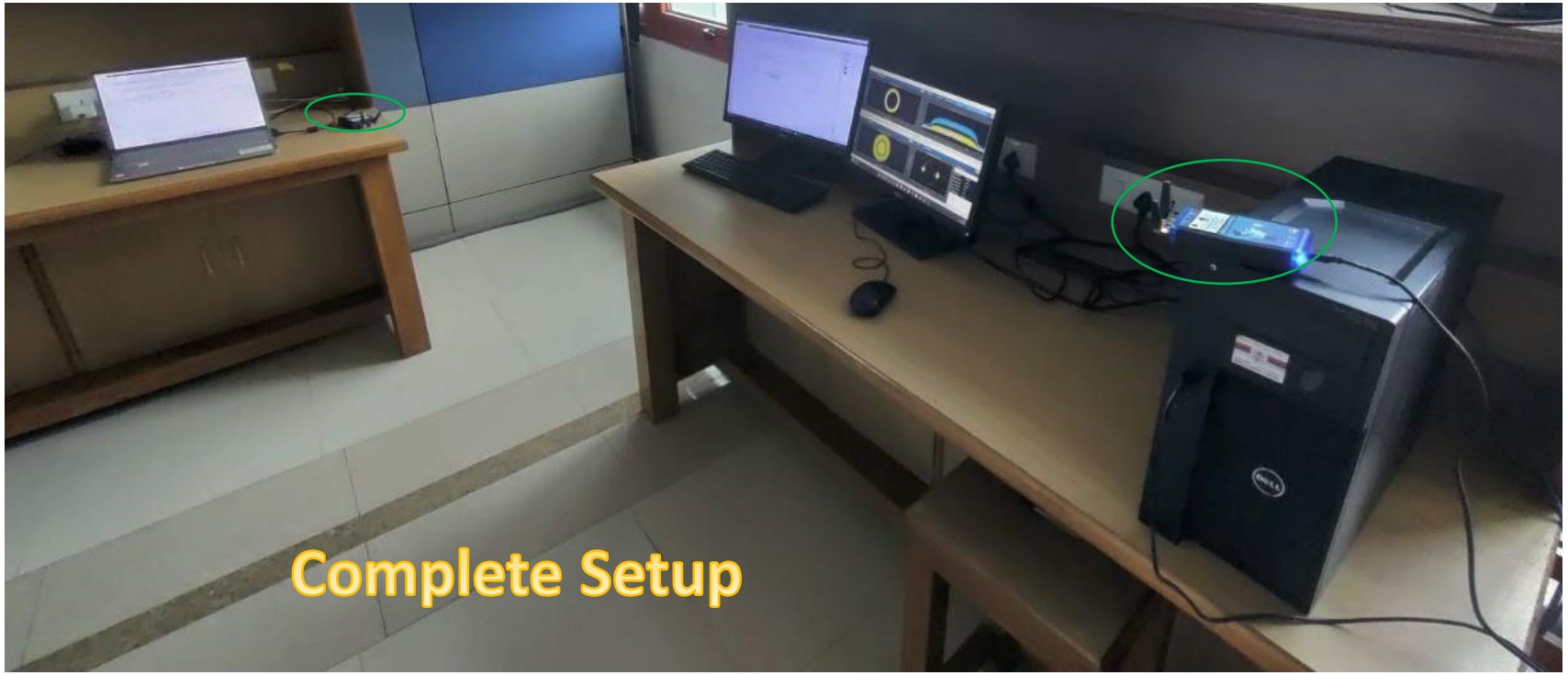


Initial Work

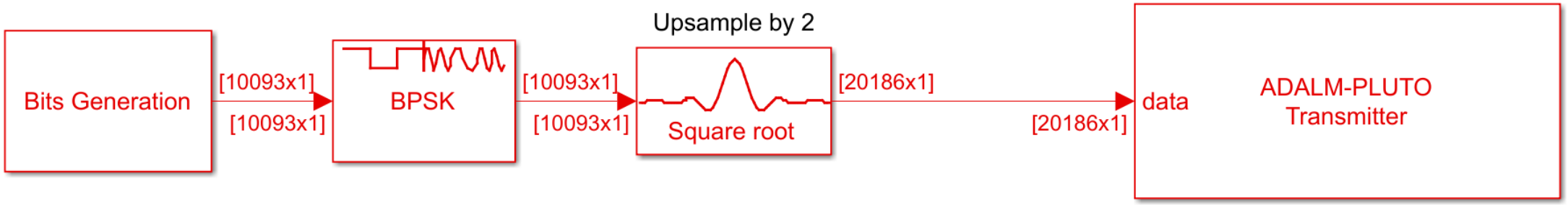
- One source and one destination model



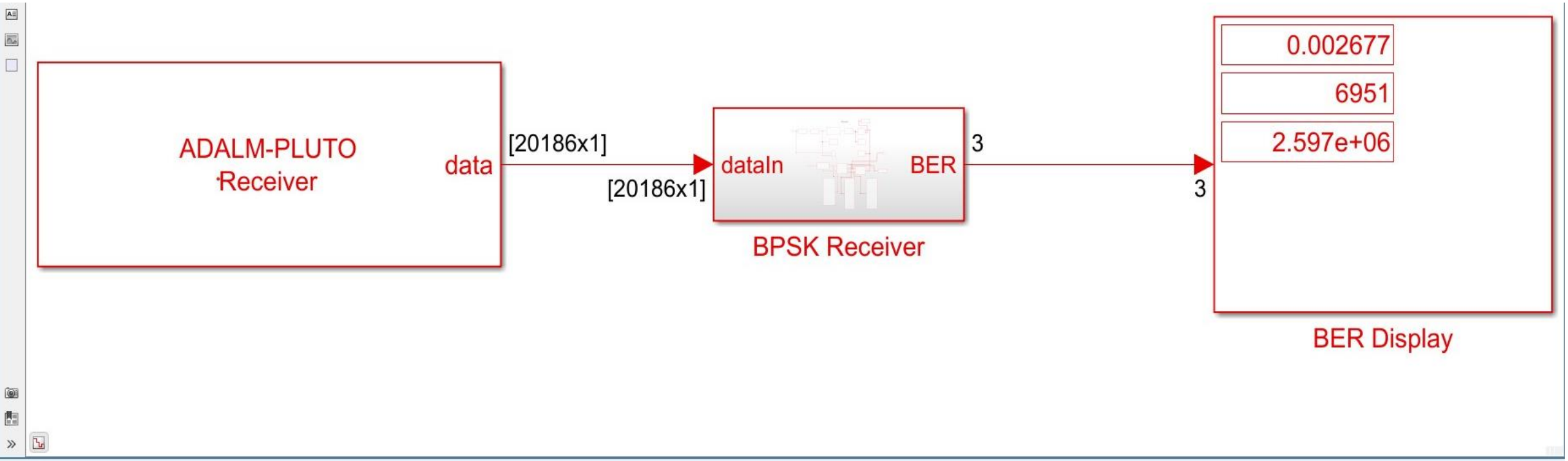
Experimental Setup

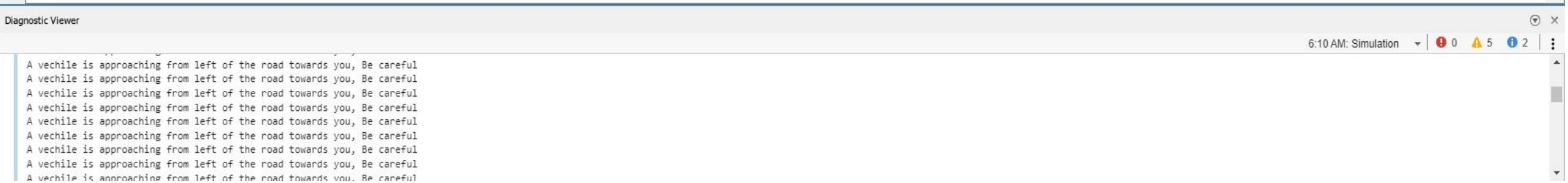


Source


Bits Generation
[10093x1]
[10093x1]
BPSK
[10093x1]
[10093x1]
Upsample by 2
Square root
[20186x1]
[20186x1]
data
ADALM-PLUTO
Transmitter

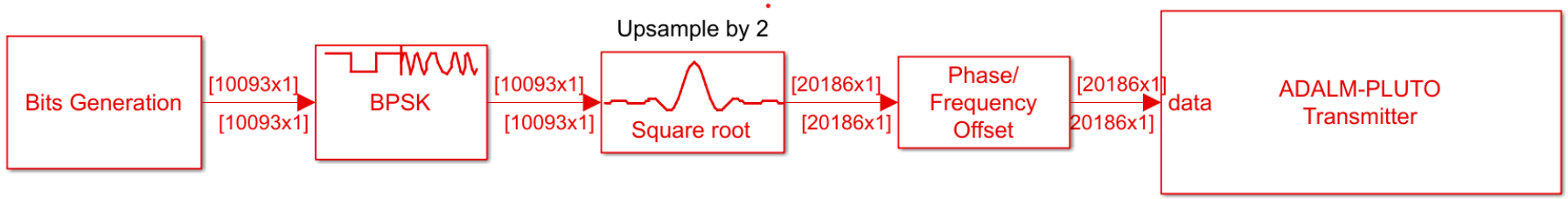
Destination

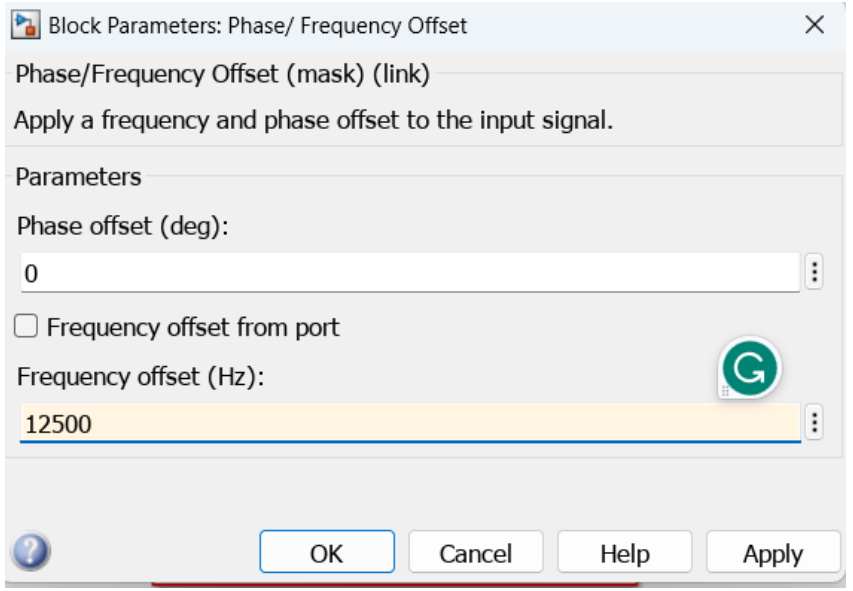




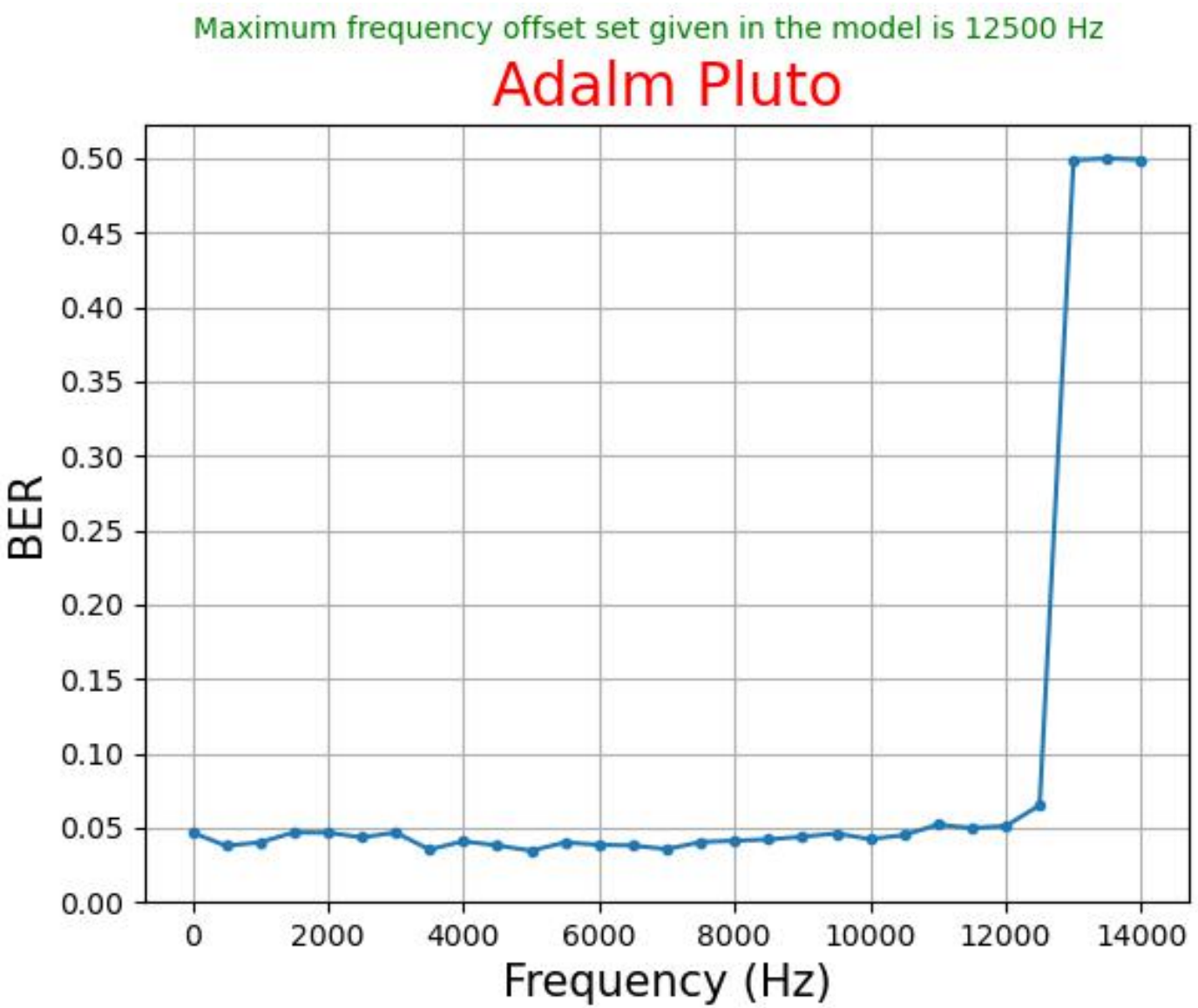
Doppler Shift

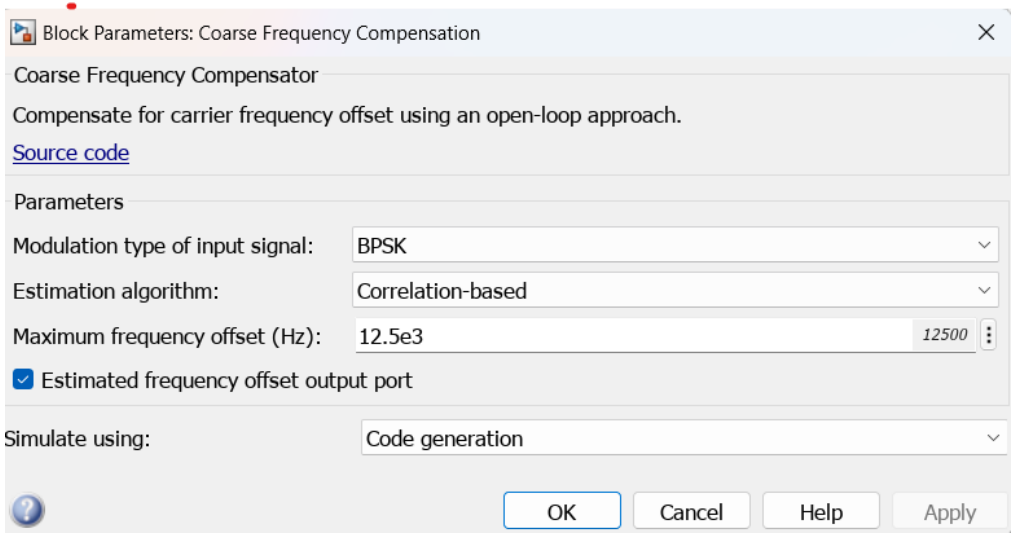
- Vehicular scenario incorporating Doppler shift





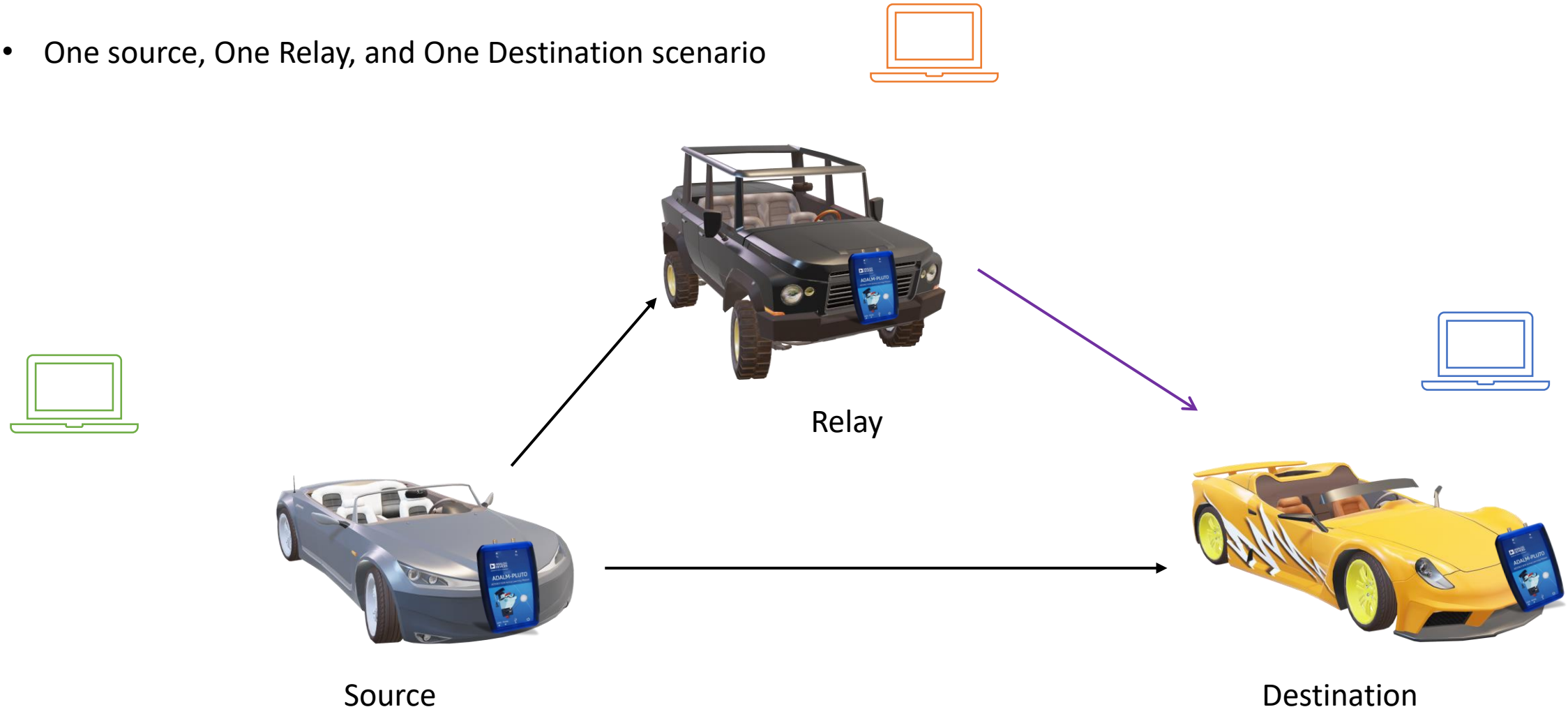
Result for Doppler Shift



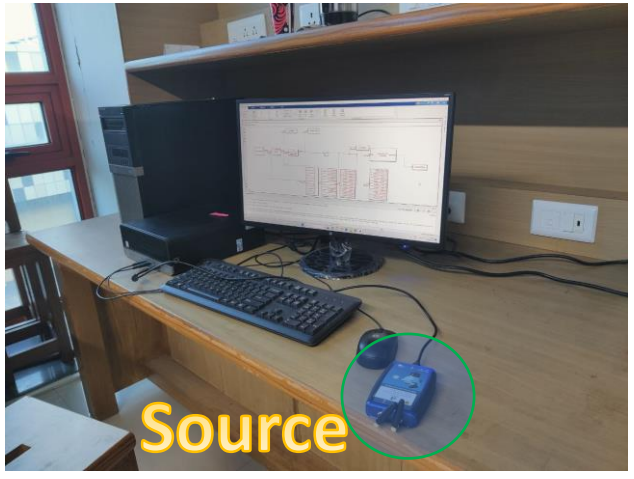


Current Model

- One source, One Relay, and One Destination scenario



Experimental Setup



Current Problem

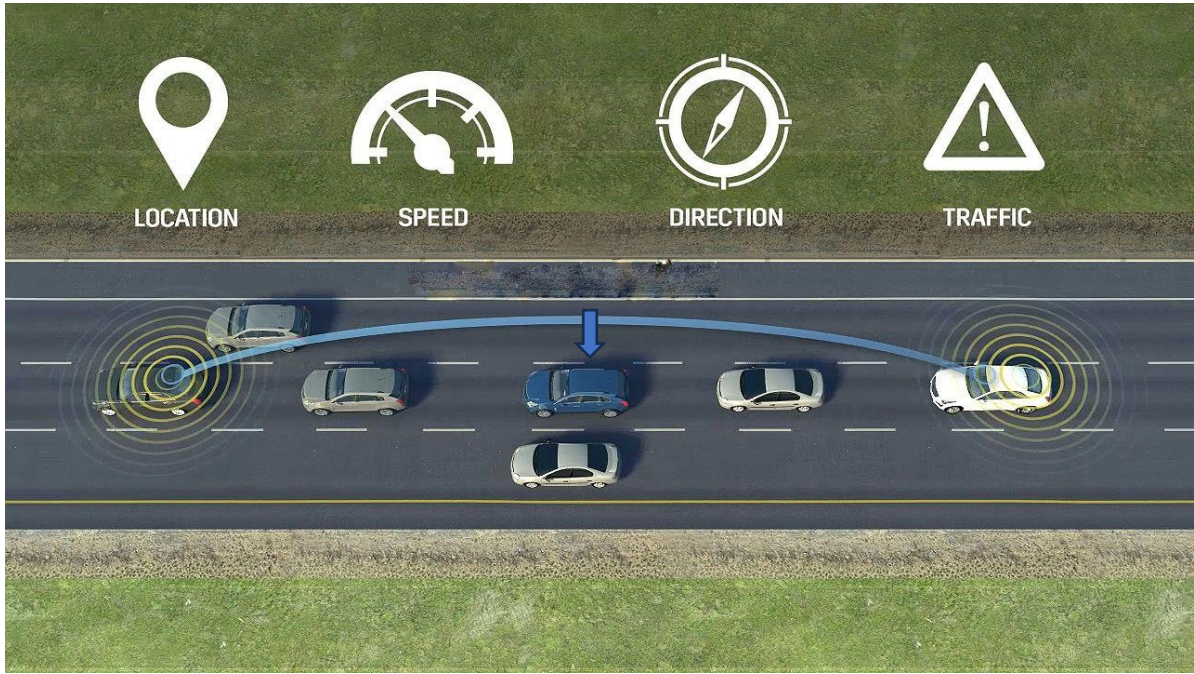
Time slot 1

Time slot 2

The destination initially encounters interference, and when the transmitter subsequently transmits a signal, the destination struggles to decode the received signal successfully.

Future Work

- Use of multiple nodes as proposed in the model
- Applying the DTH algorithm
- ML to optimize thresholding



Thank You