

# VCC Vision Centric Challenge 2015 - "MaxMin"

A Robofest ([www.robofest.net](http://www.robofest.net)) Challenge for Advanced High School and College Students  
Lawrence Technological University, Southfield, Michigan

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Using computer vision as the main sensory modality of autonomous mobile robotics projects has the following advantages: (1) Low cost (compared to expensive laser scanners), (2) Richness of information (3) Low power consumption (compared to laser scanners), (4) Retrieving 3D information with stereo vision.

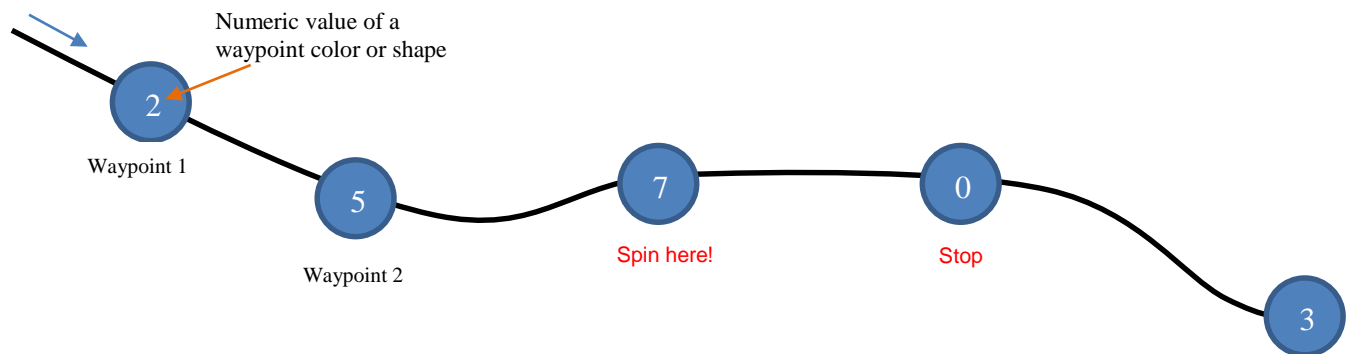
In order to promote research on computer vision and autonomous mobile robotics, we challenge college students (undergraduate and graduate students), as well as talented high school students with the following Vision based Robot Competitions during Robofest 2014-2015 academic year.

## Team Divisions

- Advanced High School: max. 3 team members
- College: max. 2 members per team

## Challenge Synopsis

Follow a solid or dashed line to a series of waypoints. Each waypoint will be associated with a numeric digit. Robots must locate and transverse all waypoints recording their associated values during the challenge. Once all waypoints have been evaluated the robot must return to the waypoint with the largest numerical value and spin 720°. The robot must then return to the waypoint with the smallest numerical value and stop.



## Challenge Course Description

The exact shape, color, and length of the course are unknown. Floor or ground color will be unknown, but should be different from the color of the dashed line. Lighting conditions on the course are unknown and dynamic. The line will be made from bright masking tape of which the width is at least 2.5 inches. The gap between lines will be at most 12 inches. 90 degrees will be the sharpest angle to turn. Total number of waypoints will be provided at the beginning of each run. Number of waypoints can range from 1 to 10.

- **Advanced High School:** Waypoints will be represented by 9 x 12 inch sheets of colored construction paper. Actual paper used will be SunWorks® Construction Paper available online at <http://www.officedepot.com/a/products/307664/SunWorks-Construction-Paper-9-x-12/>. A table of the waypoint color to numeric value information is provided in Appendix A. A sample course is shown above.

- **College:** Waypoints will be represented by white 8.5 x 11 inch sheets of standard letter size printer paper. Each waypoint will have a printed orange shape. Paper and shape orientation will vary but remain consistent for all teams. All shapes and their associated numeric values is provided in Appendix B. A PDF file containing 10 shapes in orange color can be downloaded from on the web at <http://www.robofest.net/2015/VCC15collegeShapes.pdf> .

### Competition Rules

- A robot will have 3 chances to run. For each run, each robot has a maximum of 4 minutes. All the robots will be impounded (quarantined) before starting each “run”.
- The winner will be decided by the number of successful runs. To complete a successful run the robot must: transverse all waypoints, return to the largest numerical value, spin 720°, return to the smallest numerical value and stop.
- If multiple teams tie for the number of successful runs the teams will rerun courses of increasing difficulty until a winner is decided.
- Spinning 720° on any waypoint other than the waypoint with the largest value will disqualify the robot from that run.
- Permanently stopping on any waypoint that is not the waypoint with the smallest value will disqualify the robot from that run.
- Completing the run sequence out of order will disqualify the robot from that run.
- The robot will be considered off course and disqualified from that run if the dashed or solid line is no longer beneath any portion of the robot.
- Human player cannot have any interaction with the robot. For example, giving sound or visual signals to the robot is not allowed.

### Robot Requirements

- Must be autonomous. (No remote control by human driver or remote computer is allowed)
- Any robot platform with any vision system such as LTU’s L2Bot is allowed to enter the competition.
- Any number of onboard cameras (webcam or camcorder) can be used. You may use any other sensors such as digital compass.
- Any programming language can be used.
- Width: must be less than 2ft
- Length: less than 3ft
- Height: maximum 6ft
- Weight: no limit

**Prize:** Winner Trophies; High school team members of the winning team receive \$2,000 LTU renewable scholarships.

### Competition Date

- Saturday, May 16, 2015, 8:30am ~ 4:30pm
- Course will be setup on May 15, 2015. Teams can practice between 3pm and 6pm

### Questions:

- Regarding registration or L2Bot lease: Contact Prof. Chung at [chung@LTU.edu](mailto:chung@LTU.edu)
- Regarding Rules: Contact Prof. Ruzala at [jruzala@LTU.edu](mailto:jruzala@LTU.edu)











### Misc. Info

- Go to [www.robofest.net/collegiate](http://www.robofest.net/collegiate) for more info and possible rule updates
- The event is open to the public. Admission is free. Parking is free

## Appendix A

Advanced High School Waypoint Numeric Value Chart	
<i>Paper Color</i>	<i>Numeric Value</i>
Black	0
Blue	1
Brown	2
Green	3
Orange	4
Pink	5
Scarlet	6
Violet	7
White	8
Yellow	9

## Appendix B

College Waypoint Numeric Value Chart		
<i>Shape</i>		<i>Numeric Value</i>
Circle		0
Square		1
Triangle		2
Pentagon		3
Hexagon		4
Cross		5
Arrow		6
Moon		7
Heart		8
Star		9