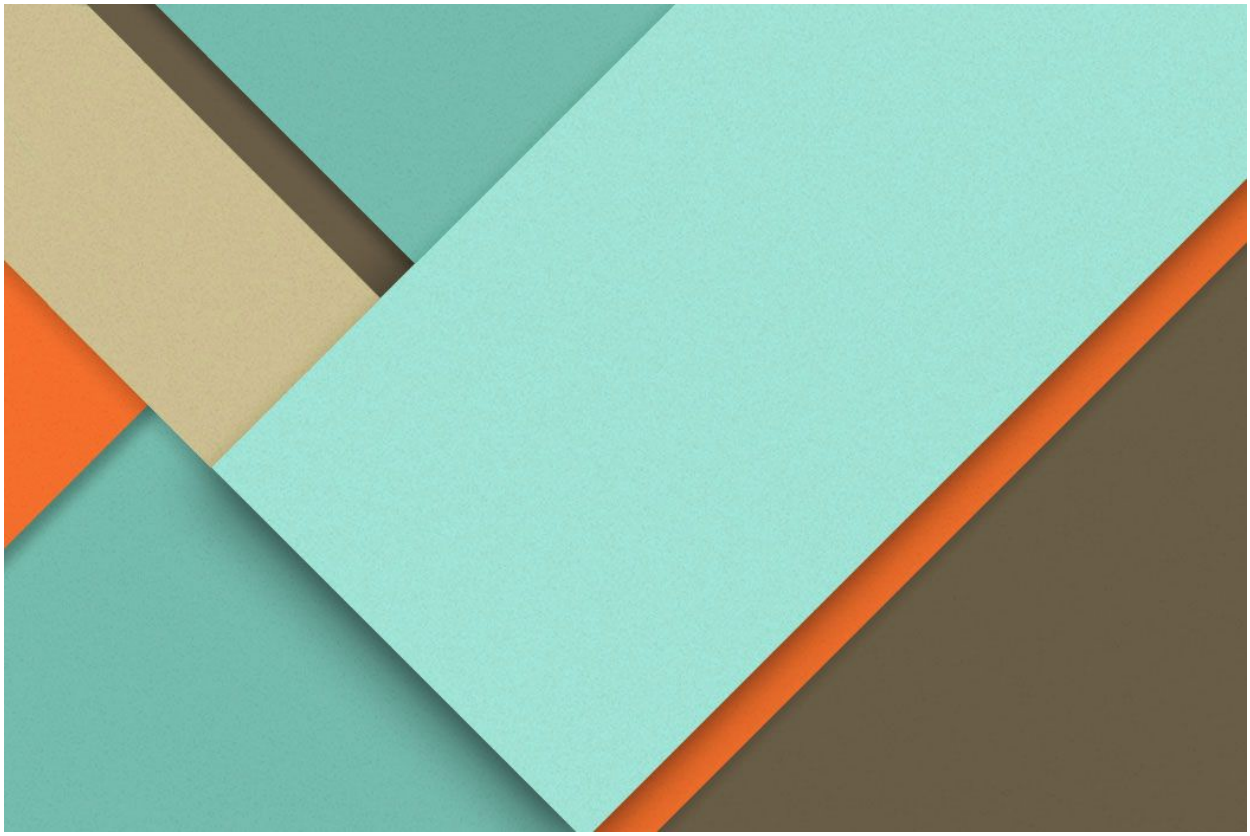


Robotathon 2017

IEEE Robotics and Automation Society

Isabel Cachola
Head of Robotathon
isabelcachola@utexas.edu

Brian Wilmarth
President
bwilmarth@utexas.edu

Meera Wakim
Vice President
meerawakim@utexas.edu

Table of Contents

** Sentences in red are clarifications added after the original release of the rules.

Introduction

This year's competition is a racing game. It includes several mechanical, electrical, and logical challenges that will help teach basic concepts relating to robotics, design, and teamwork. Each team will need to create some method for their robot to navigate the field, avoid obstacles, and reach their opponent first.

The competition will be held on the afternoon of **Saturday, November 18th at 12pm**. **Teams should arrive by 11:30 for the competition. Location to be announced.**

Parts

Each team will have access to the following parts:

-An LM4F Launchpad Board

-1 Touch Sensor

-2 IR Sensors (10cm-80cm range)

-2 Large Servo Motors

-1 Small Servo

-1 Line Sensor

-1 Metal Caster

-2 Wheels

-1 Voltage Regulator

-NiMh Batteries

-Battery Holder

-Small Breadboard

-~15 Jumper wires

-XT60 Battery Connectors

-1 Switch

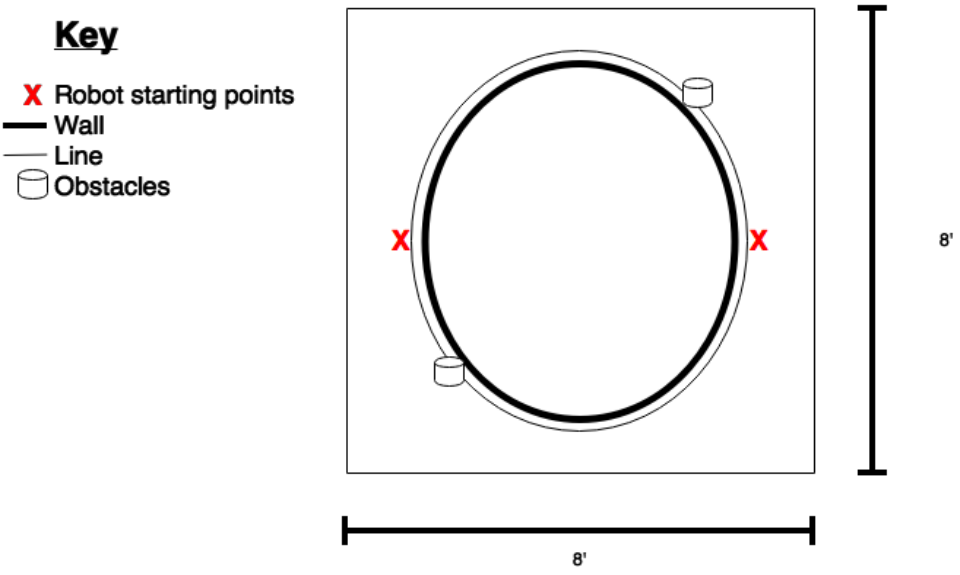
**Up to $50 worth of additional parts of their own choosing, including any extra parts from the RAS Office. RAS will not reimburse students for any purchases made.

**Due to the nature of the challenge, teams may not use funds to purchase motors. If a team breaks a motor, they may purchase a new one with the contingency that it is the same motor they were supplied.

**Teams may not use the funds to purchase additional computing power, such as an Ardunio or RaspberryPi

Field Layout

Sample Field



The Game Field base is 1⁄2" x 8' x 8' MDF panels with whiteboards on top. The field will have a border of 2" x 4" to act as rails. The track is composed of two main components: a line and a wall. The line will be black on a white background, materials may vary. Thickness may vary but will remain between ⅛" and ½". There may be gaps up to 6" long in the line. The wall will be formed by 2" x 4" x 1" blocks with a hole drilled through the middle. A string will go through the hole to form a flexible wall. The shape of the track is subject to change per round but it will never intersect itself. There will be approximately 6" of space on either side of the line. Total length of the track may vary. Each robot will have a starting point on opposite sides of the track. There will be one or more obstacles placed along the track. Obstacles include ramps and blocks. The field will contain a maximum of 4 ramps and 10 blocks. Blocks will be solid, hollow 4" cubes, made from laser cut ¼" plywood. Ramps will have varying inclines between 20 and 45 degrees, with a ½" flat platform between the inclines. A CAD model of the field will be uploaded to the http://ras.ece.utexas.edu/ . The field allows for multiple methods of navigation as you may choose to line follow or wall follow. The most effective robot will use both methods of navigation.

Competition Rules

A robot is defined as including the provided launchpad and a battery pack that can be switched on with the battery's power switch. Robot must fit within a 1'x1'x1' box at all times. The robot must be autonomous, relying on sensors instead of outside user control. A team may not intentionally damage another team's robot or the field. A robot also cannot leave particle like substances on the field (i.e., do not drop sand, glitter, marbles, etc. behind you). In addition, do not use fire, animals, toxic chemicals, or some combination of those. Breaking any of these rules will result in disqualification from the competition. At the end of the competition, RAS will maintain ownership of the robots, but teams should feel free to continue working on these throughout the year.

There will be a two minute time limit. The teams will place the robots directly in their starting zones before time begins. The referee will choose the direction of travel to be either clockwise or counterclockwise. The goal is to tag your opponent before your opponent tags you. A tag entails your robot touching the opponent's robot. Your robot must be moving in the direction of the round in order for the tag to be valid. If you pass your opponent, you may either (1) move out of the way until your opponent passes you and continue chasing them or (2) complete another full lap to tag your opponent. This also means if you pass your opponent, they will have the opportunity to tag you. Moving in the opposite direction of travel will only aid your opponent in tagging you. If neither robot tags the other within the given time, the team with the most amount of points earned during the round wins (Points detailed in Scoring). If the winner of the round is unclear, the final decision will be judge's' prerogative.

Each team has 1 timeout per round, in which both teams must remove their robots from the field. Each timeout will last a maximum of 30 seconds and teams may make any changes necessary to their robots in the given time. At the end of the timeout, teams must place their robots in the spots from which a timeout was called. Participants touching a robot during the round without having called a valid timeout first will result in an automatic forfeit of the round. Only team members may handle their own robot during the match.

Scoring

A team will be scored on their progress and the success of their robot at the competition event. **At the end of competition, the team with the most overall points wins.**

The competition will be run as a series of 1v1 rounds, the winner of which will progress through a bracket system. The loser will drop down into a second bracket, and will

get a second chance to win. The event is double elimination, so once you lose a second time, you are eliminated from the event. Teams are also expected to complete a series of checkpoints before the competition for points. Checkpoints breakdown listed below.

Competition Points Breakdown

A match is won either by tagging the opponent or by earning the most points within the round. If both teams have an equal number of points, winner will be judges decision. If both robots have stopped making progress, the teams can mutually agree to end the match early.

Teams may earn additional points to their overall score by clearing obstacles. Clearing a block obstacle is defined by removing the block completely from the line. Clearing a ramp obstacle is defined as completely crossing the ramp without falling off or going around. Once a robot has successfully cleared a ramp obstacle, it must complete a full lap around the track before it can receive points for the same ramp again.

If your team places 1st in the competition bracket, your team will earn 100 points. If your team places 2nd, your team will earn 80 points.

Action	Points
Winning round	20
Clear ramp obstacle	5
Clear block obstacle	2

Checkpoints Breakdown

Teams will be expected to complete checkpoints to show consistent development of their robot. Checkpoints are each worth different point values and will contribute to the team's total score in the competition. Teams will get the full point value for the checkpoint if they complete it by the checkpoint deadline. If completed after the deadline, teams will receive late points. Checkpoints must be approved by 2 Robotathon mentors.

- Design approved by Valvano - Make a sketch of your robot. Get Dr. Valvano to sign off on the sketch.
- Blinky LED/Running demo - Set up your development environment and flash code to the LM4F to make an external led blink
- Moving base/soldering - Solder the power regulator's headers and create a base. Get said base to move in a straight line.
- Wall Following - Get your robot to follow a wall at a constant distance from the wall

- Line Following - Get your robot to follow a black electrical tape line on the ground
- Figure 8* - Get your robot to do a figure 8 lap around 2 cones spaced 3' apart.
- Square Dance* - Get your robot to move around 4 obstacles set up in a rectangle of variable dimensions, and return to where it started. This challenge will be strict (i.e., your robot should not have much deviation from a square shape and must stop on the same place as where it started)

Checkpoint	Full Point Value	Full Point Deadline	Late Point Value
Valvano Design Approval	15	Oct 6	10
Blinky LED/Demo	15	Oct 6	10
Moving Base	15	Oct 13	10
Wall Following	30	Oct 27	20
Line Following	30	Nov 10	20
Figure 8	15	Nov 17	0
Square Dance	15	Nov 17	0

The Conference

Attendance to the conference on September 23rd, 2017 is mandatory for participation in Robotathon, with the exception of medical or family emergencies. Attendance will be taken at each talk and 2 points will be deducted for each absence. If you would like to petition for an excused absence, email isabelcachola@utexas.edu with your name, EID, team number, and excuse. All excused absences will be at her discretion.

Bonus Points

Additionally, bonus points will be awarded to teams for submitting progress reports and attending workshops and office hours. Each team will have the option to submit a short progress report, which must be submitted between Thursday 8:00 am and Sunday 11:29 pm, for 1 bonus point per week. Only one report needs to submitted per team. Submission form can be found at https://goo.gl/forms/ou0h8YcMWcHYXmu12. At workshops (not included in the conference), 1 point per person will be awarded per workshop with a maximum of 3 per team per workshop. Teams may earn 1 point per hour spent in office hours, with a maximum of 3 points a week. Only one team member needs to be present to earn a point but only 1 point may be earned per hour (i.e. if there are 4 team members in office hours, the team may not earn 4 points).