Continental Automotive Systems Sibiu

Continental Technical Competition 2017

Urban Autonomous Taxi

Anniversary Edition – 10 Years

Rules and regulation booklet

1. GENERAL ASPECTS

a. Target group

- The competition is addressed to all active students (including master programs) from technical faculties (Computer Science, Electrical Engineering, Electronics, Mechatronics, Robotics, Electromechanics, etc)

b. Competition team

- Consisted of maximum 3 students regardless the technical area of expertise

c. Competition description

- Design an autonomous robot / vehicle able to:
    - recognize signs
    - drive on a specific track (line following)

d. Project idea presentation

- For the pre-selection the teams should prepare a presentation document within 10 pages written in English, that will include:
    - Project description / architecture
    - Costs / spending
    - Details of all technical aspects involved in the projects
    - List of materials needed to implement the project idea (including a web link with component data sheet)
    - Main steps of implementing the project idea and responsible
    - Time planning
    - Other aspects that proves the fulfillment of the contest requirements
    - Deadline for sending the presentation: 15th of February 2017
- Participation intention e-mail should be send prior to the presentation described above, until 15th of January 2017
- Previous already done projects with the same functionality are forbidden, including existing (already built) products on market
- The pre-selection ends on 1st of March 2017 based on project presentation
- All the teams previously selected must provide a video with a status of the project until 15th of April 2017

e. Financial aspects*

- The final product will remain in the teams' property
- The transport will be supported by Continental Sibiu if you travel by train and/or bus (based on the travel tickets for each team member, refunds will be made in ~2 weeks in your bank account).
- Accommodation will be ensured by Continental Sibiu (2 nights, 3rd and 4th of May)

* Note to previous participating teams: Continental will not offer grants for the materials needed to build the equipment.

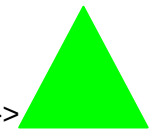
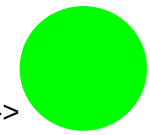
f. Deadlines and checkpoints

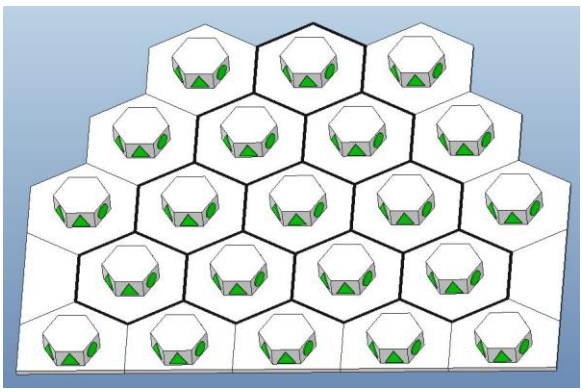
- Application deadline: 15th of January 2017 (participation intention email)
- Deadline for sending the project presentation: 15th of February 2017
- Pre-selection deadline & Results communication: 1st of March 2017

- Final selection deadline & Results communication: 21st of April 2017
- The selected teams will have to implement the project until 4th of May 2017 according to the original idea. No deviations allowed
- Competition date: 4th – 5th of May 2017
- Regular checkpoints during implementation will be performed online. Project implementation status will be sent online via e-mail
- In the days of the contest, teams are allowed to bring with them the equipment needed for final adjustments.

2. TECHNICAL REQUIREMENTS

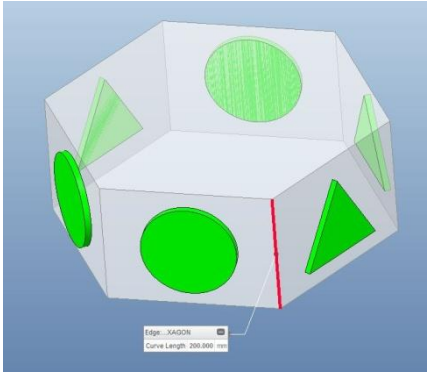
a. Racing track and robot / vehicle

- The robot / vehicle should be able to drive independently (no external intervention during the official attempt) on a designated area
- The track line must be hovered by robot / vehicle projection at all time. The track line is 25 mm width
- The robot / vehicle must be able to:
  - Detect the following signs: **Mandatory Left** ->  **Mandatory Right** -> 
  - Take turns based on the figures above
- The circuit lanes are hexagonal shaped (see picture 2.1). The color of the lane is black and the background is white



Picture 2.1 *Example given of a circuit*

- The traffic signs are displayed on the sides of a hexagonal prism placed in the middle of the hexagonal shapes. The prisms are 20 cm high (see picture 2.2)



Picture 2.2 *Hexagonal prism with traffic sign (prism transparency is just for visualization)*

- The image processing (sign recognition) can be made on PC (wireless camera -> PC -> robot)
- Ground clearance of the robot / vehicle must be at least 5mm. Inside the track might be maximum 5mm bumps (level difference due to track construction), which the robot/vehicle must overpass
- Robot/Vehicle dimensions:
    - The robot / vehicle projection must fit into a 20cm x 30cm shape

*all the signs presented in this document are only for information. The dimension of the signs will be provided in due time.

3. CONTEST RULES

a. Preparation time

- 1 day before the contest, each team will be granted a preparation time
- In the contest day no preparation is allowed
- Modifications regarding the vehicles' behavior (HW and SW) are NOT allowed during the contest

b. Competition

- Only one robot / vehicle is allowed to be placed on the track at any given time
- Each team has the right of 3 official attempts
- The robot / vehicle must collect points based on correctly passed crossroads and time, in order to be qualified for ranking.
- The robot / vehicle must not physically separate into pieces. If the robot / vehicle will separate into pieces, it will be disqualified.
- The robot / vehicle must not damage any component of the track. If any component is damaged, the robot / vehicle is disqualified in the respective attempt
- The criteria of winning the competition:
    - Each participant will receive points for each crossroad passed
    - Each crossroad passed and sign not taken into consideration will receive 1 point. E.g. after "n" crossroad passed but no sign taken into consideration the participant will receive n points
    - Each crossroad passed and sign taken into consideration will receive points exponentially. E.g. after "n" crossroad passed and signs taken into consideration the participant will receive $2^{(n)}$ points
    - The maximum number of crossroads allowed for each participant is 10
    - The maximum time to finish is 180 sec. If two or more participants will receive the same number of points then the time will be considered. The atomic unit for time is 'second'. No time units less than 1 second are taken into consideration
    - More than 1 start point will be available. Each participant is randomly placed at the start point using dices.
- The team with the **HIGHEST** number of points will WIN the competition
- The best attempt will be taken into account for each robot / vehicle
- Time limit for each attempt is 3 minutes

c. Selection criteria

- Presentation of the project idea and design
- Final selection with pictures and movie
- The evaluation will be made by the Continental technical team

d. Appeals

- The appeals can be submitted to the organizers only when all the participants finished all the rounds

4. Contact

If any questions feel free to contact us via e-mail on the following address:
technical-competition@continental-corporation.com

*all replies will be distributed to all participant teams