

Augmented and Autonomous Vehicle Security

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Abstract

Our research project is focused on highlighting security concerns in augmented and autonomous vehicles. We have developed and built a robotics testbed and simulator on which we can measure and apply real-world data. We primarily focus on the two coupled weak points in augmented automotive cybersecurity: wireless transceiver entry points into an unsecured Controller Area Network (CAN).



Main Objectives

Our main objectives were to design and implement a testbed on which we could launch security exploits and defenses while providing a retrospective of current automotive cybersecurity. We wished to highlight the inherit dangers of an unsecured CAN bus and demonstrate the necessity of high speed, short-term encryption. Our goals were to create a secured CAN-like protocol within a FPGA coupled with hardware encryption on which we could pipe wireless packets through. We would test this device with a set of wireless transceivers at high speeds in moving vehicles and within our robotics testbed. The realworld data we generated could then be used within a simulator in which we could measure safety and implement a variety of network protocols.

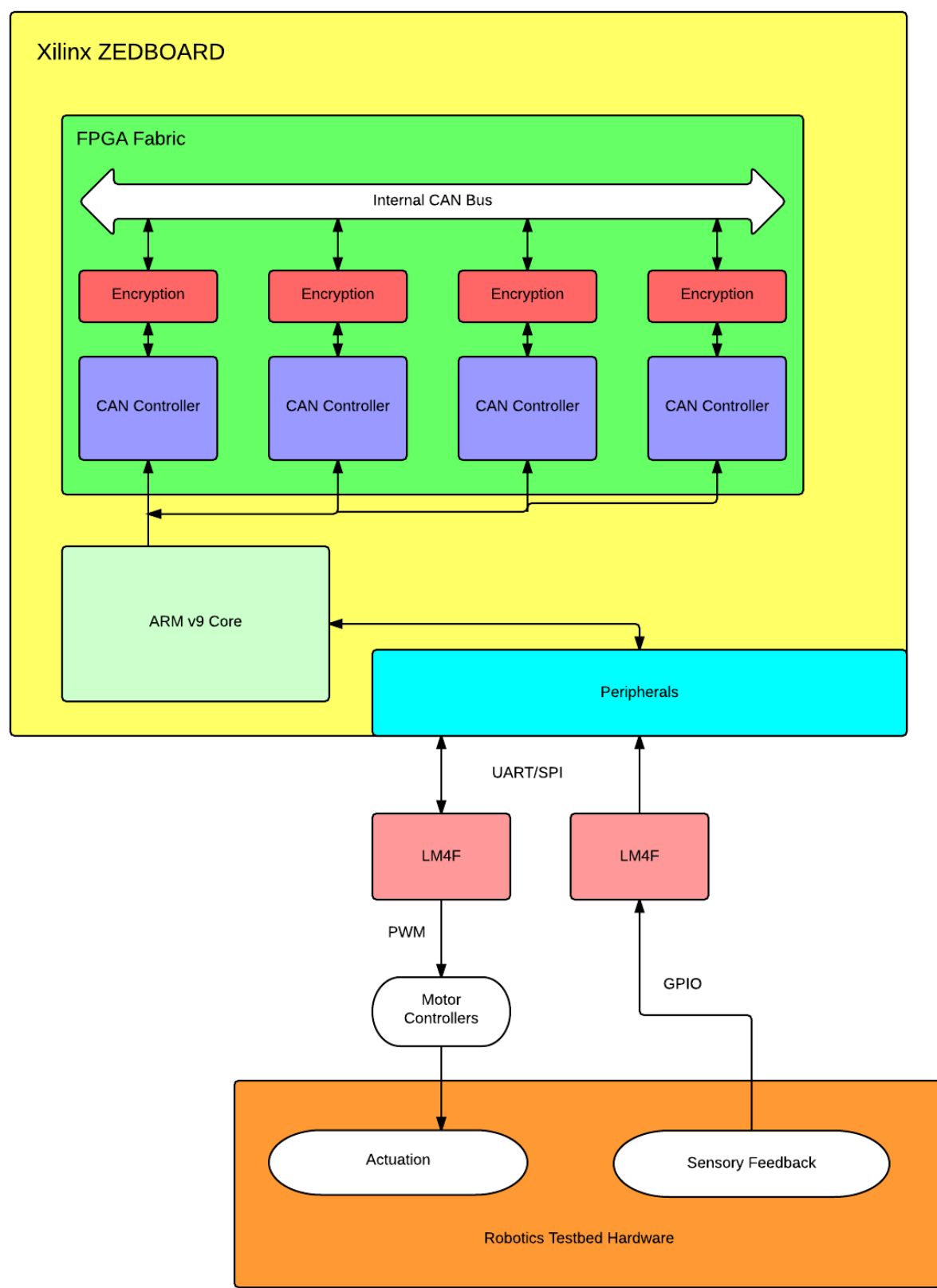
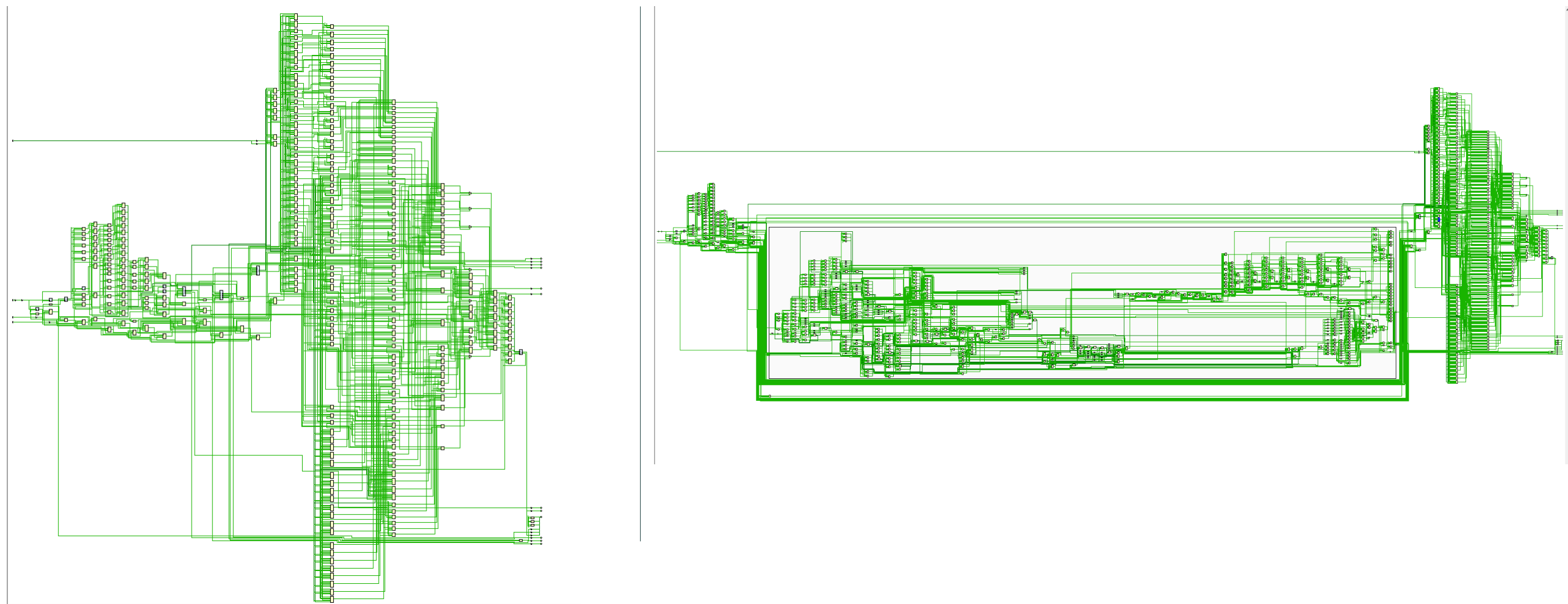
Modules

Our primary modules were broken down into:

- FPGA -
 - CAN Bus
 - UART - CAN Packet Translation
 - PWM Generation
 - Hardware Encryption
- Wireless Transceivers -
 - Data Transmission
 - Software Encryption
- Robotics Testbed -
 - Data Measurement
 - Embedded -
 - IMU Measurement
 - Motor Control (PID)
 - Laptop to CAN Bus Interface
 - Sensor Interface
 - Simulator -
 - Network Timing Constraints

Measurements and Data

We will focus on modular specific system testing and timing constraints collected in this section. The following section will collect this data into a summary of our results.



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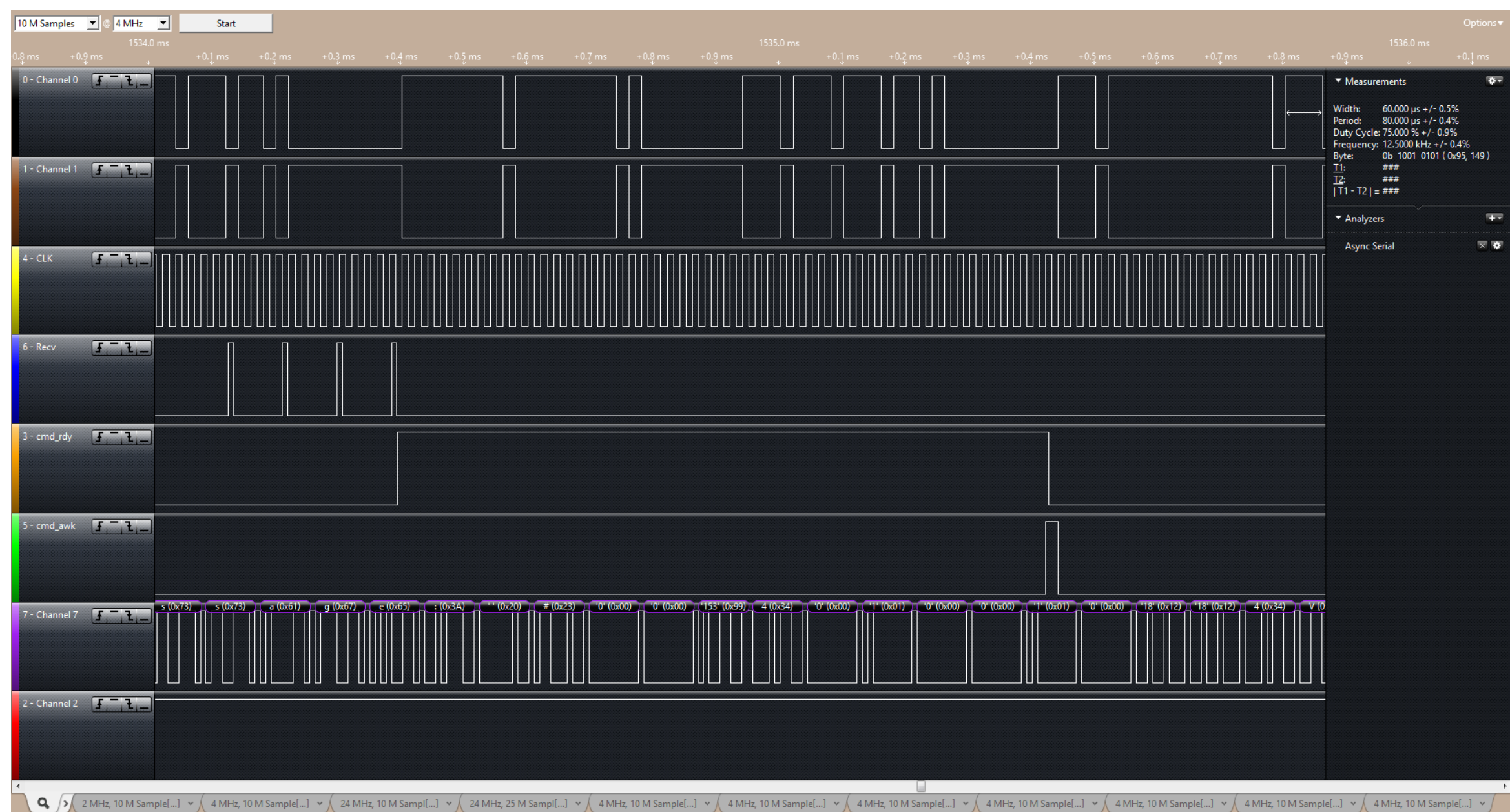
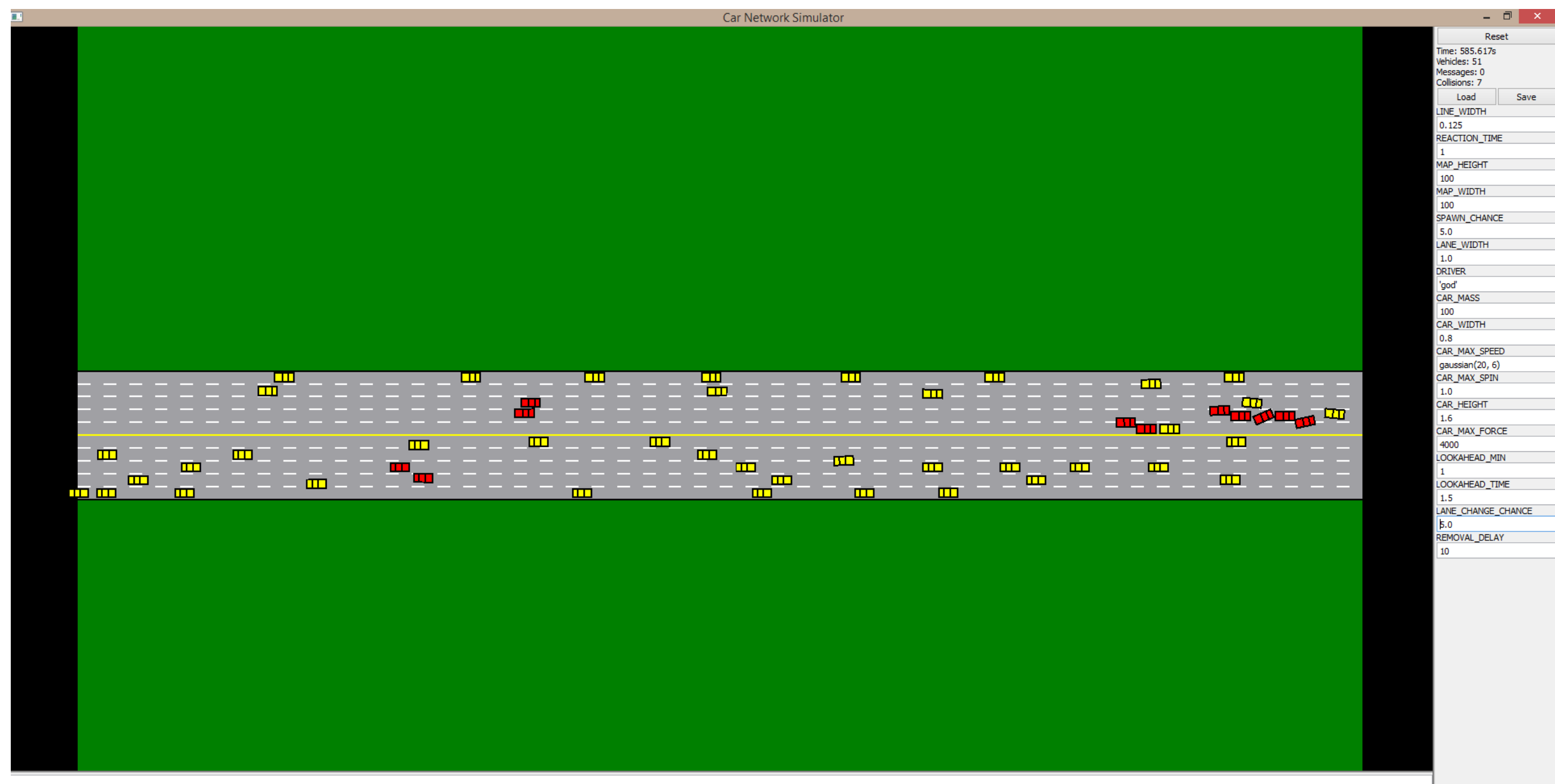
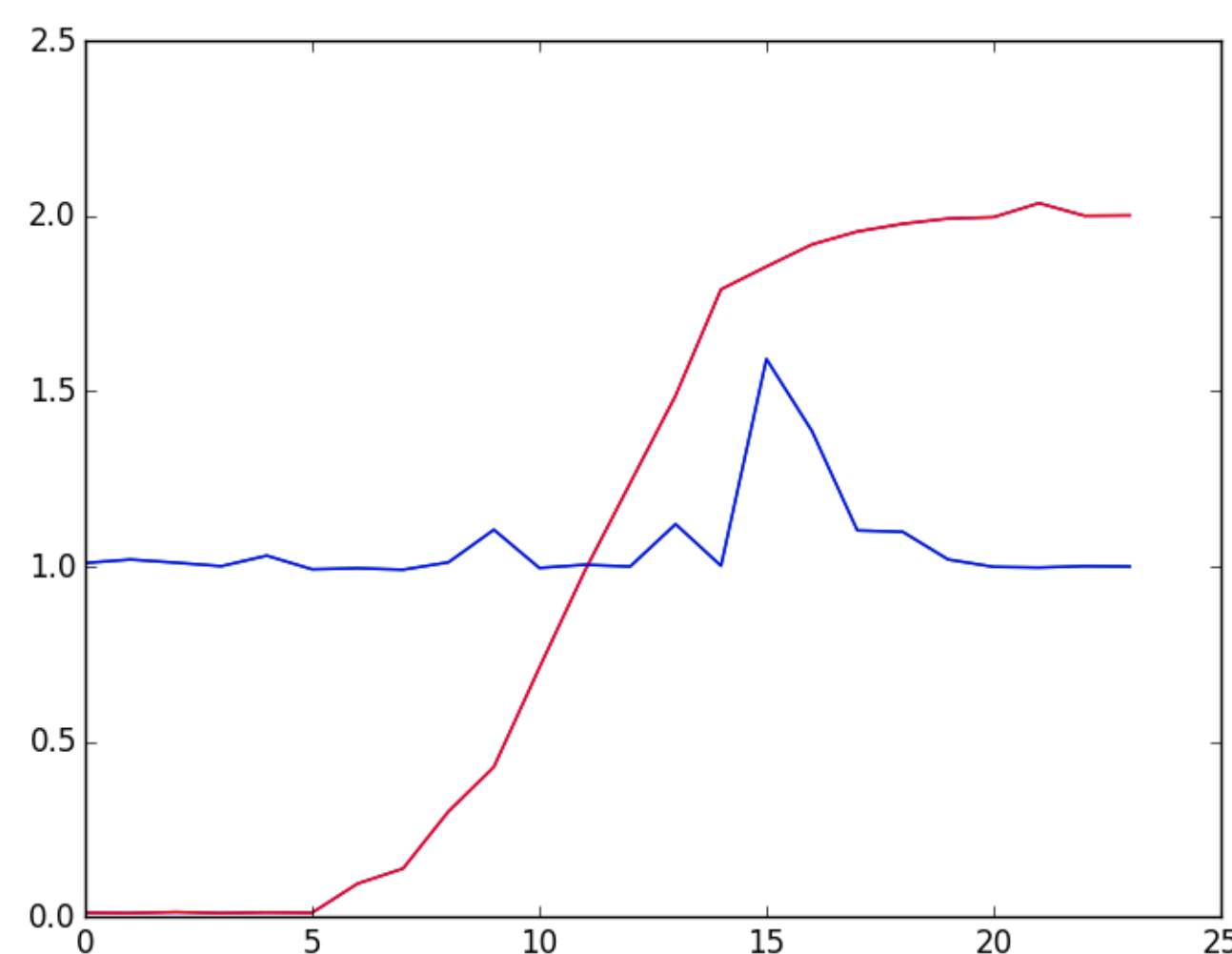


Figure 2. Hardware CAN Bus Capture



Results

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Treatments	Response 1	Response 2
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296

Table 1: Table caption

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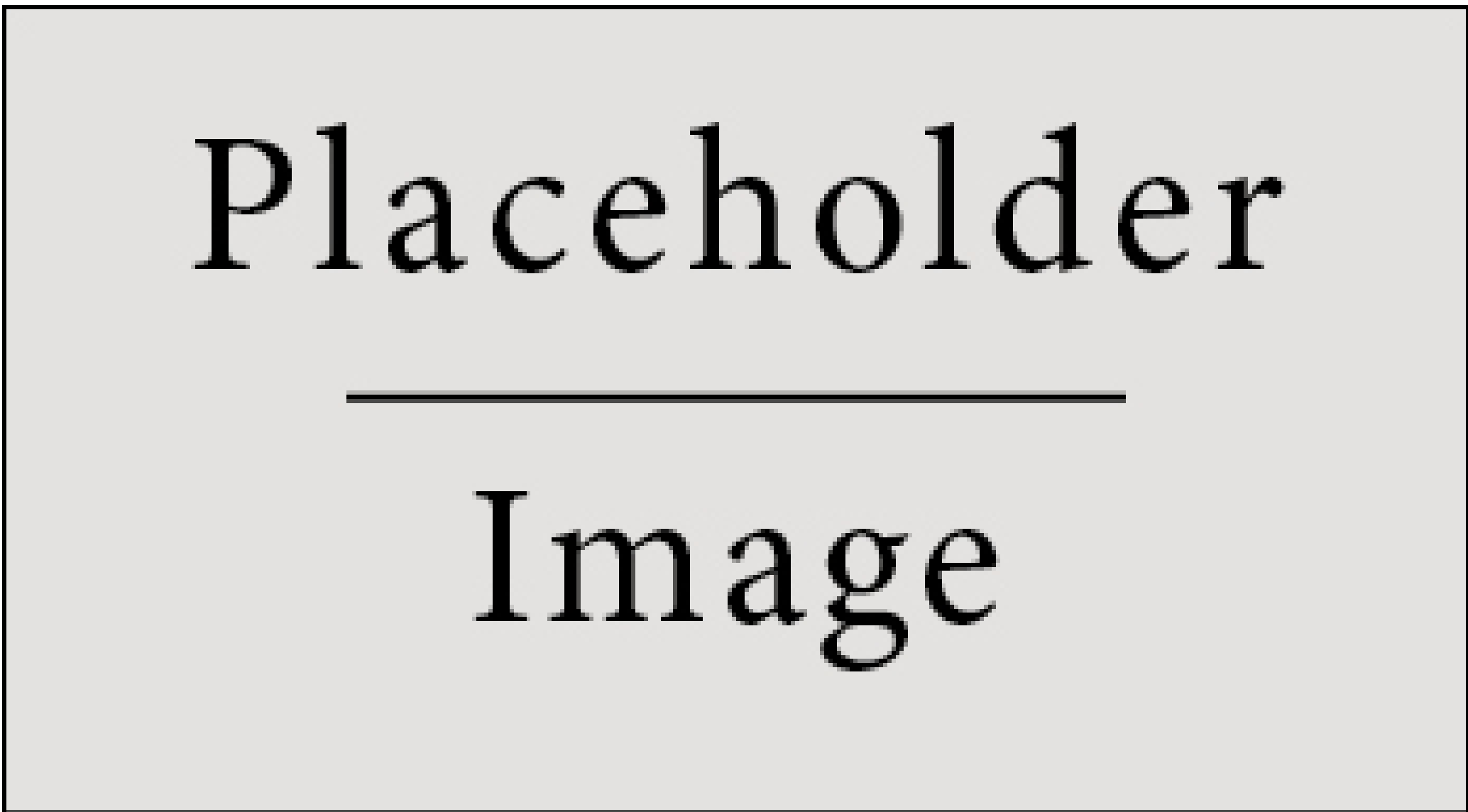


Figure 1: Figure caption

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Treatments	Response 1	Response 2
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Table 2: Table caption

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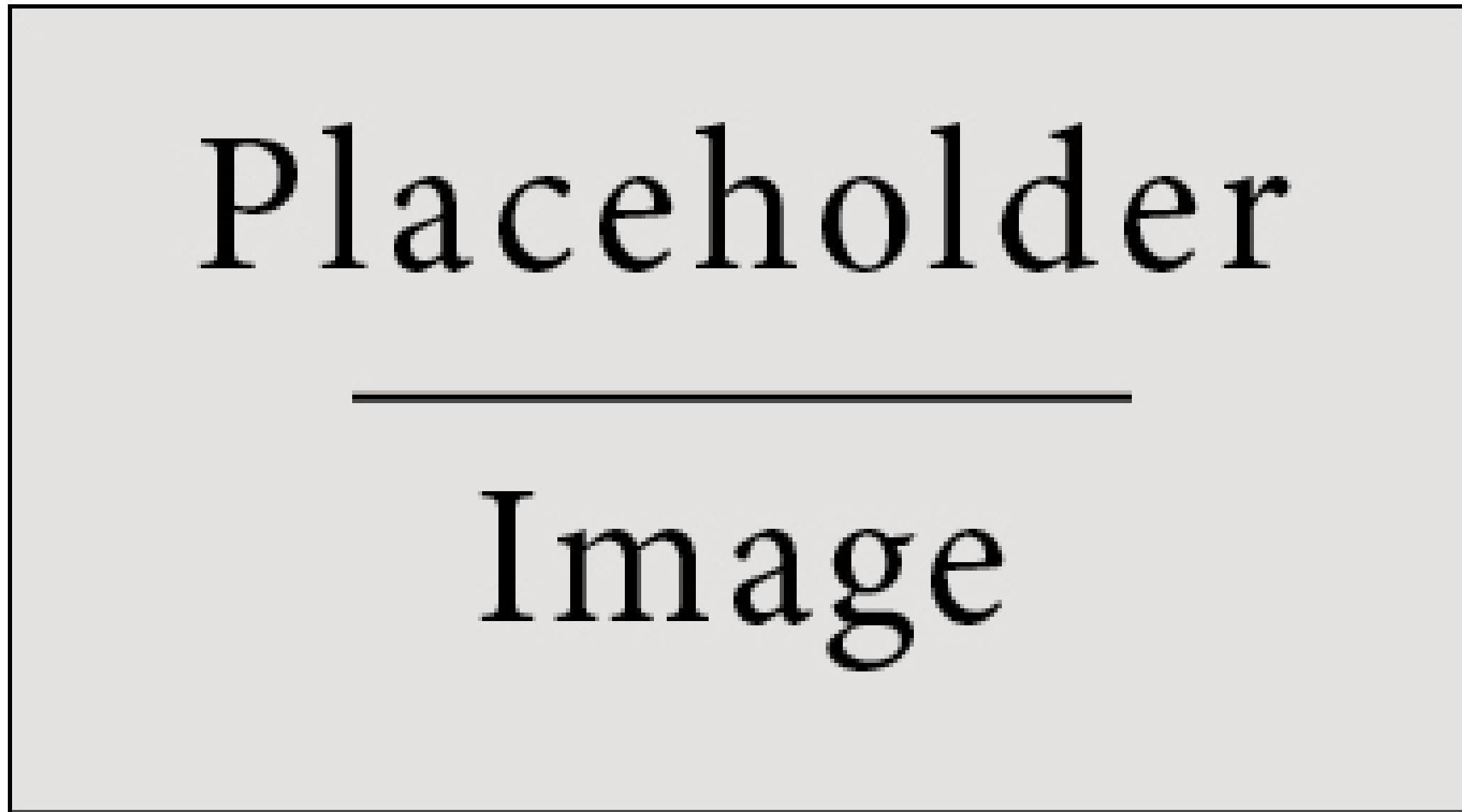


Figure 2: Figure caption

Conclusions

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Future Research

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Acknowledgements

Dr. Tiwari, TI, UT Austin, swiggity swaggity swoop