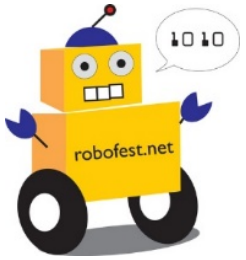


21st LAWRENCE TECHNOLOGICAL UNIVERSITY ROBOFEST 2020

Kickoff Information Meeting

US Kickoff January 11, 2020 10:00 am

This file can be found under the **Get Involved→2020 Main** Page on the website

www.robofest.net robofest@ltu.edu 248-204-3568

Room J233 Taubman Complex, LTU
21000 West 10 Mile Road, Southfield, MI 48075, USA

Welcome to Robofest 2020

Little robots, Big Missions

Robofest Staff

Staff

- Dr. CJ Chung, Prof. of Computer Science, Founder and Director
- Dr. Chris Cartwright, Prof. of Mathematics
- Elmer Santos, Assistant Director
- Shannan Palonis, Coordinator
- Pam Sparks, Coordinator
- Teri Dubois, Coordinator
- Dr. Joe DeRose, Workshop Instructor
- David Carbery
- Dr. Fred Brauchler, Workshop Instructor
- Marilyn Weisman, MCS Department
- Don Dubois
- Judith Williams

Student Assistants

- Daniel Oliver
- Charles Faulkner
- Mark Kocherovsky
- Nikki Subramanian
- Param Tirupari
- Thomas Brefeld
- Yancong Nie
- …

Meeting Agenda

I. *Overview of Robofest*

II. *Competition Season Schedule*

III. *2020 Registration and How to Advance to World Championship*

IV. *Open Competition Categories*

V. *Synopsis of Each Main Competition Category*

VI. *Q & A*

VII. *Break (5-10 minutes)*

VIII. *2020 Game Rules*

Robofest Mission Statement

Robofest's mission is to:

- Generate excitement and interest among young people for Science, Technology, Engineering, and Mathematics (STEM), Arts, and Computer Science
- Develop soft skills such as teamwork, leadership, creativity, communication and problem solving
- Prepare students to excel in higher education and technological careers

Features of Robofest

- 100% Autonomous – sensors required
- Challenging
  - dynamic playing fields
  - unknown factors
  - **no** direct adult help allowed
- Any robotics kit / system allowed
- Affordable (reuse old kits; Registration fee: $50)
- Pre and Post Assessments (on-line)
- Qualifying Competitions, MI Invitationals & World Championship
- Age Divisions for most categories:
  - Jr. Division: 5^{th} – 8^{th} (in spring 2020)
  - Sr. Division: 9^{th} – 12^{th} (in spring 2020)
- Variety of competition categories for more opportunities in STEaM learning

Robofest Team Pledge

Teams must agree to and abide by the Robofest Team Pledge:

As a Robofest team member, I understand that the focus of Robofest is about learning through competition.

My team and I will show integrity by doing our own work and by following all the rules.

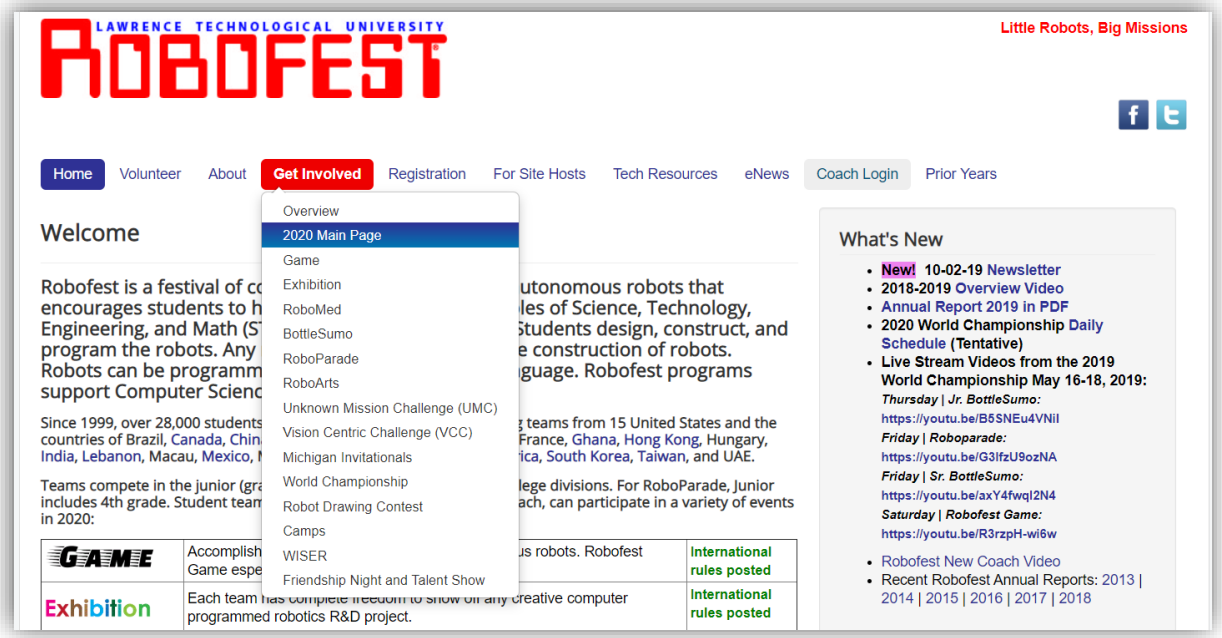
My team and I will display courtesy by sharing practice tables and space.

I promise to do my best to uphold the Robofest Spirit.

Teams must design, build and program robots on their own (see section 6 of General Rules)

2020 General Rules

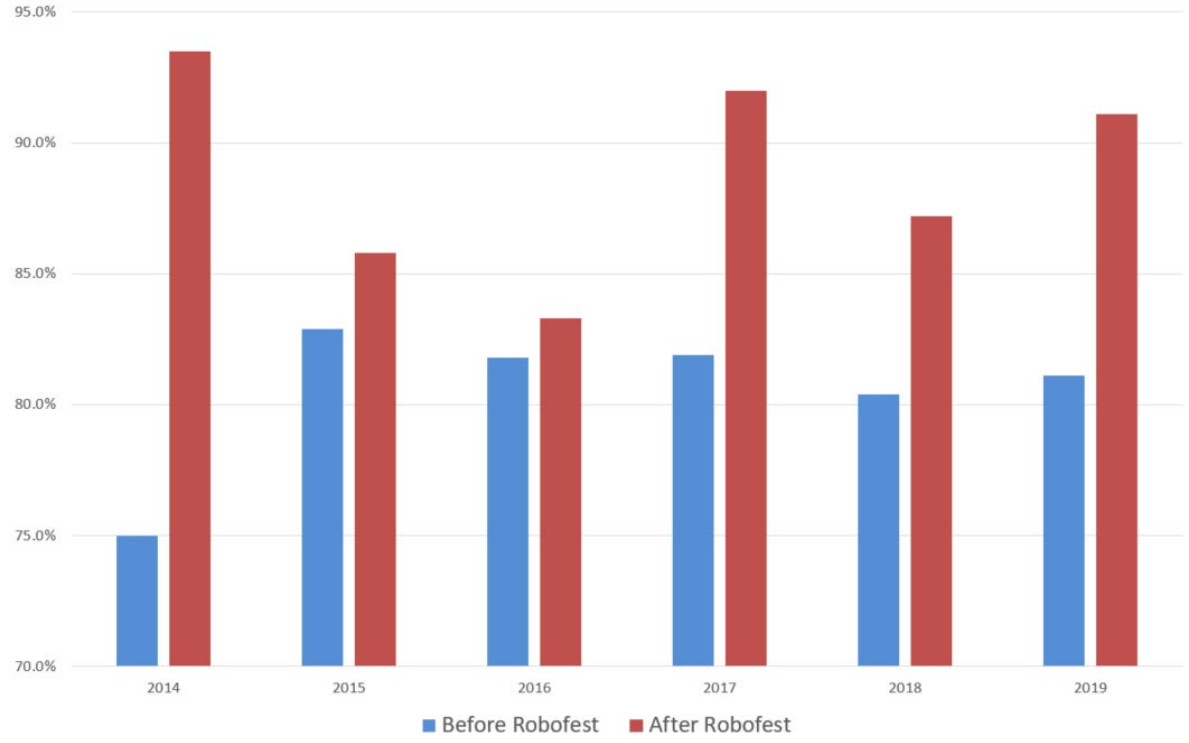
- Official General Rules Document, and other important forms can be found on the robofest.net website under the **Get Involved→2020 Main Page**



- Coaches are responsible for communicating rules updates to contestants

Robofest Assessments or Surveys

- Participants will be assessed anonymously before and after the competition to see the level of improvement
- Pre-assessment/survey instructions will be sent to Coach in team registration confirmation
- Post-assessment/survey instructions will be sent to Coaches in April
- Results published in annual reports we well as a journal on education research



STEM Career Preference Changes after Participating in Robofest

Robofest Scholarship

Robofest team members who choose to attend Lawrence Technological University may apply for a $3,000 annual renewable scholarship (total of $12,000)

- Submit an application, located on the LTU.edu Scholarship website under the “Future Students/Portfolio and Private Scholarships” tab
- Submit a 400-word essay regarding your Robofest experience, your career goals
- Submit a letter of recommendation from one of your Robofest adult coaches or mentors
- Robofest can assist with letter of recommendation
- Submission Deadline: April 1st

Volunteer Opportunities

Team Mentors & Workshop Assistants:

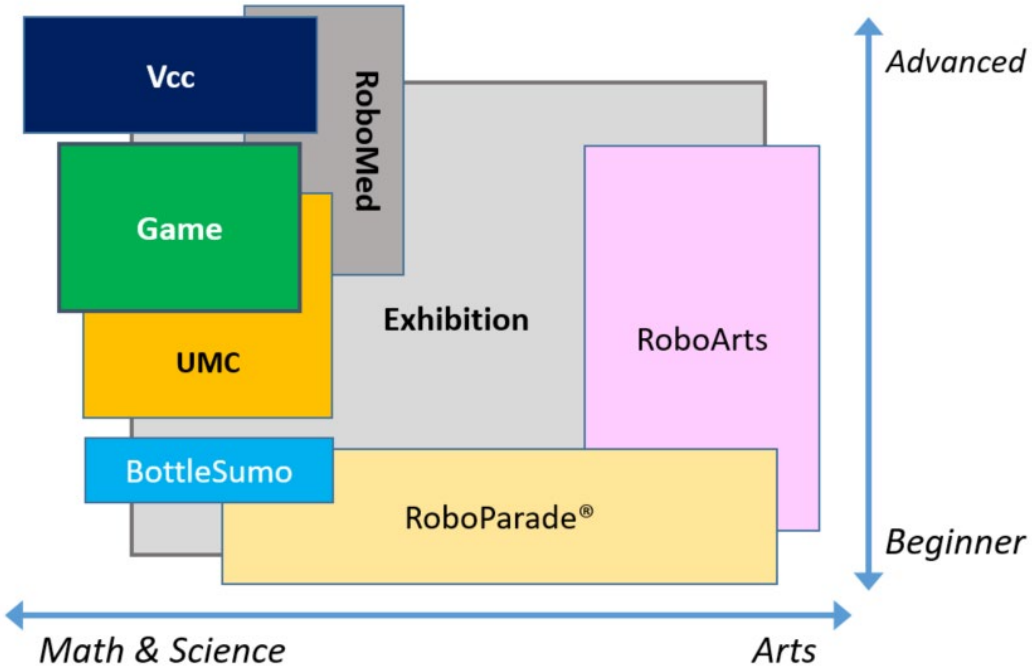
- Professionals from any industry
- Experienced Robofest participants of any age can volunteer Service Hours can be earned:
  - President's Volunteer Service Award
  - National Honor Society
  - Boy Scouts/Girl Scouts
  - School or Church
- Contact Elmer Santos esantos@ltu.edu

Judges and Event Volunteers:

- Needed for local events and World Championship, May 2020
- LTU Staff – Possibility for Comp Time
- Industry professionals welcome
- Former Coaches and participants welcome
- Training Provided
- Contact Pam Sparks psparks@ltu.edu

2020 Season – 8 Opportunities

- Main Qualifying Competitions
  - Game
  - Exhibition
- Open Competition Categories
  - RoboParade
  - BottleSumo
  - Vision Centric Challenge (Vcc)
  - Unknown Mission Challenge (UMC)
  - RoboArts
  - *New!* RoboMed



2020 Pre-Season Schedule

- October 1: International rules published
- October 25: Official US rules published – Kickoff meeting at LTU
- November 1: Kickoff meeting and Webinar
- November 4: US Team registration opened
- January 11, 2020: Kickoff Meeting and Webinar - Finalization of all category rules (clarifications and minor adjustments from kickoff meetings)
- January ~ February: On-site technical workshops and online classrooms – registration open for competing teams
- February 15: Warm-up at LTU (Judge Training)

2020 Main Season Schedule

- February ~ April 21: US and International Qualifiers; Post-assessment survey sent to coaches
- April 20: Video Submission deadline for US and International Video Qualifier Game and Exhibition teams
- April 20: Video Submission deadline for Virtual Regional Screening of Winning US Exhibition teams
- April 25: Michigan Invitational Events at LTU (More dates may be added)
- April 27: Video Qualifier and Virtual Regional teams notified of advancement to World Championship
- May 14, 15, 16: World Robofest Championship at LTU

2020 Workshops

- On campus workshops in Computer Science Robotics Lab - J234*
- Only for teams who have registered and paid for a qualifier
- Pre-registration site is available if you have not chosen your preferred qualifier
- Students can register for multiple workshop types (categories/languages)
- Complete list at www.robofest.net, click on “coach login” ➔ “Available workshops”
- Python - EV3 for Game:
  - Sat, Jan 11, 1:00pm ~ 4:00pm
- EV3 for Game:
  - Sat, Jan 18, 9:00am ~ Noon
  - Sat, Jan 25, 9:00am ~ Noon
  - Sat, Feb 1, 9:00am ~ Noon
- RoboMesh - VEX IQ for Game:
  - Sat, Jan 18, 1:00pm ~ 4:00pm
- EV3 for RoboParade:
  - Sat ,Feb 22, 9:00am ~ Noon
- Python/Open CV - EduBot for Vcc: (*Location: Buell Building Room M138)
  - Sat, Feb 22, 9:00am ~ 3:00pm

Michigan Invitational

- 2nd Chance Opportunity for advancement to World Championship
- Small events (10 – 12 teams)
- April 24 and 25, 2020
  - Junior: April 24, 5:00 pm ~ 8:30 pm
  - Junior: April 25, 9:00 am ~ 12:30 pm
  - Junior: April 25, 1:00 pm ~ 4:30 pm
  - Senior: April 25, 5:00 pm ~ 8:30 pm
- Lawrence Tech University, Southfield, MI
- Computer Science Robotics Lab – J234

World Robofest Championship

Lawrence Tech University Campus, Southfield, MI

- Thursday May 14:
  - Welcome Meeting and Friendship Activities
  - Jr. BottleSumo Group 1
- Friday May 15:
  - RoboParade
  - UMC
  - Jr. BottleSumo Group 2
  - Sr. BottleSumo (Classic and Unlimited)
- Saturday May 16:
  - Parade of Flags – Opening Remarks
  - Game and Exhibition Championships
  - RoboMed
  - RoboArts
  - Vcc
  - **Jr. BottleSumo Final Round**
  - Open Category Awards Ceremony (noon)
  - Closing and Final Awards Ceremony

Becoming a Robofest Team Coach

- Any teacher, school administrator, parent, tech specialist, or scientist/engineer is eligible to be a coach
- Coaches must be adults without a criminal record
- **Please note:** email is the primary and official communication method between Robofest and coaches – Update and confirm changes in coach profile
- Robofest Coach's Video to help new coaches get started - on line: robofest.net ➔ **Get Involved** ➔ Overview
- Coaches must agree to *and* abide by the 2020 Coach's Pledge:

Robofest Coach's Pledge

As a Robofest coach, I have read and agree to abide by the Robofest 2020 general and category specific rules as they exist now and as they may be set forth during the Robofest season.

As a coach, I am responsible for communicating and enforcing the Robofest rules to team members, team volunteers, and others affiliated with my team. I understand that any rule updates, guidelines, additional information, and announcements will be communicated to me, officially via emails, or webpage updates. I am responsible for reading the information and I will relay it to all the people affiliated with my team. If any changes are made to my email account, I will notify Robofest administrators as well as update my coach profile.

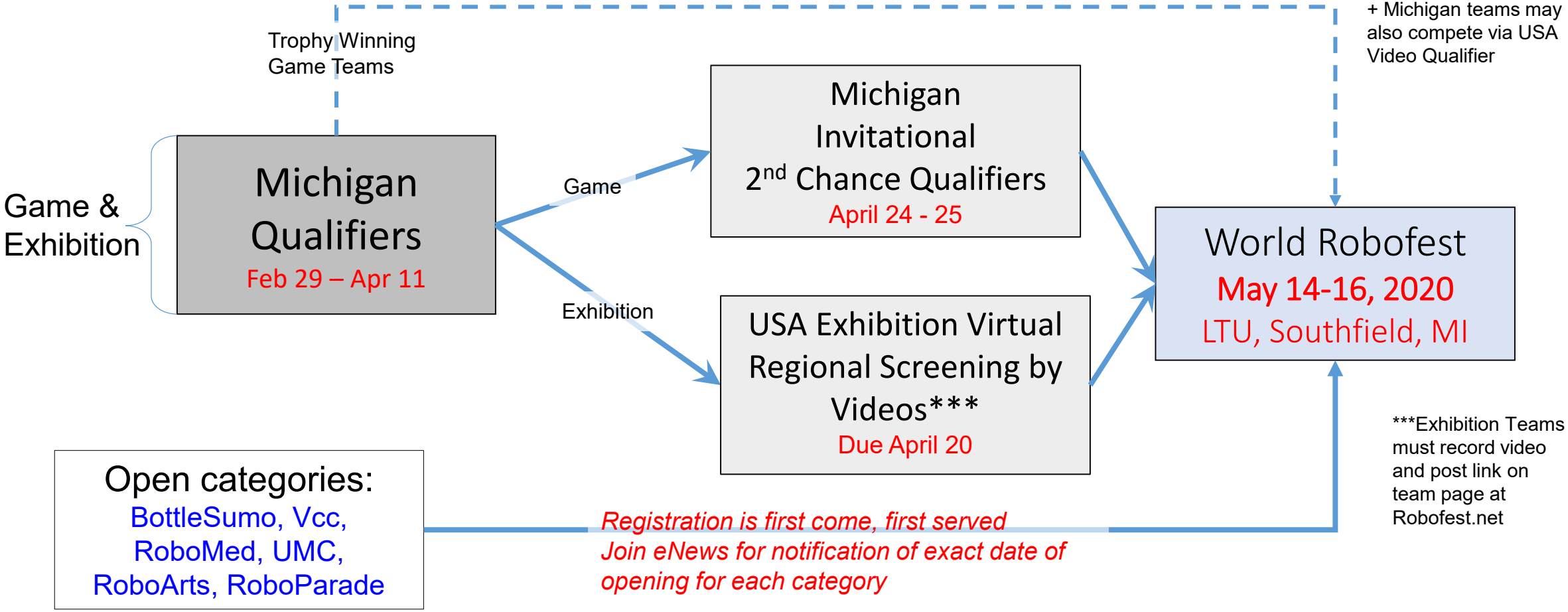
As a Robofest coach, I understand that the students come first. Robofest is about the students learning computer technologies, science, engineering, and mathematics. Everything my team does starts and ends with the principle: the students do all of the work. My team members will do the designing and building of the robot, problem solving and programming. Adults can help them find the answers, but cannot give them the answers or make the decisions in detail.

I intend to uphold and maintain the Robofest spirit.

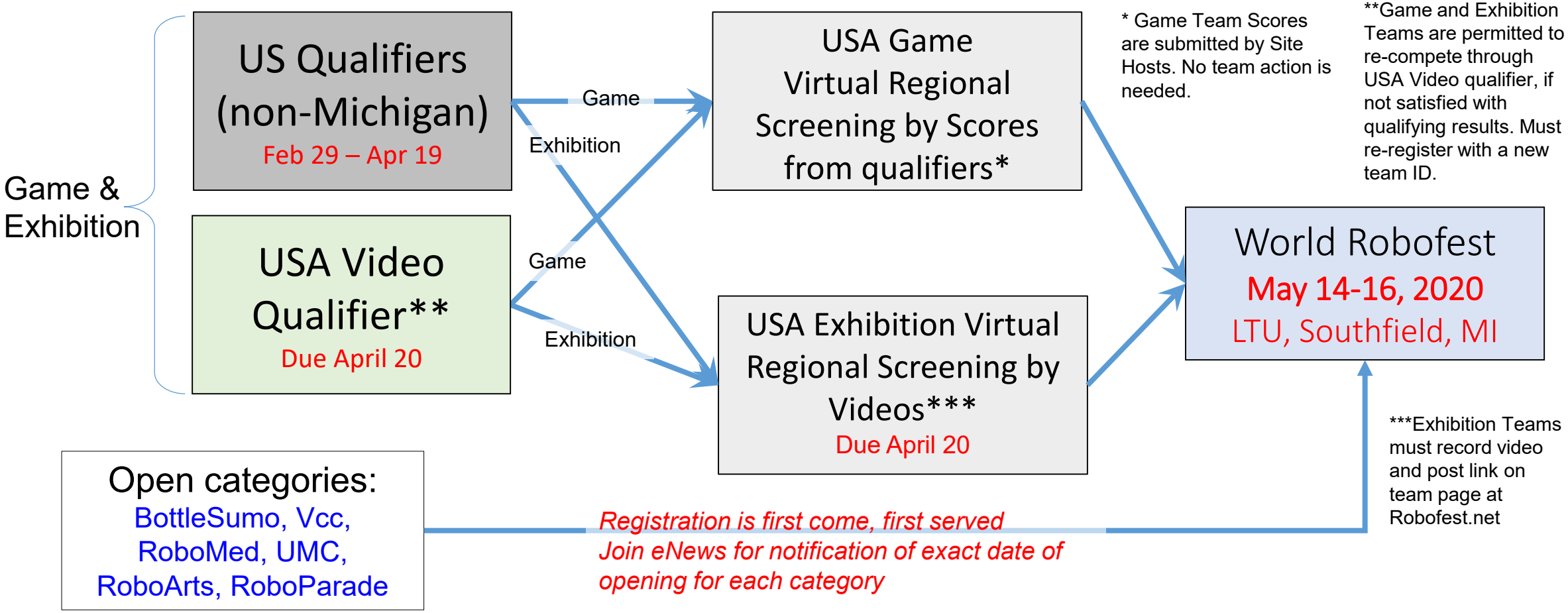
Team Coach Roles

- Recruit team volunteers, including technical mentors and assistant coaches
- Find team sponsors
- Facilitate team meetings and transportation to event(s)
- Register Teams for events-Enter and verify all team data
- For exceptions to student's grade, complete the *"Age Division Waiver Request"*
- Upload Team Photo and Robot Photo if desired
- Pay Registration Fee
- Collect Consent & Media Release Form if not completed on line
- Coordinate Student pre & post assessment completion
- Follow all General and Category Specific Rules robofest.net ➔ **Get Involved**

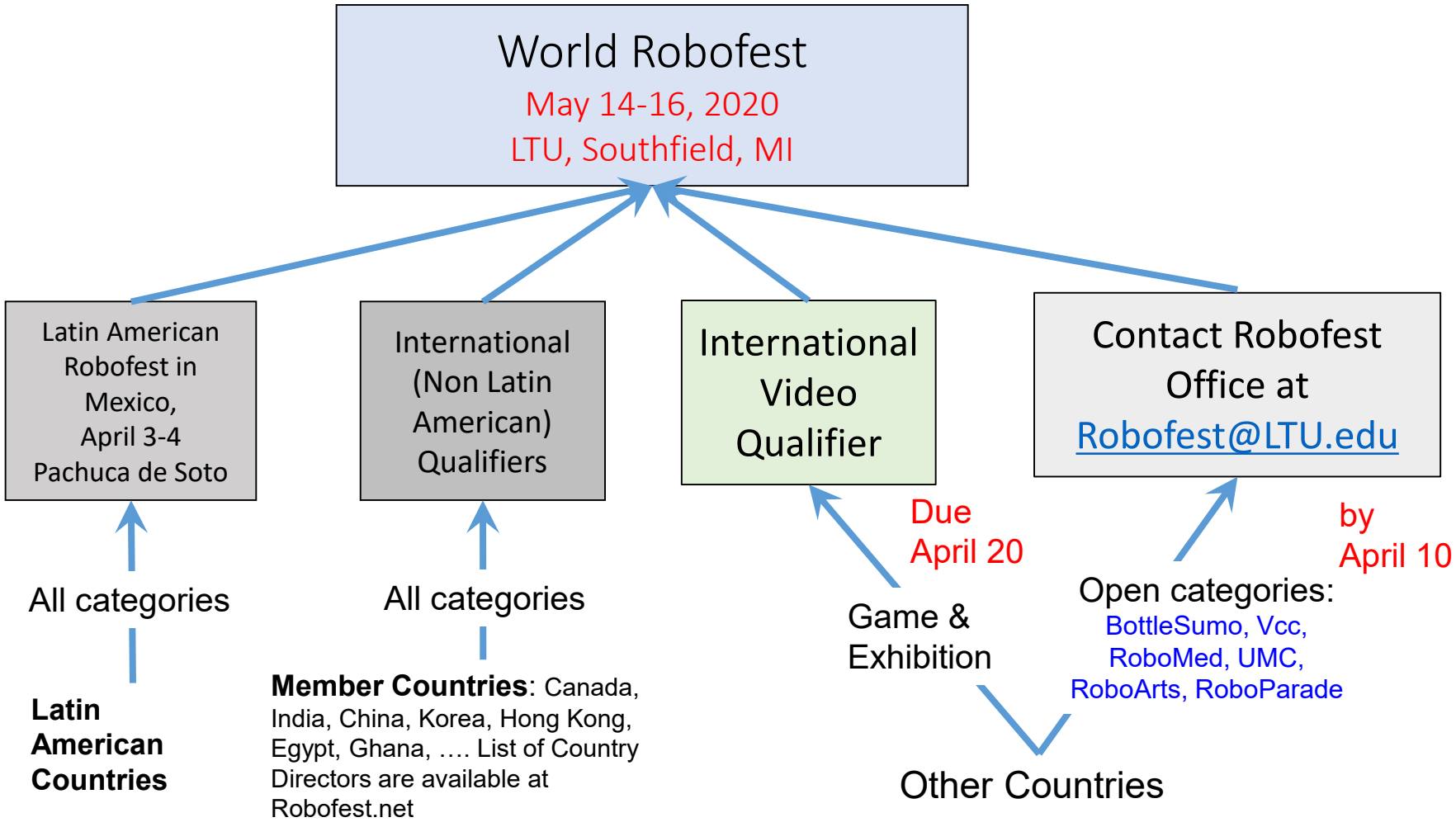
Advancing to World Championship – Michigan Teams+



Advancing to World Championship – Non-Michigan USA Teams



Advancing to World Championship – International Teams



Open Categories (1/2)

Competition Category	Age (Grade*) Divisions	Team Size	Platform	Unknown Factor	Reg. Fee**	Competition Venues:
BottleSumo	**Jr.** (5th-8th)	Max. 3	LEGO NXT, EV3 or VEX IQ	Partially unknown	$50	Various locations and World Championship
	Sr. Classic (9th-12th)	Max. 3	LEGO NXT, EV3 or VEX IQ	Partially unknown	$50	Various Locations and World Championship
	Sr. Unlimited (9th-12th)	Max. 3	Any	Partially unknown	$50	World Championship
RoboArts	**Jr.** (5th-8th) **Sr.** (9th-12th)	Max 5	Any	Lighting Conditions	$50	Various Locations and World Championship

(*) School Grade in spring 2020 - For exceptions to student's grade, complete the online "*Age Division Waiver Request"* at the time of registration
(**) Per team; May be different for Local events. No refunds will be given

Open Categories (2/2)

Competition Category	Age (Grade*) Divisions	Team Size	Platform	Unknown Factor	Reg. Fee**	Competition Venues:
RoboMed **(New for 2020)**	**Sr.** (9th-12th) **College**	Max. 5	Any	Lighting Conditions	$50	World Championship
Unknown Mission Challenge (UMC)	**Jr.** (5th-8th) **Sr.** (9th-12th)	Max. 3	LEGO NXT, EV3 or VEX IQ	Fully unknown	$50	World Championship
Vision Centric Challenge (Vcc)	**Sr.** (9th-12th)	Max. 3	Any vision-based robot	Partially unknown	$50	World Championship
RoboParade	**Jr.** (4th-8th)	Max 5	Any	Lighting Conditions/ Route	$50	Various Locations and World Championship

(*) School Grade in spring 2020 - For exceptions to student's grade, complete the online "*Age Division Waiver Request"* at the time of registration
(**) Per team; May be different for Local events. No refunds will be given

BOTTLESumo

- Be the first robot to intentionally push a bottle off the table OR be the last robot remaining on the table
- Jr. Division –Only LEGO NXT, LEGO EV3, and VEX IQ
- Sr. Classic Division: Only LEGO NXT, LEGO EV3, and VEX IQ
- Sr. Unlimited Division-Any robot platform
- Max team size: 3
- Rules: robofest.net → **Get Involved** → **BottleSumo**

RoboArts

- Similar to Exhibition, but projects are specifically focused on the visual and performing arts
- Jr. and Sr. Divisions
- Max team size: 5
- Rules: robofest.net → **Get Involved** → RoboArts

RoboMed

- An Open Category competition at the World Championship for intelligent and interactive (bio) medical robotics/device projects
- The project must be related to (bio)medical and healthcare fields using sensors and/or actuators
- RoboMed competition promotes on entrepreneurial mindset. Sentences about “Opportunity Recognition” and “Value Creation” are encouraged in the project description
- Two age divisions
  - Senior Division (Grades 9-12)
  - College Division (Undergraduate including Community College students)
- Team Size: Maximum five (5) members
- Rules and Judging rubrics: robofest.net → **Get Involved** → **RoboMed**

UMC

- Missions are completely unknown until day of challenge
- Jr. and Sr. Divisions
- Lego NXT, Lego EV3 or Vex IQ
- All robot components must be un-assembled at the beginning of the competition
- Max team size: 3
- Rules: robofest.net → **Get Involved** → UMC

Vcc CBC (Construction Barrel Course)


A sample course

- This CBC is only for Senior (9th-12th) division. Vcc college division is discontinued in 2020
- Maximum **3** members per team
- Any robot platform with up to 2 cameras is allowed. No other external sensors are allowed
- Rules: robofest.net → **Get Involved** → **Vcc**

- Follow a lane marked by red cups
- Detect a "dead-end" sign at the end of the course and come back to the Home location
- After detecting Home object, the robot must then perform an ending-task that will be unveiled
- Other unknown factors include: shape of the course, # of cups for the course, width of the lane, gap between cups, max curve angle, and Home object

RoboParade

- Robots are constructed and programed by student participants to follow the parade route, detect other vehicles, stop and start without human help
- Jr. Division -Includes 4th Grade (no waiver needed) Perfect for beginners
- Max team size: 5
- 2020 World Championship Event Theme: **"Precious Life Below Water and Water Resources: Our Lakes, Rivers, and Seas"**
- Rules: robofest.net → **Get Involved** → **RoboParade**

Qualifying Categories

Teams must compete at local sites OR through Video Qualifier in order to advance to the World Championship event

Competition Category	Age (Grade*) Divisions	Team Size	Plat-form	Unknown Factors	Reg. Fee**	Note
Game	**Jr.** (5th-8th) & **Sr.** (9th-12th)	Max. 5	Any	Partially unknown	$50	Each team uses a fully autonomous robot to play this year's game, **GolfBowl**
Exhibition***	**Jr.** (5th-8th) & **Sr.** (9th-12th)	Max. 5	Any	Lighting Conditions	$50	Each team has complete freedom to show off a creative autonomous robotics project.

(*) School Grade in spring 2020 - For exceptions to student's grade, complete the online "*Age Division Waiver Request"* at the time of registration
(**) Per team. No refunds will be given; some qualifying sites may charge an additional Site Check-in Fee; Sites outside USA may have different fee schedules
(***) Exhibition teams must submit a video to be considered for advancement to the World Championship

Exhibition

- Complete freedom to show off any type of creative intelligent robotics project -Robotics Science Fair
- No Recommended Theme
- Must employ sensors
- Human to Robot, Robot to Robot interaction strongly encouraged
- Wireless program controlled remotes are allowed only if the program of the remote controller is written by students
- Space for project is limited to **64** square feet including a 6ft or 8ft table

Exhibition

- Four minutes are given for an official presentation including demonstration. Team is responsible for keeping the time
- Sharing online videos (such as YouTube) is highly recommended prior to Qualifiers so judges can prepare questions –Upload to team registration page

Judging

Rules and Rubric: robofest.net → **Get Involved** → **Exhibition**

- The application of math and science theories which are appropriate to the team members' age level is a strong plus for judging. Not appropriate to the age level is OK, but it may not give any advantages for the judging
- One member team is allowed, but will get lowest score for teamwork criteria

Exhibition Judging Rubric (1 of 2)

Similar Rubric is used for RoboArts and RoboMed

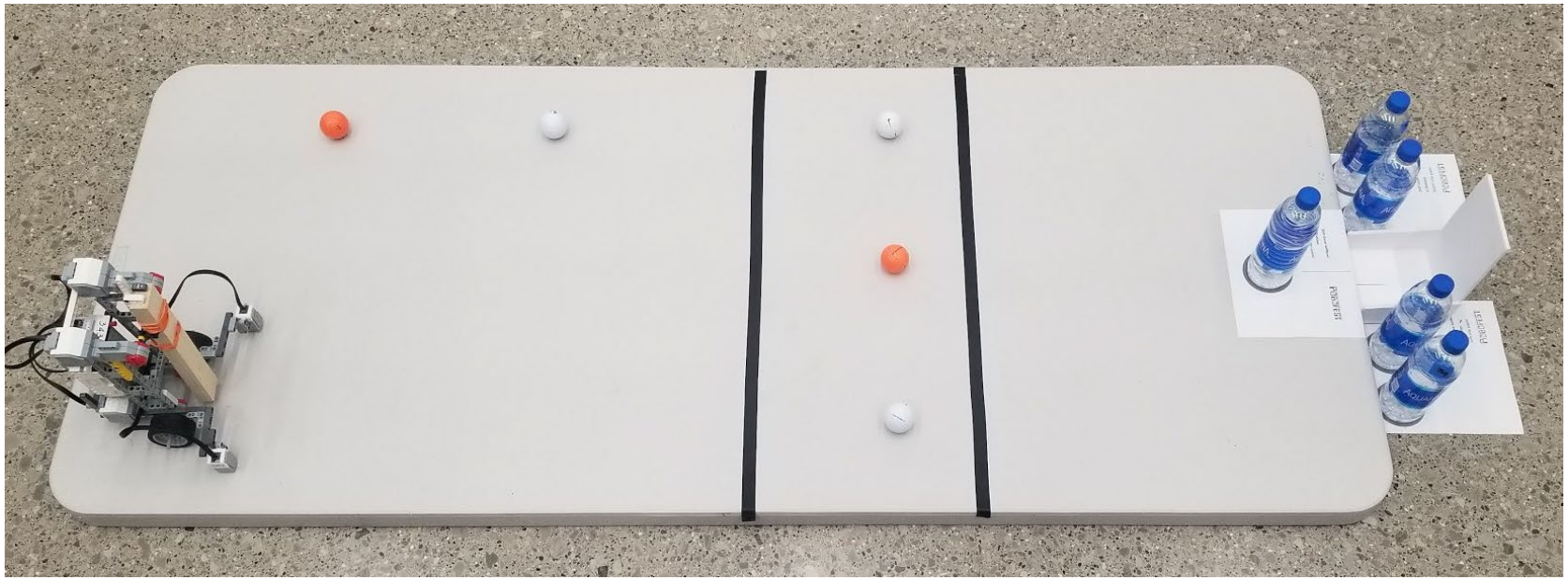
5: Strongly Agree	excellent, outstanding, advanced, exemplary, or amazing
4: Agree	good, accomplished, or proficient
3: Neutral	average, intermediate level, or acceptable
2: Somewhat Disagree	attempted but needs work
1: Disagree	little attempted or needs lots of help

Judging Category	Sub Categories	Weight	1 ~ 5 Score
1. STEM learning	This project truly demonstrates applications of science, engineering, and math.	8%	
	Students have an age appropriate understanding of the science, engineering and math concepts they applied.	8%	
2. Project idea and originality	The project idea is very original and showed impressive creative thinking and problem solving skills.	12%	
3. Project demo performance (robot)	The official public robot demo is free from problems and very impressive.	12%	
4. Project presentation	Project presentation is clear, well organized, and delivered effectively within the allowed time.	8%	
	Information on the team poster, brochure and signage is clear, well designed, and able to be understood even by robotic novices. Project is within allowed size parameters.	4%	

Exhibition Judging Rubric (2 of 2)

5. Teamwork	Specific member roles are clearly introduced. Work division is well balanced. Team members are respectful toward each other.	5%	
	Teamwork and team spirit are evident. *Note: If the team only has one member, the score should be 1.*	3%	
6. Robot design	The robot mechanical design is creative, effective, user-friendly, and sturdy.	8%	
7. Project complexity	The project is complex with multiple features/functions, sensors, and components.	7%	
8. Practicality	The project shows potential as a useful and practical application of robotics technology.	7%	
9. Programming	Students are able to explain their programming code. Programs are well structured and commented.	8%	
10. Team independence	Based on my observations and interaction with the team, I believe the project was mostly designed, developed, and programmed by students, not by adult coaches, parents, or mentors. The students were able to clearly and confidently explain each part of their project.	10%	

GAME GolfBowl



- Jr and Sr Divisions
- Max 5 members per team
- Must advance from a qualifying competition to compete at the World Championship
- For detailed rules, scoring sheet, example videos, field template files, etc., go to robofest.net → **Get Involved** → **Game**

- Develop a robot with a wood piece attached that will putt 5 golf balls into a Hole-slot
- Alternative partial points will be given if 4 bottles on the floor are knocked (bowled) over or moved
- Penalty points are given if a bottle on the table is knocked over or moved

GAME GolfBowl 

Video Demonstration of GolfBowl

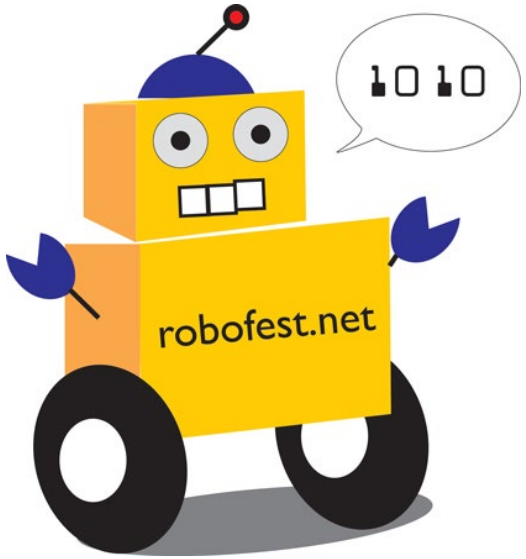
Additional Demo Videos are available at robofest.net → **Get Involved → Game**

Game Field Kits and Putters Available for Purchase

- To order: Email spalonis@ltu.edu (best way) OR call 248-204-3568
- Can be picked up in Robofest office J-233 or Shipped
  - Putter (35cm that must be cut to desired length) $1 Plus Shipping and Handling
  - Game Kit $10.00 (Junior or Senior) Plus Shipping and Handling:
    - 1 Hole Slot (Foam board)
    - 1 Set of Bottle Templates (Left, Right and Center)
    - 3 White Golf Balls
    - 2 Orange Golf Balls
    - 1 Full Water Bottle
    - 4 Partially Full Water Bottles
    - 1 Roll of electrical tape
    - 10 Reinforcement Labels (ball markers)

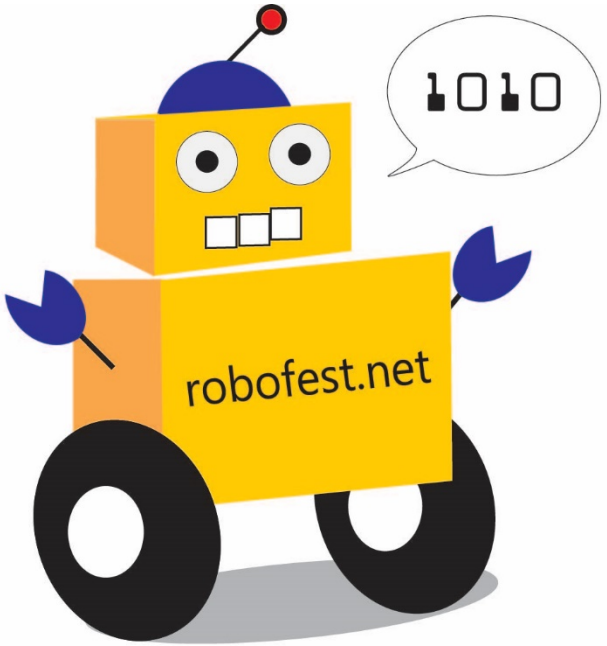
Questions?

Thank you!



Send questions, comments, corrections, and suggestions to robofest@LTU.edu

join the Robofest eNews list at robofest.net!



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2020 Game Presentation will begin shortly