Continental Technical Competition 2018

Sibiu Urban Quest

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

- Formed by maximum 3 students regardless the technical area of expertise

c. Competition description

- Design an autonomous robot/vehicle able to:
    - Read QR codes
    - 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: 28th of February 2018
- Participation intention e-mail should be send prior to the presentation described above, until 12th of January 2018. The email should contain the name of the team, the name of the participants, university, faculty, emails and telephone numbers.
- Previous already done projects with the same functionality are forbidden, including existing (already built) products on market
- The pre-selection ends on 5th of March 2018 based on project presentation
- All the teams previously selected must provide a video with a status of the project until 10th of April 2018

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, 25th and 26th of April)

* Continental will not offer grants for the materials needed to build the equipment.

f. Deadlines

- **Application deadline: 12th of January 2018 (participation intention email)**
- Deadline for sending the project presentation: 28th of February 2018

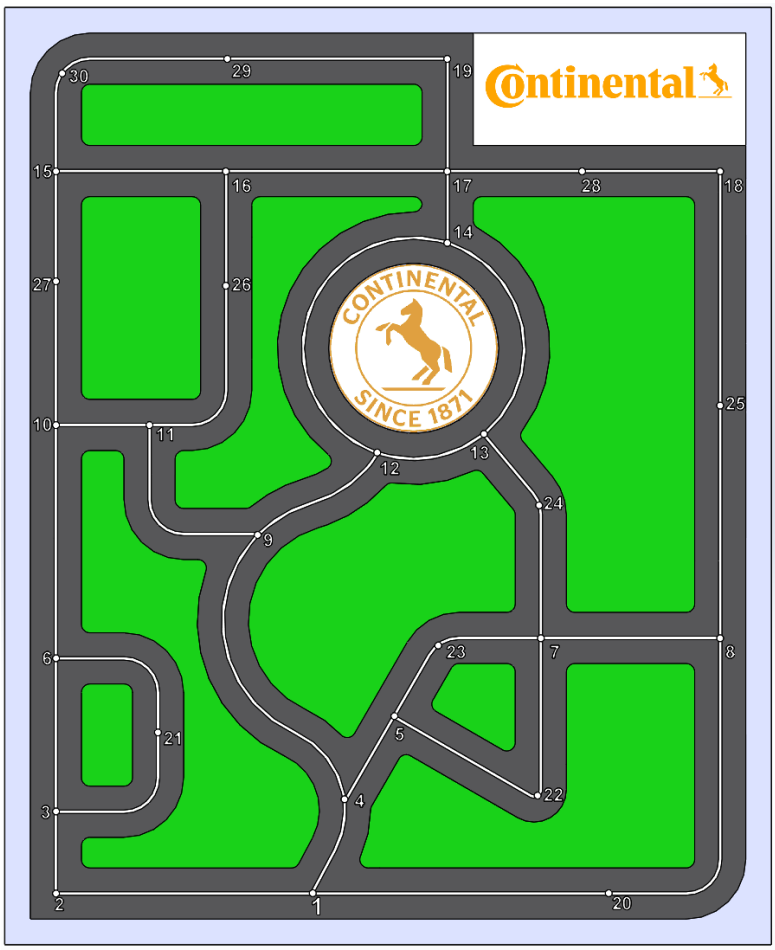
- Pre-selection deadline & Results communication: 5th of March 2018
- Final selection deadline & Results communication: 13th of April 2018
- The selected teams will have to implement the project until 26th of April 2018 according to the original idea. No deviations allowed
- Competition date: 26th – 27th of April 2018
- 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

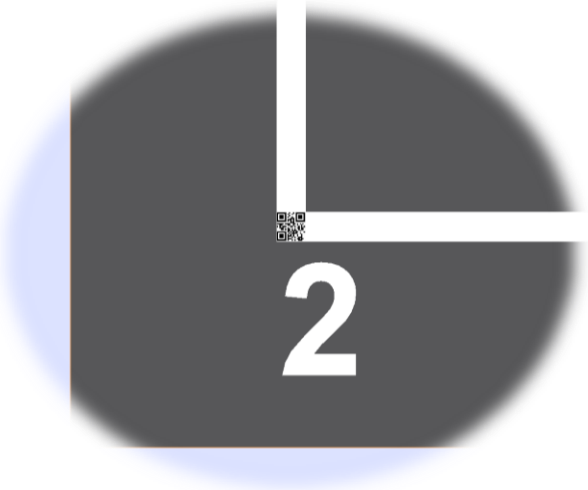
- The robot/vehicle should be able to drive independently (no external intervention during the official attempt) on a designated area
- The road must be covered by robot/vehicle projection at all time. The road is 300 (+/-50) mm width and the road's central line is 20 (+/- 5) mm width.
- The robot/vehicle must be able to:
  - Detect the QR codes
  - Follow the road's central line
  - Reach certain checkpoints
  - Signalize the reach of a check point
- The color of the lane is dark grey, the central line is white and the background is green (exception for the logos)

Picture 2.1 *Competition Track*



- QR codes can be placed anywhere on the middle of white line as checkpoints or for guidance
- The QR code reading can be made by any kind of device suitable for this task (camera, phone, dedicated device, etc)
- The QR codes are printed on white labels (white background / black color code)
- The dimension of the the QR code is 2x2 cm (+- 2mm) – fits into the middle white line.
- See Annex for examples of QR codes.
- Each participant will receive the full map of the track, including QR codes and their placement.

Picture 2.2 QR code placement



- Ground clearance of the robot / vehicle is recommended to be around 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

3. CONTEST RULES

a. Preparation time

- 1 day before the contest, each team will be granted a preparation time
- Adjustments are only allowed between rounds
- Modifications regarding the vehicles' behavior (HW and SW) are NOT allowed during the round

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 checkpoints 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 team takes a penalty of 30 points.

- The criteria of winning the competition:
    - Each participant has to reach checkpoints (or destinations).
    - Maximum checkpoints that shall be reached by each participant is 4.
    - Each checkpoint has an ID, represented by QR code label, placed on the middle white line of the road.
    - At the beginning of each attempt the vehicle will read the IDs of checkpoints that have to be reached. The order is given by the starting label. E.g. 13_5_8_20, means that the participant has to reach first the checkpoint with ID13, then checkpoint with ID5, then checkpoint with ID8, etc.
    - The IDs will be read from a QR code start label similar with the QR codes from the track. This start label is placed under the code reader by hand then removed.
    - The checkpoints and their order (per round) are identical for all participants, but the vehicle will know them only after reading the start input label.
    - Each participant will receive points for each signalized checkpoint.
    - Each reached checkpoint must be signalized by the vehicle using a clear signal (sound, light, flag, or other distinctive method).
    - For each checkpoint signalized in the correct order the participant receives 100 points.
    - For each checkpoint signalized in wrong order the participant receives 10 points. From the above example if participant reach:
        ID13, ID5, ID8, ID20 → 400 points
        ID13, ID8, ID5, ID20 → 220 points
        ID20, ID5, ID13, ID8 → 40 points
    - 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.
    - When maximum number of checkpoints have been reached, the counter will be stopped.
    - All participants start from the same starting point marked by a QR code but this starting point is randomly chosen at the start of each attempt by dices.
- The team with the **HIGHEST** number of points over all 3 rounds will WIN the competition

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

5. Annex

The following is an example of how QR codes will look, together with the information encoded. There will be no black outline on the track. The lines in the picture below are there just for delimitation purposes.