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# The Evolution of Aerodynamics in Formula 1: the Impact of FIA 2026 Regulations

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# THE EVOLUTION OF AERODYNAMICS IN FORMULA 1: THE IMPACT OF FIA 2026 REGULATIONS

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A technical analysis research proposal using data science techniques -- MS in Data Science, University of Missouri - Columbia 26'

## Objective

- **Aerodynamics** is a crucial element in **Formula 1**, significantly influencing car performance, speed, and handling. This study investigates the **evolution** of aerodynamic designs in F1, **analyzing** their impact on car performance, and **predicting** the effects of the upcoming **FIA* 2026 active aero regulation**s using **data science** techniques.

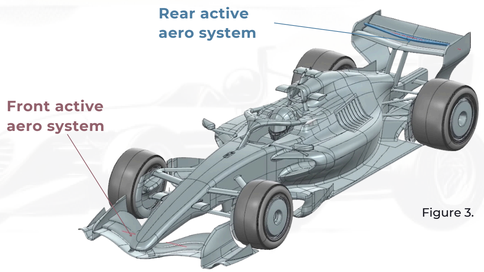

Figure 3.


Figure 1.


Figure 2.

## Methodology

- **Data Collection:**
  - **Sources:** FIA archives, F1 technical journals, and team publications
  - **Types of data:** wing shapes, diffuser configurations, lap times, speed, downforce, and details on the 2026 regulations.
- **Data Analysis:** Forecast performance based on aerodynamic configurations, agile design features, active aerodynamics, and regulatory changes
  - **Statistical Methods:** correlate aerodynamic features with performance metrics
  - **Machine Learning:** Decision trees, Neural networks, Support vector machines, Random forests, and Ensemble methods /python/

## Research

- **Evolution of Aerodynamic Advancements:**
  - **1960**s: Introduction of wings for downforce
  - **1977**: Ground effect pioneered by Lotus
  - **1980**s: Ban on ground effect, focus on underbody aerodynamics
  - **1994**: Introduction of stepped floors
  - **2009**: Major changes to reduce aerodynamic turbulence
  - **2017**: Wider cars and tires for increased downforce.
  - **2022**: New regulations for ground effect revival.

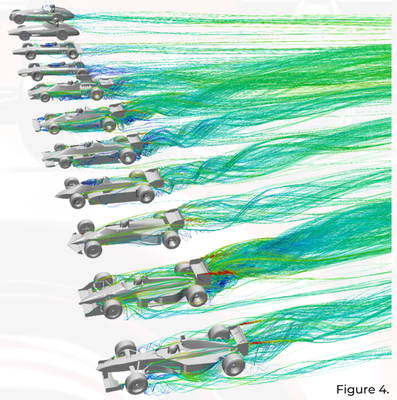
Figure 4.

- **Performance Impact Analysis:** Highlights major aerodynamic changes, with data-driven insights on car speed, handling, and overall performance.

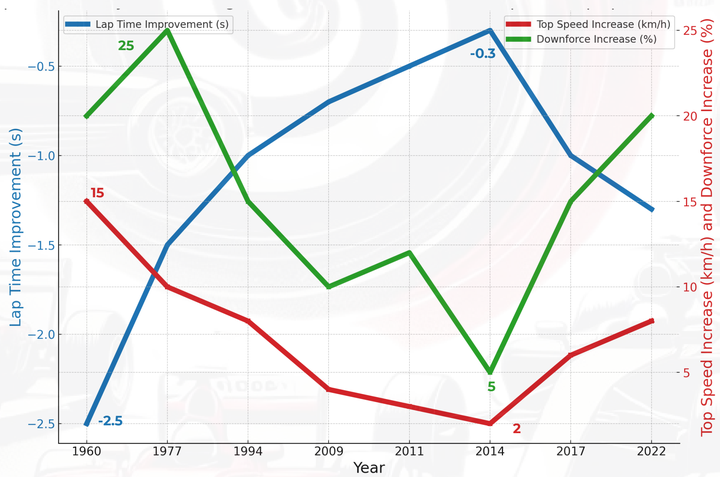

Figure 5. Impact of Aerodynamic Changes on F1 Performance Metrics /laptime, top speed, downforce/

- **Ground Effect** (1977): Significant speed increase, improved cornering.
- **Wing Design** Changes (1980s): Enhanced stability and control.
- **Stepped Floors** (1994): Reduced underbody downforce, focus shifted to wings.
- **2009**: Reduced overtaking difficulty, slightly slower speeds.
- **2017**: Increased downforce, better grip, faster lap times.

## Anticipated Findings

- **Predictive Models:** Presentation of machine learning model results predicting future performance based on current aerodynamic trends and the anticipated impact of the 2026 regulations.
- **Comparative Analysis:** Performance metrics before and after major aerodynamic changes and the implementation of the 2026 regulations.

Figure 6.

## Summary

- **Key deliverables:** Principal aerodynamic advancements, including agile cars and active aerodynamics, their consequent effects on Formula 1 performance metrics, and data-driven projections regarding the implications of the 2026 regulations.
- **Implications for Future Designs:** Analysis of how data science can drive future innovations in aerodynamics, predict, and adapt to regulatory changes.
- **Future Trends:** Predictions on future trends in aerodynamic development and the anticipated effects of the 2026 regulations.

LinkedIn

References

*FIA: Fédération Internationale de l'Automobile. The FIA the is the governing body for world motor sport and the federation of the world's leading motoring organisations.