SAEINDIA NORTHERN SECTION

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AUTONOM INDIA 2021

AUTONOMOUS VEHICLES TECHNOLOGY CHALLENGE

Design & development of autonomous 4 wheeled 4 seater electric vehicle for urban mobility in Indian context

ATS

IPG AUTOMOTIVE

MOBILITY OUTLOOK

Competition / Objective

1. Generation of minimum 10 different typical unsafe Indian driving scenarios with all relevant driving objects /actors using IPG carmaker simulation tool.

2. Generate min 10 edge cases which are difficult for a conventional ADAS system to function in Indian driving condition.

3. Application of the most relevant ADAS sensors to ensure object detection, collision warning and collision avoidance in the identified unsafe driving scenarios

Advanced Driver Assistance Systems – Use cases

- Adaptive Cruise Control
- Emergency Brake Assist
- Lane Departure Warning
- Lane Keeping Assist
- Park Assist
- Intelligent Light Assist
- Traffic Sign Assist
- Driver Drowsiness Detection
- Night Vision

Competition mode

The competition is divided into four rounds.

- **Round 1 – Scenario Generation:** each team has to generate minimum 10 simulation scenarios based on Indian Traffic conditions.

- There is no limit of maximum scenario generation.

- Minor changes will not be considered as a valid scenario.

Evaluation Criteria :-

Realistic recreation of the entire driving sequence (scenario creation). The uniqueness of the Indian driving situation critical to safe driving will be added advantage.

- The scenario will be evaluated by the jury and grading from 1 to 10 will be given on each scenarios (1 being min. and 10 being max.) depending upon the complexity.

- The award winning teams will be the teams, submitting the maximum no of valid scenarios and also teams having the highest total score among +5 scores.

EXAMPLE OF A SCENARIO

Round 2 : FIRST ELEMINATONS (1/5)

EACH TEAM WILL BE GIVEN A SET OF SCENARIOS BY THE JURY.

The team is expected to model or select various sensors for use with the given scenarios.

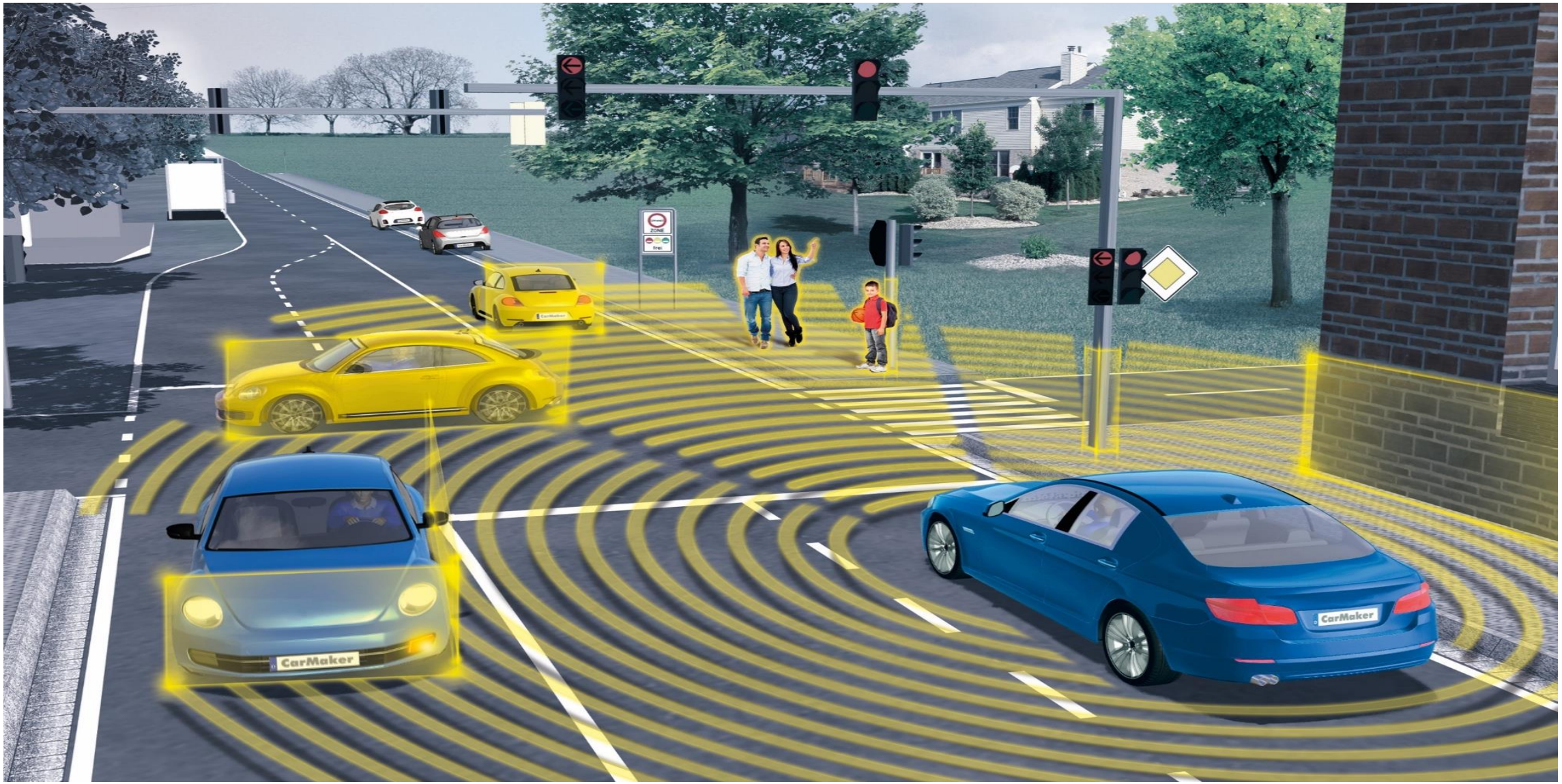
The jury will evaluate based on the best coverage by a sensor model and optimum use of their sensor fusion model, optimum use of sensor algorithm looking at the overall 3-D coverage of the surrounding of the vehicle in each scenario.

Jury will consider Technical parameters used for,

a. Target definition / modelling.
b. Sensor definition.
c. Environment modelling
d. Object discrimination methodology.

Parameters like Collision Avoidance, Time to Collision , Distance etc.. Will be used to determine the performance. Tests might be considered at different speeds.

The most Innovative / unconventional solution for the identified scenarios will be considered for awards from this round.


CarMaker
CarMaker

Round 3 : Second Elimination Round

This round is a little more advanced than the previous round.

In this Round the jury will evaluate the teams using a set of scenarios that will not be shared with the teams in advance.

The intent to give the teams more time to work on their sensor fusion models, control algorithms based on the learnings during round 2 evaluations and interactions with the industry specialists.

Evaluation criteria will be similar to round 2.

Innovative thinking and out of the box ideas will be considered for awards from this round.

On the basis of above evaluation top 20 teams will be selected for interaction round.

Round 4 : THE FINALS.

Interaction Round : In this round , the Jury will interact with all the team one by one and evaluate their approach, innovativeness in their technology, sensor fusion, optimal use , control algorithms, detection of false positives etc.

Based on the performance of round 3 and round 4 , the final winners will be selected by the Jury.

INDUSTRY EXPERT INTERACTIONS

1. **Vehicle Dynamics: Overview of Vehicle Dynamics. Concepts and working of braking, steering, acceleration and necessary parameters to be considered.**
2. **IPG Car Maker and related simulations: Usage of Car Maker, configurations, scenario generator, use of sensors models.**
3. **ADAS / Autonomous Vehicle overviews and functionalities: Basic Concepts, principle and levels of autonomy, system architecture basics and case studies. ADAS features in the vehicle and overview of Active Systems.**
4. **Sensing, Perception and Control Algorithm: Overview of various sensors, their usage and applications. Concepts of fusion, overview of AI/ML, application of algorithms and controls interfaces.**
5. **Scenario Creation and Data Acquisition: Complexities of scenarios, parameters to be captured during data collections and their usage. Overview of Data Acquisition systems and communication protocols.**

AWARDS

Round 1: Scenarios Generation

1. **Highest Number of Valid Scenarios from a Team :** Winner , First Runner Up , Second Runner Up
2. **Maximum Number of Valid Score in Terms of Validity submitted by a team (Grade greater than 5 per scenario) -** Winner , First Runner Up , Second Runner Up

Round 2 : Elimination Round (1/5)

Round 3 : Elimination Round (TOP 20)

Final Round –

1. **Overall Awards**
   - Overall Winner
   - Overall First Runner Up
   - Overall Second Runner Up

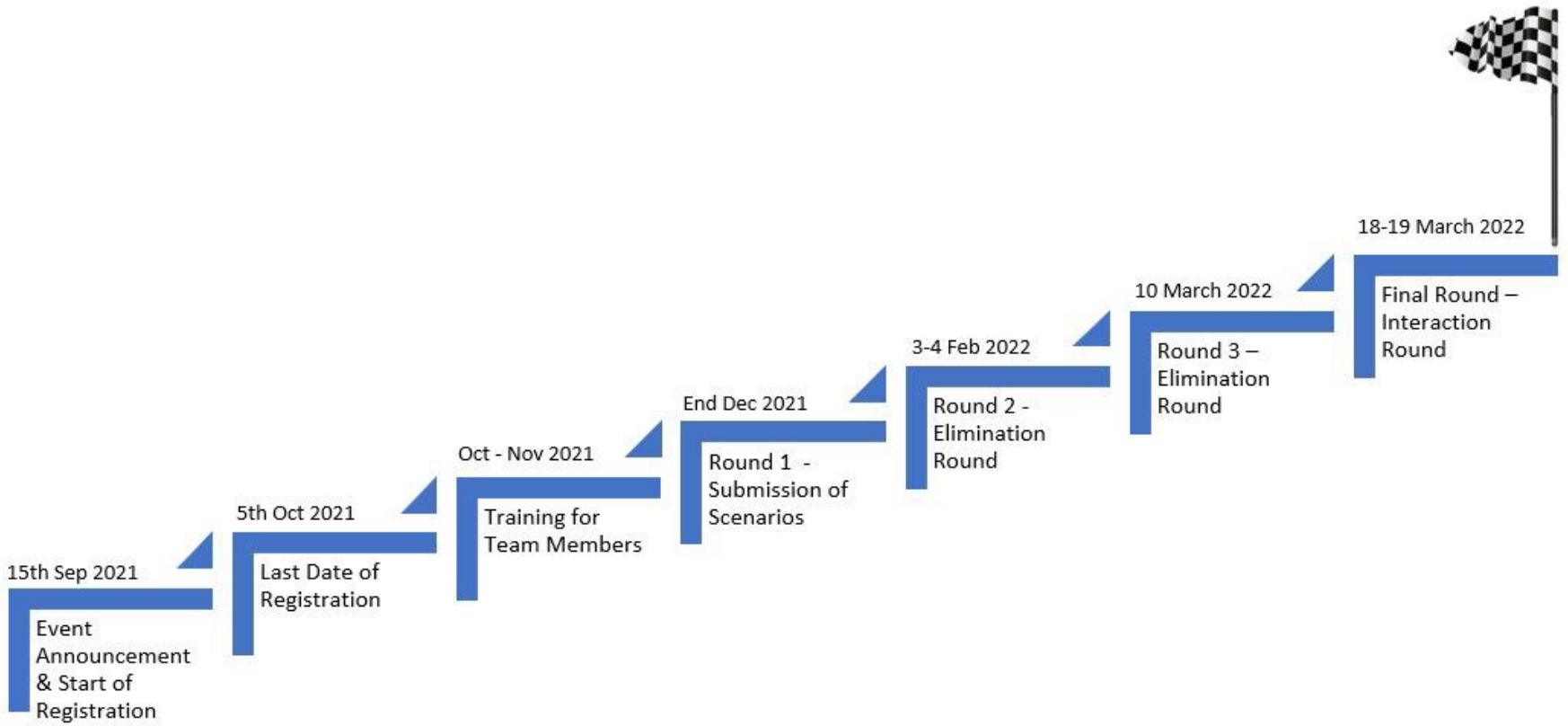
OTHER AWARDS :

WINNER, FIRST RUNNER UP, SECOND RUNNER UP

CATEGORIES:-

- BEST SENSOR MODEL
- OUT OF THE BOX APPROACH AND INNOVATIVENESS
- OPTIMAL USE OF SENSOR MODEL

EVENT MILESTONES



INDUSTRY –ACADEMIA COLLABOTATION

- SAENIS is trying to promote the Industry –Academia collaboration by conducting various events and Interactions etc.

- Separate space in our website will be provided for training modules, research papers etc.

- We will facilitate Information exchange between the Academia and Industry on various key topics.

Thank You