ESONANCE 2015

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Unmanned Rescue Mission (URM)

Competition Guidelines

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Unmanned Rescue Mission (URM) at a glance

Unmanned Rescue Mission (URM) is the biggest event of 'ESONANCE 2015' featuring a robotic competition on "Rescue Operation during natural Disaster". Here, participants have to solve a scaled down version of a problem arena depicting disaster situation with ***exclusive*** obstacles and difficulties.

Delivering aid, including food, clean water, fuel and medical supplies to places during natural disaster such as Earthquake, becomes a difficult task.

Transporting bulk materials over uneven and rough terrain, in tight spaces, and over long distances is often required to help those in need.
While several frequent tremors were already felt in different regions of Bangladesh, the country is far from being completely safe from massive Earthquake threats.

Keeping these situations in mind and its possible after effects, this year's challenge is to design and develop a scaled-down version of a transporter capable of delivering aid/materials, which will be guided by, at most, one person.

The contestants need to design **two** robots in this competition: an **autonomous line follower** and a **transporter**. Each robot will be assigned to perform separate task in separate arena (line follower arena and Transporter arena).

1. **Autonomous line follower:** A small **autonomous robot** has to follow a line in line follower arena under various conditions (e.g. round corners, sharp corners, crossovers, line obstacles etc.). This line follower robot will be used to unlock different aids/supports to resolve exclusive obstacles (e.g. bridge, road block, short cut etc.) for smooth travel of the **transporter** in transporter arena.
2. **Transporter:** A manually controlled, robot which will be capable of transporting objects of different shapes and sizes (maximum dimensions of $(4cm \times 4cm \times 4cm)$) to the final unloading zone in the transporter arena.
   The manual bot should be wirelessly controlled (i.e., using RC (radio controlled), e.g., RF (radio frequency) or IR (infrared)),

As for example, in line follower arena, the autonomous line follower robot crosses some obstacles by following a line and finishes predefined checkpoints (tasks). The successful completion of those tasks will allow the team to establish a bridge in transporter arena for the manually controlled robot (transporter) to cross a zone filled with water.

Any team failing to perform the tasks to trigger the bridge by the autonomous robot will not be able to perform the other task that will involve the manual robot.

Note that the arena for the two robots for two separate tasks will be different and the arena specifications will be published soon.

Autonomous Robot Specification (line follower)

Design Rules: Robot must be a ground wheeled autonomous vehicle.

- **Length:** Maximum length is 30 cm.
- **Width:** Maximum width is 20 cm.
- **Height:** Not to exceed 20 cm.
- **Weight:** 5 kg maximum.
- **Power:** Maximum 24 volts on-board power supply.
  Each team has to bring its own power supply for robot. No additional equipment/parts will be supplied in the competition.
- The robot may be:
  - Built from scratch by the participants (recommended).
  - Built from readymade chassis (but no construction set such as LEGO or Meccano or any other Brand is allowed). Teams who use readymade chassis will get 75% of total point.

Manual Robot Specification (RC Transporter)

Design Rules: The robot must be ground wheeled vehicle, which is manually controlled

- **Length:** Maximum length is 35 cm
- **Width:** Maximum width is 30 cm
- **Weight:** 10kg maximum
- **Power:** Maximum 24V on board power supply.
  Each team has to bring its own power supply for robot. No additional equipment/parts will be supplied in the competition.
- The robot may be:
  - Built from scratch by the participants (recommended).
  - Built from readymade chassis (but no construction set such as LEGO or Meccano or any other Brand is allowed). Teams who use readymade chassis will get 75% of total point.
- The robot is manually controlled using RC (RF or IR) by one team member. The team may use readymade RC module. Readymade grabbers are not allowed.

Ratifications of Robots

- Each participating robot has to be submitted to the tests of ratification.
- The tests of ratification consist in verifying that the dimensions of the robot correspond to the technical specifications and the other specifications mentioned in "Robot Specification".
- Any of the robots not satisfying the tests of ratification will be excluded from the competition.
- The ratification will be realized on the day of the competition.
- Team leader should present the robot to the homologation desk.
- The Autonomous Robot must follow a line from the beginning to the end as fast as it can and reach the final checkpoint.
- The manual robot should make a onetime run and proceed to the unloading zone. It picks up each object on the way and unloads them at the unloading zone.

Competition Rules

- The autonomous robot will be placed at a pre-assigned starting point on each stage, and may be started by hand when directed by the judge.
- The manual robot will be placed at the pre-assigned starting point and will only be allowed to start once the autonomous robot crosses the final checkpoint.
- Time is measured from crossing the start line by the autonomous line follower until the manual transporter robot unloads the last object. A robot is considered to have crossed the line when the forward most part of the robot contacts or crosses over the line.
- Time will be measured by an electronic gate system or by a judge with a stopwatch, based on the availability of equipment. In either case the recorded time will be final.
- The autonomous robot must follow the line fully autonomous without any human intervention.
- No wireless communication or external data feed to the autonomous robot is allowed. This will consider as disqualification from the competition.
- The autonomous robot may use shortcut tactics to complete the course faster by following the line. But the robot must go through every checkpoints including the final checkpoint. Otherwise, the robot will be disqualified. No shortcut tactics for the manual task is available.

- The robot is placed by at the start and should attend the end point. Any other case, the robot is disqualified.
- For the manual task, the robot should reach the unloading zone.
- The objects must be unloaded in the specific area defined as the unloading zone. Objects unloaded outsize the unloading zone will not be considered.
- The start and the unloading zone can be on either side of the arena, and would be revealed on the day of the competition.
- In competition only 5 attempts or restarts of the autonomous robot are authorized.
- After crossing the starting zone no restart is allowed for manual robot.
- If the autonomous robot loses the line, it must restart from the last checkpoint. In this case, the timer will remain running during restart and a penalty will be pointed.
- If any of the robots steps off the arena it will be disqualified.
- The judges can ask for an explanation of any mechanism on the robot and there would be an immediate disqualification of defaulters of any kind.

- Each participating team must agree all rules by presenting a written agreement to the homologation desk at the day of competition.
- The competition Committee reserve all the right to change any rule as they deem fit.
- Competition rules may change anytime which will be pre-notified through internet and will applicable to all teams.

Note that
- Arena specifications for two robots,
- General rules of the Team,
- Evaluation procedure

will be published soon in the ESONANCE website and Facebook Page.