To: ENGR 132 Project Teams
From: Rowan Harper; Lead Control Systems Engineer
Date: April 15, 2025
Re: Defining ACC performance

We are happy to learn of your progress with your algorithm development, which has provided you with a better understanding of the parameters required and how to obtain them. Next, we need you to examine how our ACC system performed with the original tires. This system underwent rigorous testing and is well-understood. It has been operational in a fleet of vehicles for some time, including the hatchback, sedan, and SUV vehicles currently under study.

Our engineering team determined parameters for the ACC system for each vehicle equipped with the original tires. They also compiled benchmark data for each vehicle, representing speed test data collected and aggregated into a single example for comparative purposes. We conducted extensive tests and simulations to assess the system's performance. We have confidence in the accuracy and reliability of our benchmark data, but it is not noise-free. You will find the datasets in the included spreadsheet and the benchmark parameters in Table 1 below.

	Compact Hatchback	*Midsize Sedan*	*SUV*
t_s, *Acceleration start time [s]*	6.21	9.39	6.85
τ, *Time constant [s]*	1.51	1.96	2.80
y_L, *Initial speed [m/s]*	-0.09	-0.22	0.19
y_H, *Final speed [m/s]*	25.08	24.72	24.18

Table 1. Benchmark test parameters for each vehicle with CruiseAuto's ACC system.

In our initial memo, we outlined performance boundaries for the ACC system that we developed for these vehicles. We understand that your instructor requested an examination of these boundaries in M0 - Project Introduction. It will be necessary to review that information alongside the additional benchmark parameters.

We kindly request that your team complete the following tasks:

→ Quantify the inherent error in the benchmark data attributable to measurement noise.
→ Compare your algorithm's parameter outputs with those determined by our engineers.
→ Use this data to gain an understanding of what we define as a well-functioning ACC system.

We appreciate your hard work and dedication to this project.

Rowan Harper
CruiseAuto, Lead Control Systems Engineer