



SENIOR DESIGN PROJECT SYNOPSIS – SPRING 2013

Dynamic Spoiler For SAE Formula Car A PROJECT SPONSORED BY SAE Panther Motorsports

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The system will have mechanical and electrical components that will work together to provide the optimum aerodynamic load in any situation. Prior to designing the spoiler we will study the dynamics of the car and decide where the forces should be applied to give us the best results.

The spoiler will be divided in two halves of the same surface area and dimensions which will move independently to each other. Each wing will be lifted by a servo motor and brought back down by a tension spring. Both wings will be interconnected by a rod to increase the rigidity and the whole system will not be permanently installed to the car and could be un-mounted.

The motion of the system will come from a pair of servo motors that will be controlled by an on board logic board. As an input, the computer will have the information gathered by 2 sensors installed in the car, a steering sensor, and a braking sensor. The velocity input of the car will come from the car's engine control unit (ECU) The computer will have a preinstalled logic with 3 driving variables and 2 driven variables (angular displacement of the servos), this logic will be derived from the dynamic and aerodynamic analysis of the vehicle in motion.

The formula SAE Team (Panther Motorsport) has expressed their excitement about this project for two major reasons. To start with this innovative aerodynamic solution will provide the team with an advantage against the competition since we can maximize the benefits of a spoiler while minimizing its disadvantages. Also, there will be a design and innovativeness competition running parallel to the performance competition, having such an original system installed will give the team the lead.

How well we manage the relative motion between the vehicle and the medium that it's moving through will determine what aerodynamic loads (drag and down-force) that it will subject to. Minimizing the drag on straights and maximizing it when the car is braking, as well as maximizing the down force on the tires when the car is turning are our main goals.

Choosing a dynamic spoiler will allow us to distribute these forces, maximizing the force that is being applied vertically to the most desired tires, as well as minimizing the drag and therefore the air resistance to motion.