

# Fall 2007 Mini Urban Challenge using Vision-based Robot, L2Bot

Using computer vision as the main sensory modality of autonomous mobile robotics projects has the following advantages:

- 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), as well as talented high school students with the following Vision Robot Competition - Mini Urban Challenge, Fall 2007.

**When:** Tuesday, December 18, 6pm ~ 9pm

**Where:** Lawrence Tech Buell Management Building, 21000 West 10 Mile Rd., Southfield, MI

## Team Divisions

- Advanced High School: using L2Bot 2007 edition, max. 3 team members
- College: L2Bot 2006 edition, one member per team, harder problem will be given

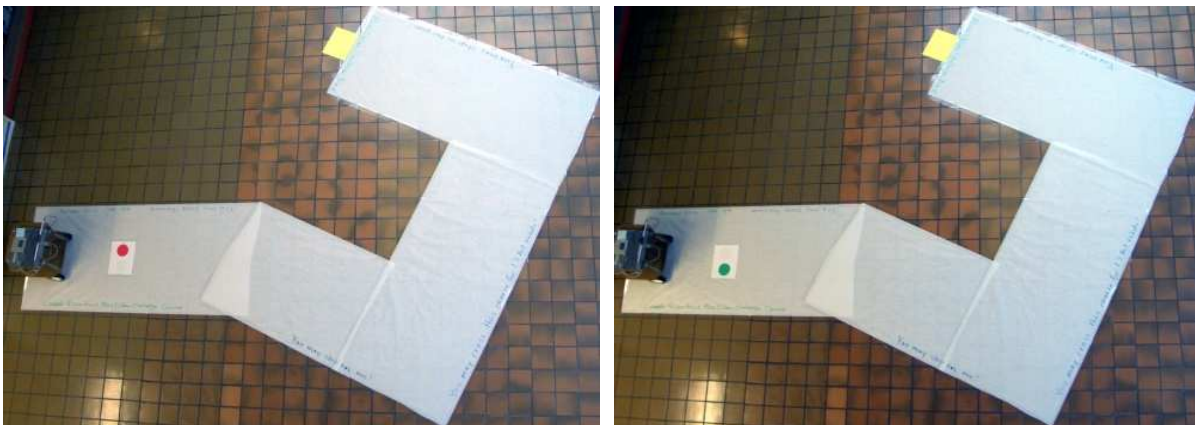
## Challenge Synopsis

Follow a road made of 3' wide white paper. There will be a letter size yellow paper at the end of the road. The robot must stop at the dead-end and come back home. The robot does not need to stop at the home when it comes back. The actual road shape is unknown until the day of competition, but you can see a sample road below. 90 degrees will be the sharpest angle to turn. The floor color is a sort of brown.



## Additional Challenge for the College Division

The robot starts when the green traffic light on the floor is shown to the robot. In the beginning before the start, red traffic signal light is placed on the floor as shown in the picture below. During the road following the robot must stop whenever and wherever the red light is presented to the robot on the floor. It is encouraged for college students to use artificial neural net architecture to train the robot for the challenge. The following pictures show another sample course setup in the atrium with the initial condition with the red light (left picture) as well as the green light (right picture).



## Competition Rules

- The event will be held in the evening after 6pm. There will be no direct sun light during the competition.
- 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.
- For the successful road following, all 3 wheels of the L2Bot must be on the road.
- The robot must restart from the start point if any failure such as failed road following.

## 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 NOT allowed.
- 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.

**Prize:** \$50 gift certificate for each division winner

## How to decide the winner

A team with the shortest average travel time out of three runs will win the race.

## How to register?

- Registration fee: none
- To register, send an email to [chung@LTU.edu](mailto:chung@LTU.edu) by December 3
- Also send an email to [chung@LTU.edu](mailto:chung@LTU.edu), if you need to purchase or lease an L2Bot

## How to practice?

- It is easy to create a test course at home using white papers at home.
- A practice course will be setup from Saturday December 16 from 11am in the atrium tentatively until the competition day.

## Misc. Info

- Go to [www.robofest.net](http://www.robofest.net) for more info and possible rule updates
- The event is open to the public. Admission is free. Parking is free.
- Concession-stand with pizza and pop will be setup.
- We plan a Robofest 2008 info meeting in the evening too.