

**ECE Capstone program
Spring 2018
Summary Project info**

Please provide the following information to be shared with on capstone information exchange platform:

- 1. Project number:** Sp18-67
- 2. Project title (as will appear on the poster):** Vehicle Dynamics Controller
- 3. Team members:** Asif Mohyuddin, David Zamora, Salman Shahzad, Fuquan Zhang
- 4. Adviser(s) name(s):** Prof. Zoran Gajic
- 5. Up to 10 keywords that will help to classify the project:**

Control systems, Phase lead controller, Bode diagrams, Crossover frequency, Stability phase margins, Closed loop transfer function, Controller Canonical form, Transient response, Overshoot and settling time, Circuit design and testing.

6. Project abstract (up to 200 words) to be shared with judges:

In our project, we study and observe the lateral dynamics of a vehicle and design an appropriate controller to improve its transient response. The transfer function of our system is given and we use it to analyze the dynamics of the system. After carefully observing its response we designed a phase lead controller that can be used to decrease its overshoot and settling time, and to improve its overall stability. Phase lead controller was chosen over PID keeping in mind the system requirements and complexity. Bode diagram method was implemented in this case for the design. A block diagram in Simulink was used to analyze the response of the system with and without the controller. A circuit was then designed to model the system along with the controller using operational amplifiers for simulation purposes in Multisim. The circuit was later physically implemented on the breadboard and the response of the system was compared with the simulation results.