Name: **Ádám Tóth**, BSc student, electric engineer, third year

Project type: thesis project

Topic: **Design and Implementation of Blind Spot Detection (Warning) System**

Supervisors: Dr. Szilveszter Pletl

- This function aims to reduce the number of accidents during lane changes by addressing the issue of drivers missing vehicles in their "blind spot" or those approaching at high relative speeds.
- The focus of the project is to design a Blind Spot Detection (Warning) BSD/BSW system by using system engineering principles. The methodology of the project is to analyze stakeholder requirements and create system specifications.
- The project can be separated into two parts:
  - Model Based Design
  - SW design and implementation
- Due to it being a 2-3 person work I chose the SW design and implementation

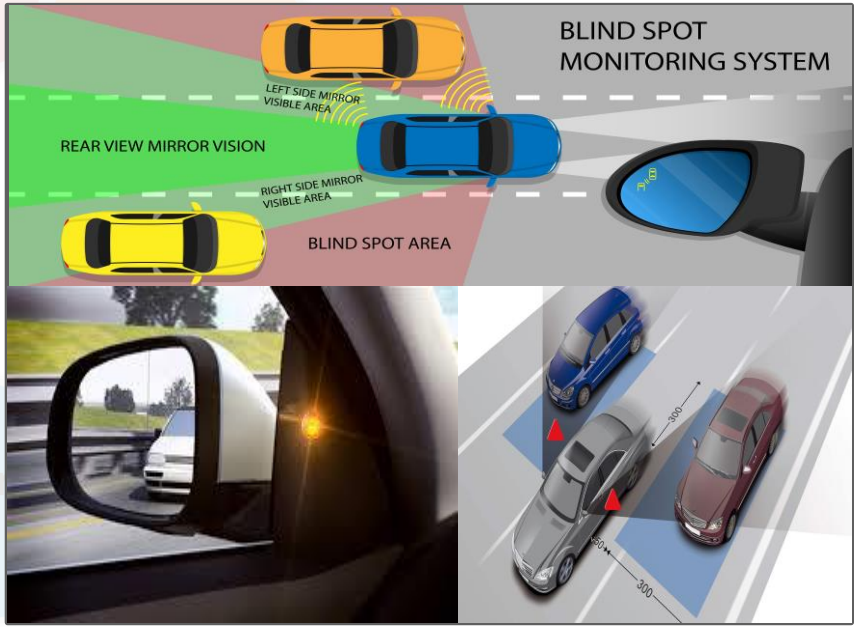
Experiments

Stakeholder Requirements:

- The Blind Spot Monitoring (BSM) system shall detect vehicles / objects in the driver's blind spot accurately even in adverse weather conditions such as heavy rain, snow or mud.
- The system shall provide acoustic and visual warning when a vehicle/object is detected in the Field of View of the system and the driver
- The detectable range should be calibrated to fit to different vehicle length
- The system shall recognize small vehicles / objects such as: motorcycles, bicycles
- The system shall allow the driver to adjust the range of the BSM system via the Human Machine Interface (HMI)
- The system should be available only if the ignition is switched on
- The system shall communicate on CAN network between the partner ECU's
- Within the radar network system, the same sensors shall be used
- The system shall be able to provide failure information via diagnostic interface

Requirements set by myself :

- Choosing a proper software where I can implement, design, and test the system
- Realization of a realistic radar that reflects real-life implementation
- Adjust the radar into the appropriate position in the vehicle to detect the blind spot
- Making a scenario, where I can make tests



Results & future work

- For this project the Carla simulator has been chosen, which is an open-source autonomous driving simulator. It was built from scratch to serve as a modular and flexible API to address a range of tasks involved in the problem of autonomous driving.
- The scenario has two weather conditions. A sunny as well as a rainy scenario
- The system shows the detected radar points with different colors.
    - Red: when the detected vehicle moves away
    - Green: when the detected vehicle approaches our ego vehicle
    - White: when the detected car is stopped or has the same velocity as our ego vehicle
- The detectable range can be modified, moreover, it fits different types of cars.
- The simulation is available for five types of vehicles
- The system can recognize small vehicles such as motorcycles and bicycles
- An HMI is designed for the system where we can modify the radar range and it's also visualized with two leds when something is in the blind spot
- The system can only work when the ignition is on. It's stimulated by pressing the „I" button on the keyboard. However, it will be changed by the time

Future work:

- Making the radar model/design more realistic by extending the model with more parameters
- Implement the project with the CAN bus communication
- Provide failure information via the diagnostic interface
- Extend the HMI with more information
- Fine tune the radar positions