HACKATHON

Chapter III - 2025

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ECLIPSE SDV HACKATHON PORTO 2025

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PITCHING SESSION

Porto Motive

SDV Eclipse Software Defined Vehicle

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The Plan

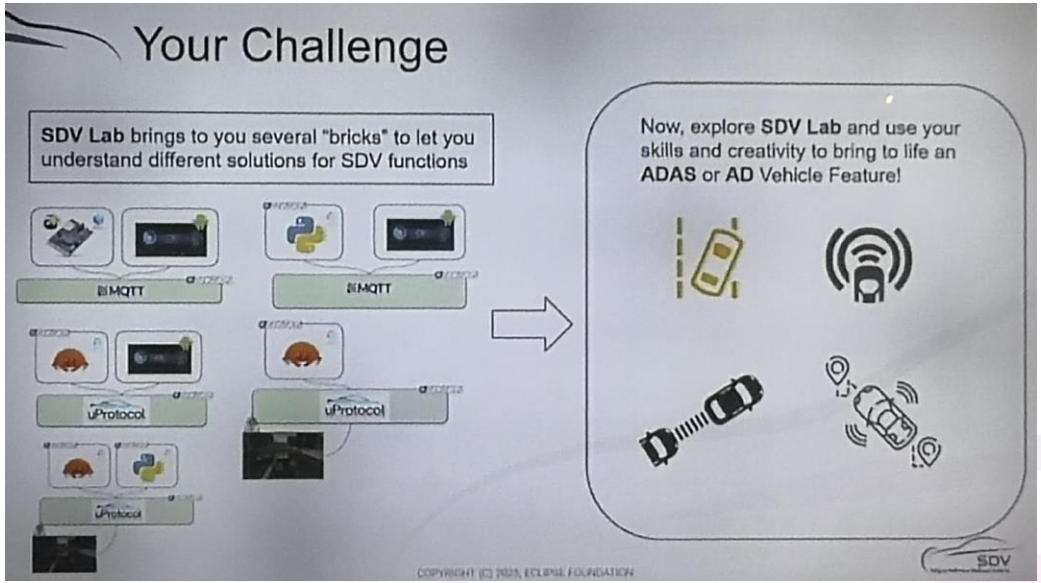
*We chose the **SDV Lab**.*

Initial Situation

At the **Hackathon Eclipse SDV – Chapter Three**, we were challenged to choose between two different tracks:

1.Software-Defined Vehicle (SDV) Lab

2.Mission: Update Possible



Why?

Because, having **no prior experience** in the **automotive** field, it seemed:

1. **more intuitive** for us to start with this challenge.

2. From a **learning perspective**, it also felt **more logical** to first understand how to implement car features before moving on to the update challenge (i.e., ***learn first, update later***).

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The Plan

Main Idea

1.Prevent rear-end collisions by enabling the first car in a traffic jam queue to deviate when a vehicle approaches at high speed (in cases where the collision would not otherwise cause a massive chain reaction).

2.Reduce the effects of collisions (especially in traffic jams) by redistributing the impact across the queue of vehicles — similar to Newton's cradle — ultimately **saving lives**, which is our primary goal.

Plan

1. We will implement an adaptive **Rear Collision Evasion System (RCES) as a proof of concept**, which we name it as **Backward Automotive Life-Saving System (or B.A.L.S.)**.

2. To achieve this, we will use **CARLA** (the open-source driving simulator) and design an **algorithm** that **leverages RADAR** to **detect vehicles approaching from behind/rear**. The system will then **automatically trigger an evasive maneuver**, deviating the car to the left or right (depending on available space).

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Team and Structure

Name	Role(s)
Bruno Miguel	developer
Rui Almeida	developer
Miguel Biltes	developer
João Silva	developer
Bernardo Esteves	developer

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The Product / Service / Added Value

Rear Collision Evasion System (RCES)

The problem

- In traffic jams, the risk of rear-end collisions is high.
- Most current systems only prepare occupants (tensioning seat belts, headrests, hazard lights)
- Active technology to evade the vehicle and prevent or mitigate the impact does not exist

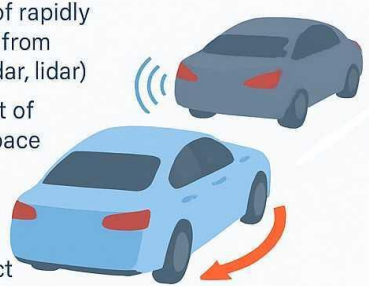
Benefits

- Increased safety in traffic jams and highways
- Real innovation: from passive to active protection against rear-end collisions
- Potential for patent and competitive differentiation
- Scalable for future autonomous vehicles and cooperative driving ystems

Our solution

RCES – Rear Collision Evasion System

- Intelligent detection of rapidly approaching vehicles from the rear (cameras, radar, lidar)
- Real-time assessment of lateral and forward space
- Automatic micro-evasions to the left/ right (when safe) to reduce or avoid impact
- Integration with V2V (Vehicle-to-Vehicle Communication): **surrounding vehicles** collaborate to open soace for evasive maneuver



If you can't avoid the traffic jam, avoid the impact.

The most important goal and main purpose *and improvement of this solution (namely comparing with market benchmark) is that this solution doesn´t exist....*
... And effectivelly this ***system can save lifes***.

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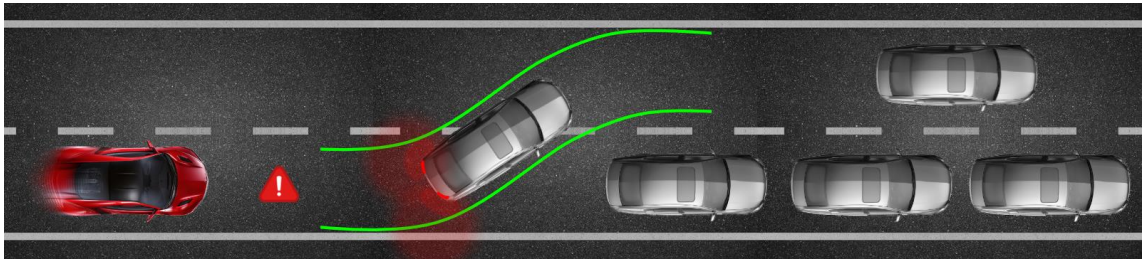
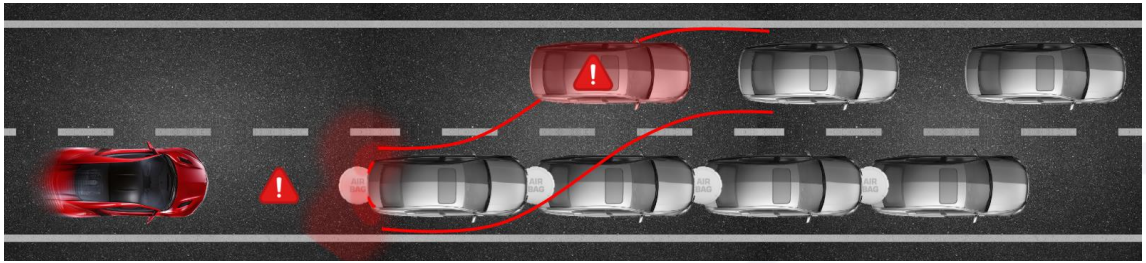
How it works - scheme

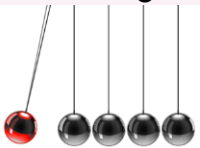




How it works

1. If there are vehicles in front of the car, the **system will attempt to steer the car into an adjacent lane** (either to the right or left), depending on whether the car is currently in the leftmost or rightmost lane, and only if a lane is available for the maneuver.

2. If no adjacent lane is available, the **car will prepare for the collision by unlocking the brakes** (of our car and the other cars) and attempting to **distribute the force** of the impact across all involved vehicles, **minimizing the damage.**



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How it works – Video 1

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How it works – Video 2

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The Market & The Competition

1. Market & Market Size

Market Opportunity

- **Automotive Safety Systems Market (ADAS & Active Safety)**
  - Global market size (2024): **$42B+**
  - Expected growth: CAGR **~10% until 2030**
  - Driven by regulation (EU NCAP, NHTSA, UN ECE standards) and consumer demand for safer vehicles.

Competitors

- **Indirect**: Current ADAS providers (Bosch, Mobileye, Continental) focus on **front/side collision avoidance** and **emergency braking**, not **rear collision evasion**.

- **Direct**: None offering an **active rear collision avoidance maneuvering system** — this is a **white space** opportunity.

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The Market & The Competition

Target Customers

• **OEMs (Original Equipment Manufacturers)**:
Car makers like Mercedes, BMW, Tesla, Toyota, VW, Hyundai.

• **Tier 1 Suppliers**:
Bosch, Continental, ZF, Valeo — companies that integrate new safety tech into vehicles.

•**Aftermarket & Fleet Operators**:
Possibility of retrofitting fleet vehicles (taxis, logistics, ride-sharing).

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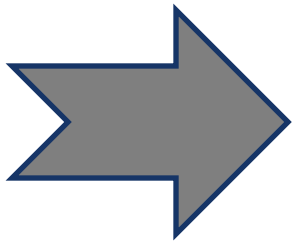
The Market & The Competition

Our Differentiation:

- **Active evasion system** → prevents or reduces the collision
- **B.A.L.S. integrates communication** for cooperative safety
- **Adaptive real-time micro-maneuvers** (steering & brake release to maximize force distribution)

Balls make your life safier.



(Business) **Opportunity**

- Current solutions are **passive** → they only *prepare occupants* (seatbelts, headrests, hazard lights)
- Governments and insurers increasingly demand **safety-first technology**
- Global push for **road safety and autonomous driving Technologies**
- Increasing adoption of **ADAS (Advanced Driver Assistance Systems)** in all vehicle segments
- Potential integration into **future autonomous cars** and **fleet management systems**

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Business Model * Plan & Funds

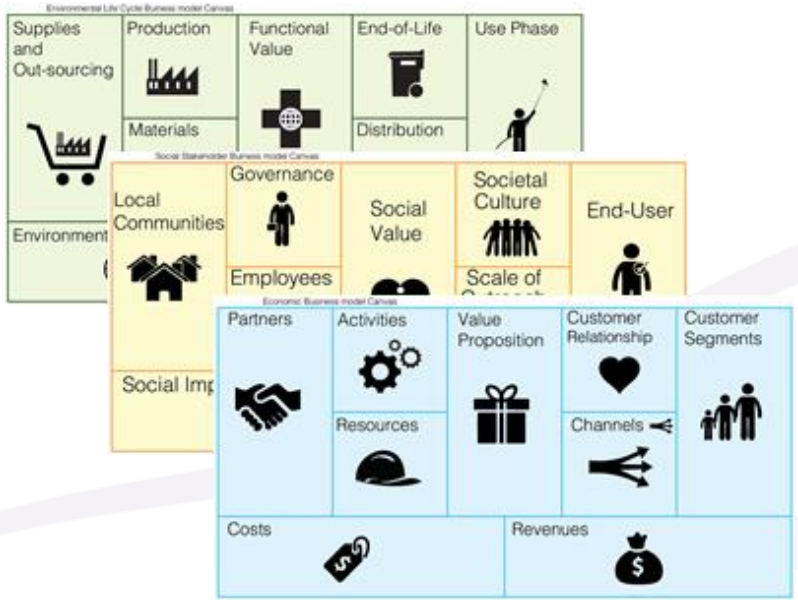
2. Business Model

• **Licensing to OEMs**: License RCES software + hardware integration kits to car manufacturers.

• **Partnerships with Tier 1 suppliers**: Collaborate with Bosch, Continental, ZF, or Valeo to embed RCES into their existing ADAS platforms.

• **Retrofit Kits** (long-term): Hardware/software retrofit for fleet vehicles (logistics, taxis, ride-hailing, buses).

• **Revenue Streams**:
  - Licensing fees per vehicle
  - Long-term royalties (per unit sold with RCES)
  - Potential SaaS extension for V2V communication (subscription for fleet connectivity).



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Business Model * Plan & Funds

3. Implementation Plan

Phase 1 – Concept & Prototype (0–12 months)
• Simulation in **CARLA** + AI-based trajectory planning.
• Proof-of-concept with RADAR + camera + micro-evasive maneuvering algorithms.

Phase 2 – Pilot & Testing (12–24 months)
• Build partnerships with **universities / automotive labs**.
• Test on real vehicles (retrofit kit with RADAR + ECUs).
• Safety validation under EuroNCAP crash test protocols.

Phase 3 – Industrial Partnerships (24–36 months)
• Collaborate with **Tier 1 suppliers** for system integration.
• File **patents** on RCES algorithms and V2V integration.
• Begin pilot integration with 1–2 **OEMs**.

Phase 4 – Commercial Rollout (36+ months)
• Launch RCES as an embedded system in new vehicles.
• Retrofit kits for fleets in parallel.

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Business Model * Plan & Funds

- 40% – Research & Development
- 30% – Pilot testing & certification with partners
- 20% – Business development & partnerships
- 10% – Legal, patents & regulatory approvals

4. Investment Needs

Seed Stage (Year 1–2): ~€2–3M
- **R&D & Talent**: Hire AI engineers, automotive software developers, safety experts.
- **Hardware**: RADAR, LIDAR, ECUs, testing vehicles.
- **Simulation & Validation**: CARLA infrastructure, real-world prototyping.
- **IP Protection**: Patent filing and legal costs.

Series A (Year 2–3): ~€10–15M
- **Pilot Programs** with OEMs and Tier 1 suppliers.
- **Regulatory Compliance** (EuroNCAP, NHTSA validation).
- **Scaling R&D** for V2V integration.

Series B (Year 3–5): ~€30M+
- **Commercial Partnerships** with OEMs.
- **Mass production** readiness.
- **Retrofit solutions** for fleet market.

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Business Model * Plan & Funds

- **Market**: €40B+ growing, with a **white space** (no active rear collision evasion tech today).
- **Clients**: OEMs, Tier 1 suppliers, fleets.
- **Business Model**: Licensing + partnerships + retrofit kits.
- **Plan**: Prototype → Pilot → Partnerships → Commercial launch.
- **Investment**: Initial €2–3M for R&D + IP, scaling to €30M+ for commercial rollout.

Sources:
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Thank You slide

Thank your audience and encourage them to get in touch afterwards.

SDV Eclipse Software Defined Vehicle

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