Creative Contest Group Rules

China Eighth National Undergraduate Student Freescale Cup
Intelligent Car Competition
(April 10, 2013)

I. Introduction

The creative contest is carried out within the period of the intelligent car final race. The purpose of contest is that students improve their innovative ability and competition level. beyond that, the content of racing competition could also be diversified. Since 2008, the creative contest has been held successfully for five years , and in 2013 it will be held in Harbin Institute of Technology, the host university of national final intelligent car competition. Contestant's entries get the qualification of the field contest by technical inspection in advance.

The organization principles of creative contest are listed as the following:
1. Standardize the subject, rules and award method of contest.
2. Promote the innovation and development of the race competition.
3.The theme of contest should be related to practical problem closely.
4.Encourage students to adopt the state-of-the-art technology and creative ideas.
5.Encourage students to reduce cost of their entries and demonstrate their nontraditional thinking.

The above principles are developed based on the opinions and suggestions given by the students and their faculty advisors of previous year team. According to these principles the limitation and requirement of contest are listed in section II, which involves contest theme, technical requirements, vehicle model action and MCU types etc.

II. Entries Requirements

Background of creative contest: When a human is trapped in the wild or on the sea, the key to maximizing his survival rate is the outside effective rescue in time, as well as his own survival skills and equipments. The situation is shown in figure 1.

Figure 1 Background of creative contest

Creativity theme: Contestant teams are required to design and make a automatic alarming and rescuing miniature system, which is comprised of many beacons and autonomous vehicles. The system can demonstrate wild rescue procedure. The beacons send out the alarm signals with positioning information. The vehicles can trace the signals and reach the location of beacons to complete the rescue task.

1. Basic Requirement of Entries:

- Entry is comprised of two model vehicles and five beacons.
- Entries demonstration field is a square area with side less than 5m/16.4f. Background color is blue.
- The sequence number(1-5) and location of beacons are determined randomly by spot judges.
- Two departure districts for the vehicles is located in the opposite corner of the field.
- Competition scenario: Beacon 1 sends alarming positioning signal first. Vehicle 1 departs from field corner heads to rescue region of beacon 1. The rescue region is marked by a circle with beacon in center and radius of 40 cm/15.75inch. After vehicle reach the rescue region, beacon stop alarming, and then beacon 2 begin alarming. Vehicle 2 departs and heads to rescue region of beacon 2. When vehicle reach the location, beacon stop alarming. Next, it is turn for beacon 3 to alarm. The above procedure repeats until the vehicle reach the beacon 5.

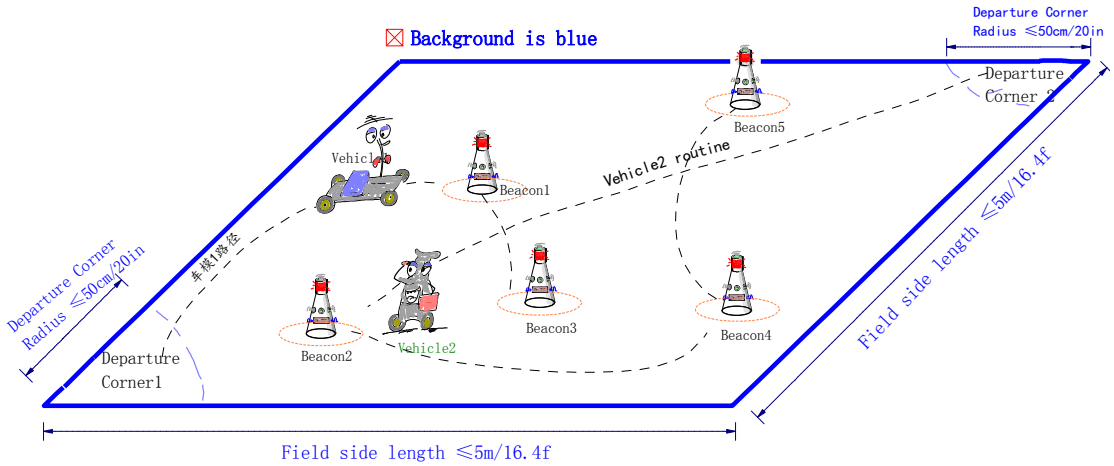

Figure 2 Scene of the Competition

During the basic demonstration of the entry, beacons send the alarm with the location information on the sequence number order from 1 to 5 successively. Vehicle 1 perform rescue task for beacon 1 and 3, and vehicle 2 for beacon 2,4 and 5 respectively. The whole rescue task should be finished through cooperation between beacons and vehicles automatically.

The design of plots should consist the above automatic searching and rescuing scenarios. Besides this, other more scenarios could also be added to the demonstration. The basic competition scenarios can be shown alone or integrated with other scenarios.

A. Requirements of Beacons

(1) Geometrical Sizes:

As shown in figure 3, height of beacons should be less than 30cm/12inch, pedestal diameter should be less than 25cm/10inch, rescue region radius should be less than 40cm/15.8inch. As any wheel of the vehicle enter the rescue region, a rescue mission is regarded as completed.

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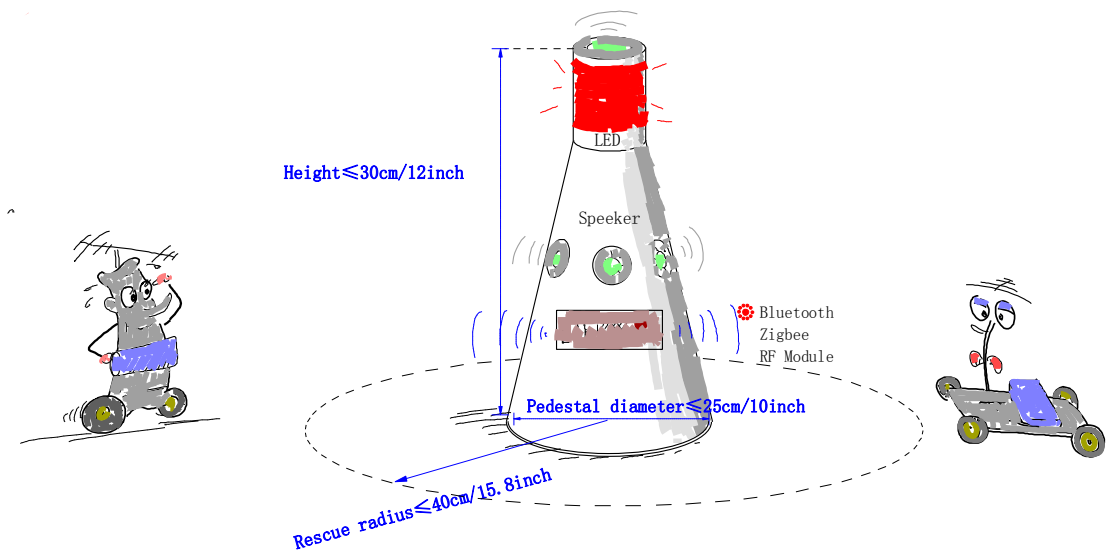

Figure 3 Beacon Sizes

(2) Types of positioning signals of beacons

Beacons could send out several kinds of positioning signals including, but not limited to, light, sonic wave, electromagnetic wave etc. There is no any restrictions on shape, material and color of beacons. Beacons should consist at least two types of signals, and could switch on or off the signals during the demonstration.

The vehicles can only be guided by tracing the signals sent by beacons to finish the rescue task. Any other guiding signal not coming from beacon are prohibited.

B. Requirements of Vehicle Models

The two vehicles could be made based on any of the five standard racing model cars: A, B, C, D, E, as shown in figure 4. They are divided into two groups: four-wheeled car and two-wheeled car. The vehicles could use the cars from the same group, or from different group respectively.

C. Requirements of MCU and Sensors

- MCU of the controller must be selected from Freescale products.
- There is no limitation on kind, quantity and part type of the sensors.

2 . Basic Evaluation Criterion of Entries

a. Creativity and spot demonstration effect

In addition to implementing basic requirement of the entries, the arrangement of the demonstration should be reasonable and innovative, and be achieved with high attractiveness and completeness.

b. Rapidity and accuracy of rescue

During the actual demonstration, the vehicle should detect the alarm signal accurately, access to the beacon promptly along the reasonable planning route. Vehicles should be in the field during the whole demonstration, avoid to be out of the boundary and also avoid collision with the beacons.

c. Advancements and rationality of technological means.

During the demonstration, teams give an oral explanation about the key technologies adopted in the system, and explain how them work to ensure the reliability of the communicating, accuracy of the signal detecting, reduction of the beacon power consuming etc.

3. Creative contest procedure

Procedure of creative contest is mainly comprised of three steps, which are spot demonstration of entries, answering the questions from experts, audience voting . The final rank is determined by the sum of scores of three steps.

III. Team Rules and Requirements

1. Full-time undergraduate and graduate students at school before the summer of 2013 with official student status may participate.
2. The number of the people on a team range from 3 to 5, including at least one undergraduate student. Students who participate the racing competition can also attend the creative contest. Team can have one or two faculty advisors.
3. Number of team attending the creative contest from an university is ONE.
4. Registration of the contest begins on April 15, 2013, ends on July 15, 2013.
5. Participating teams sign up directly to the organizing committee of the National Finals. Contact information of the organizing committee of the National Finals is as follows:

   Li Yansong
   Electrical Engineering and Automation Department,
   Harbin Institute of Technology.
   Nangang District, No. 92, Harbin, Heilongjiang Province, 150001
   Tel: 0451-86413606, 13804635258
   Email: liyansong@hit.edu.cn

   Participating team should submit creative contest entry form. See Attachment 1.

6. Submit preliminary technical report and videos to the committee before July 25, 2013. Experts of creative contest group will review the materials, and the committee will announce the qualified list on August 1, 2013.

IV. Competition Rules

1. Participating teams should submit final technical reports to the committee one week before the competition. Experts will score the technical reports.
2. Team demonstrate the entries in the order, determined by Organizing Committee, one by one.
3. The teams can use the field prepared by organizing committee. If the field does not meet the requirements, teams can also use their own field.
4. Demonstration time is limited within 10 minutes. During the demonstrating teams member give the speech of their works, answer the question from the judges and audience.
5. The technical score is given by judges, the displaying effect score is given by audience voting.
6. The final score is weighted average of report score, technical score and displaying effect score. Weighting coefficient will be determined and announced in advance.

V. Prizes

The creative contest provides first prizes and second prizes. The winning teams will receive award certificates and commemorative prizes. The specific number of prizes

will be announced after the deadline of registration, not more than 20 in principle.

China National Undergraduate Student Freescale Cup
Intelligent Car Competition Organizing Committee
Competition Secretariat
April 10, 2013