



Collegiate Robofest, **Mini Urban Challenge** using Vision Based Robots

Last Updated on 2-20-07 (still draft...)

Date:

- April 27, 2007 – Qualifying Competition
- April 28, 2007 – Final

Place: LTU Field house, 21000 West 10 Mile Rd., Southfield, MI

Recently, much attention has shifted towards using computer vision as the main sensory modality of autonomous mobile robotics projects. This is due to the following reasons:

- Low cost (compared to expensive laser scanners)
- Low power consumption (compared to laser scanners)
- Richness of information
- Possibility of retrieving 3D information with stereo vision

In order to promote research on computer vision and autonomous mobile robotics, we challenge college students (community college, undergraduate, and graduate students), robotics professionals and hobbyists, as well as talented high school students with the following Mini Urban Challenge 2007.

Synopsis of the Mini Urban Challenge

Follow a dashed line while avoiding orange construction barrels. At crossroads, the robot must read dynamic directional arrow signs on the ground to continue to reach the goal destination. Same combination of the directional arrow signs will be used to ensure the same total distance and complexity for each run. For example, we use the following figure 1 configuration for a run; a same configuration could be the one in figure 2. In that case, there will be 4 combinations of the route. The winners will be decided by the shortest travel time. The robot must restart from the start point if any failure such as touching the barrel, losing the dashed line, or going wrong direction occurs. In order to successfully pass the intersection, at least a wheel of the robot must touch/pass the arrow sign on the ground.

Age Divisions and Team Size.

The above rules are for College and Professional teams. For high school teams, there will be no construction barrels to avoid. Maximum number of members per team is 3.

Robot Requirements

- Must be autonomous (no remote control is allowed)
- Only the L2Bot provided by LTU is allowed to enter the competition. No modification is allowed. Must use the original motors, width, length, battery, etc.
- If battery voltage is greater than 12V, it will be replaced with the battery provided by the organizer
- Any laptop (notebook) with a serial port can be plugged to the L2Bot platform. You may use a USB-serial adaptor.
- One onboard camera (webcam or camcorder) can be used. The use of purchased vision system such as COGNEX is not allowed. No other sensors are permitted to use. Using sound sensor on the laptop is strictly restricted.
- The method to mount a camera depends on the team. However height of the robot should be less than 5 feet (You may use your own tripod).
- Weight: no limit
- Any programming language can be used.

Competition Rules

- The event will be held during the day at an in-door location. All the colors such as floor, arrow, etc. are unknown until the day of the competition.
- The barrels and arrows will be located after the robot starts.
- A team has 3 chances to run. For each run, each team has maximum 4 minutes. The winner will be decided by the average time of the three runs. If failed for a run, the travel distance is recorded.
- Exact voltage level is recorded just before the robot starts. It will be used for a tie-breaker.

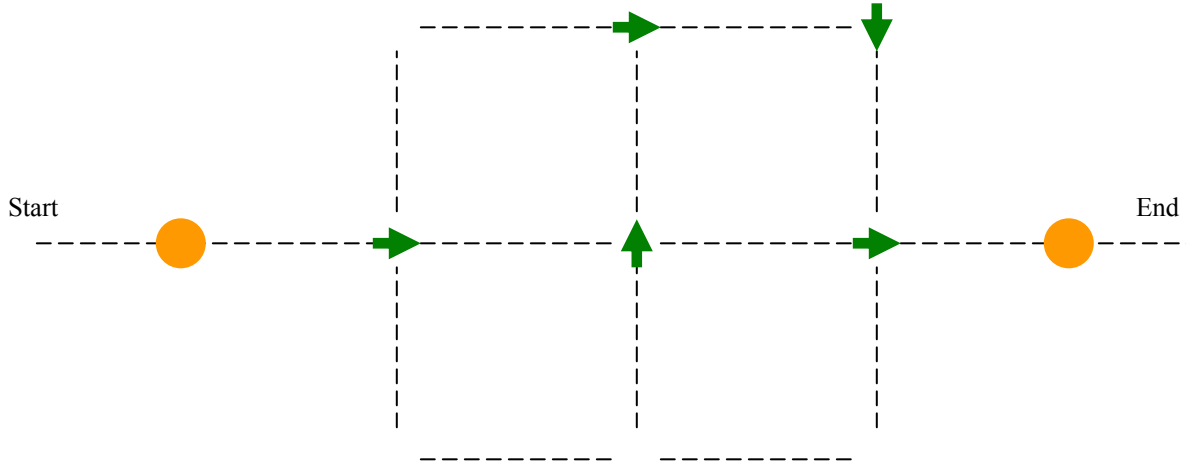


Figure 1 A sample course

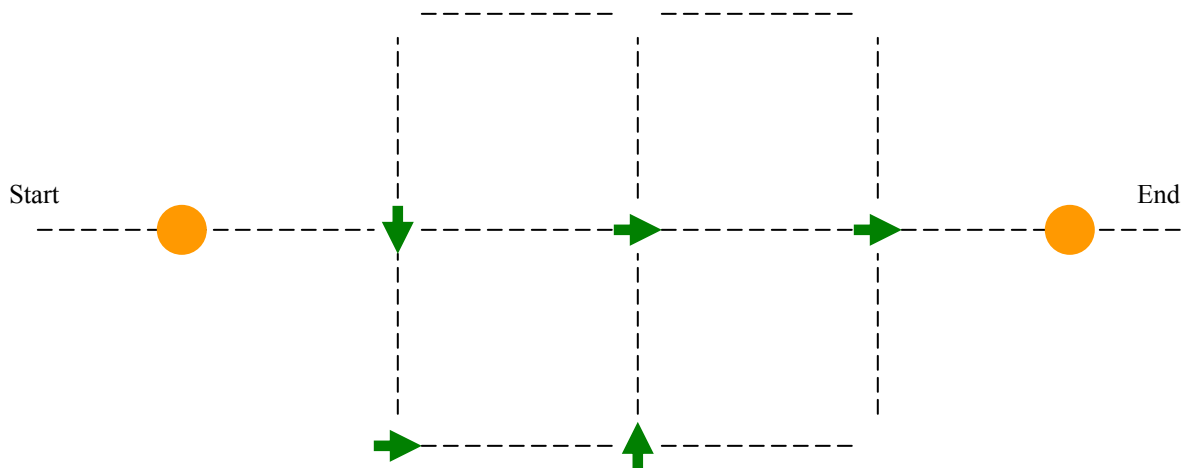


Figure 2 Another sample course

Registration

For college teams, it is recommended for college professors to be coaches of the team(s). However, it is also all right for a college student to be a coach/leader of the team.

Team coach / leader must first send/submit the Registration Form on the web via fax, email, ground mail, or in person. In order to receive framed certificate of participation and IEEE medals for all the team members, the coach/team leader must register online at www.robofest.net to input team member names.

For more details, please check out www.robofest.net/l2bot. If you have questions, please email to chung@LTU.edu