GST BOCES

Regional Robotics Competition & Exhibition

May 29, 2019

9:00 – 2:00

Wings of Eagles Discovery Center, Big Flats NY

Mission Mars Rover

Program Overview

The driving force for our regional competition is to promote and highlight how technology can be used to accomplish tasks in our world and fulfill human needs or desires. Here we use robots to complete a set of challenges. While our challenges are in the form of games they do pattern the "real world" use of robots performing tasks that are repetitive or ones that may be too dangerous for people to perform. We also are promoting types of behaviors (perseverance, collaboration, communication and discovery) which we want the adults of tomorrow to possess.

Our regional robotics program, an extension of the GST BOCES STEM initiative, has continued to grow every year. Every district in our region – including three outside of GST BOCES – have been a part of this program. This program began over half a decade ago as a regional after-school opportunity with funding from a federal Perkins Grant. Many districts have since used their experiences with the GST robotics program to start their own programs during the school day and/or add competitive robotics teams to their after-school offerings.

Although GST BOCES owns and supports primarily VEX-based robots, the challenges this spring were designed so that they could be performed by Lego robots as well. As such, any appropriate robot type may be used in competition.

Competition Details

- **May 29, 2019 9:00am – 2:00pm**
- **Wings of Eagles Discovery Center in Big Flats**
- Please arrange for transportation through your home district
- Lunch options: Options are yet to be determined

Competition Structure

Recognition Awards for Teams – 1st, 2nd, and 3rd place awards in the following categories:

- **"Science Fair" Communication**
  - Based on combined scores from judges' interviews with the teams
- **Individual Team Performance**
  - Based on combined score from the Autonomous events
- **Collaborative Team Performance**
  - Based on score from the Operator Control event
- **Overall Robotics Champion**
  - Summative performance based on weighted scores from all areas:
    35% Science Fair; 45% Individual; 20% Collaborative

Competition Agenda and Notes

Due to the number of participants we are expecting, we will be trying to implement some measures to cut down on long lines and make the day as efficient as possible.

- **The Science Fair portion *will not be* the first event of the day for all groups.** Some teams will be asked to complete one or two challenges beforehand so that we can be more efficient with our volunteer judges' schedules.
- **Teams *will be* asked to follow a specific challenge schedule for the day.** All teams should come to the event as prepared as possible for each challenge that they are participating in.
- **The "mission countdown" will begin at 9:15**, but if teams are ready we may begin science fair judging early.
- **Teams will be assigned a table for their Science Fair discussions and as a "home base" for their supplies.** Some smaller teams may be asked to share table space with other groups. Please bring what you need, but space will be limited so try to pack lightly.
- **There will be a coaches meeting at 9:10.**
- **The Awards ceremony will begin by 1:15.**

Media Release Forms:
The media release form has been updated for this year.

Please work with your district, students, and parents to make sure we get a complete list of your students who need to be excluded from video/photo/media. Please bring any media forms with you on competition day! It will be your district's responsibility to confirm that we get an accurate list of students for the competitions.

Sample Competition Schedule:
In order to keep teams on task, we will be asking them to make sure they have completed at least one challenge every timeslot. This will give teams time to adjust their robots and find time to eat yet still finish all challenges in a timely manner.

Teams will be allowed to move to the next challenge early, but the teams who are scheduled to be at an event will be allowed to finish first.

Group	9:15 – 9:50	9:50 – 10:25	10:25 – 11:00	11:00 – 12:15	12:15 – 1:00	1:00 – 1:15	1:15 – 1:30
A	Science Fair	Geology of Mars	Climate of Mars	Life on Mars	Dance	Clean Up / Pack Up	Awards
B	Life on Mars	Science Fair	Geology of Mars	Climate of Mars			
C	Climate of Mars	Life on Mars	Science Fair	Geology of Mars			
D	Geology of Mars	Climate of Mars	Life on Mars	Science Fair			
				Lunch Served for all students			

Science Fair

Each team will discuss their experiences in all aspects of the robotics program (building, programming, testing, modifying, etc.) These conversations will be scored by judges using the attached "Communication Rubric." Each student on the team is expected to contribute to the conversation with the judges. Greater depth in their discussion is an advantage. Students can talk about the details of a particular challenge, use of code, strategy, etc.

In addition to the discussions, teams should plan to use display boards, digital media, process journals, engineering notebooks, or any other artifacts to help explain their experiences with the robotics.

Every team will meet with two different judges and the overall scores from each judge will be added together for a total of up to 60 points.

Competitive Challenges

Teams will compete in FOUR events (3 purely autonomous solo events and 1 operator-controlled team event). Challenges and their point values are listed below:

- **Autonomous Challenges:** Teams will perform the first three challenges in this section. All challenges have only one official attempt per robot. A team may abort a trial for an event at any time within the first 5-10 seconds and be given a second attempt. The re-attempt of the event will be for full credit.
    - Climate of Mars ..... 100 pts
    - Geology of Mars ..... 100 pts
    - Rock*et* n Roll*in*' dance or creative challenge ..... 100 pts
        - Each challenge will offer extra credit of some kind.
- **Operator Control & Team Collaboration Challenge:**
    - Life on Mars- ..... unlimited pts

Life on Mars

User Control Challenge: must work in groups of (3) robots on this challenge.

The Mars 2020 rover is going to be tasked with collecting and storing a compelling set of rock and soil samples that could be returned to Earth in the future. (https://mars.nasa.gov/mars2020/mission/rover/sample-handling/)

Your robot will be volunteering to help move these samples to storage so they can be returned to Earth in the future. In a team of (3), you will have 3 minutes to move the items from the loading area and organize it as instructed. Some samples will be heavy, some light, some tall, some short. Many of the items will be in the form of 1.5" or 3" blocks or various sizes of PVC pipe.

This challenge will take place within a 10' x 10' area. During the timed event your robots must stay completely inside this area.

In the true sense of **collaborative problem solving**, there will be a few unknowns and maybe a surprise or two when you arrive. Before starting this challenge, you should take a few minutes to formulate a plan with the teams that you are working with. Take into account the types of robots that everyone has, the expertise of the drivers, and the **constraints** that are limiting you. Drivers can locate themselves anywhere around the perimeter of the field so they can see what they are doing.

Scoring:

- 5 points for each item that is delivered to the proper place
- 2 points for each item that is in delivered but in the wrong place
- -5 points each time an item is dropped
- Bonus points may be available for "special payloads" that will be announced at the event.

Climate of Mars

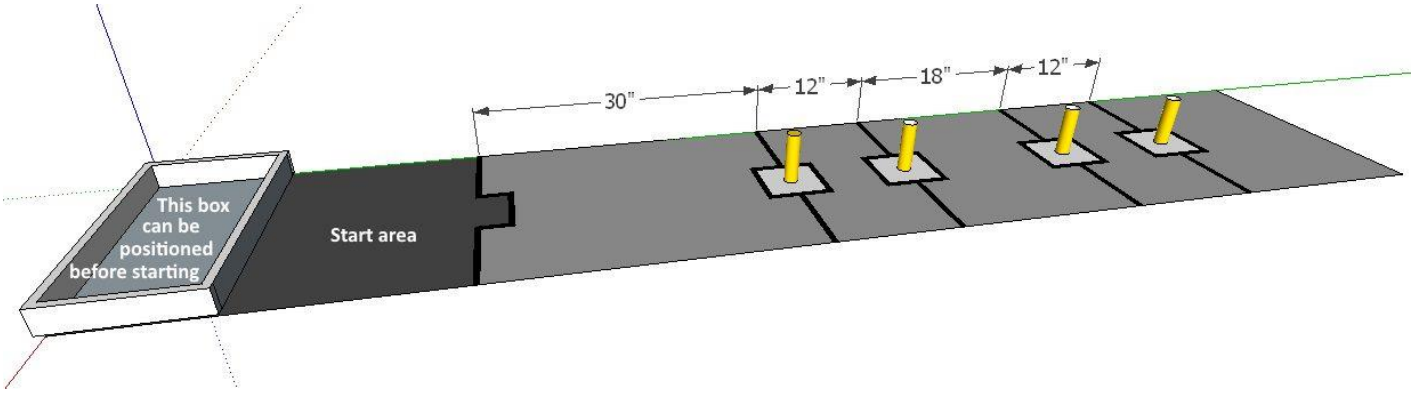
Autonomous Control challenge

Past Martian climate conditions are a focus of the Mars 2020 rover mission. The rover's instruments are looking for evidence of ancient habitable environments where microbial life could have existed in the past.

There will be 4 soil samples that your robot must collect and return to the collection zone. Each sample will be in a 6x6 box. Your robot may receive an assist from a Mars Martian (a teammate) to pick up each sample so long as the claw has autonomously made it within the 6x6 box and the Mars Martain doesn't move the sample outside of the given box.

- Robots should begin anywhere behind the start line, move forward until they get to the first sample, pick up the sample and return it to the collection box. *The entire robot should begin behind that line.*
- The robot will repeat that motion 4x; *down and back* to the 1st sample, 2nd, 3rd , and 4th
- You can use any sensor that you want for this challenge – or no sensors at all.
- Robots can move backward or forward, but needs to turn 180° at least once during the program

- The field will be 10' long. (Width will not matter due to nature of the challenge)
- You can place any objects on the floor of this challenge before you begin, if wanted. You cannot tape anything down. Teams will be able to place the collection box anywhere they wish behind the start line before the collection of samples begins. It **cannot** be moved once the program has started. The collection box will be used to collect the samples and as an object for the bump sensor to end the program.



Points:

- First trip *down and back*: 5 pts
- Second trip *down and back*: 10 pts
- Third trip *down and back*: 15 pts
- Fourth trip *down and back*: 20 pts
- Start the program by using a sensor or controller button: 5 pts
- Robot turns 180° at least once: 10 pts
- Staying within the boundary: 10 pts
- Returning each sample to the drop zone: 5 pts each (20 total)
- Robot shutting down after program completes its task using a bump sensor: 5 pts
- Dropping a sample: -2 pts

Extra Credit:

- All soil samples are placed in the collection box autonomously: 10 pts
- Robots retrieve soil samples without assistance: 2 pts each

Geology of Mars

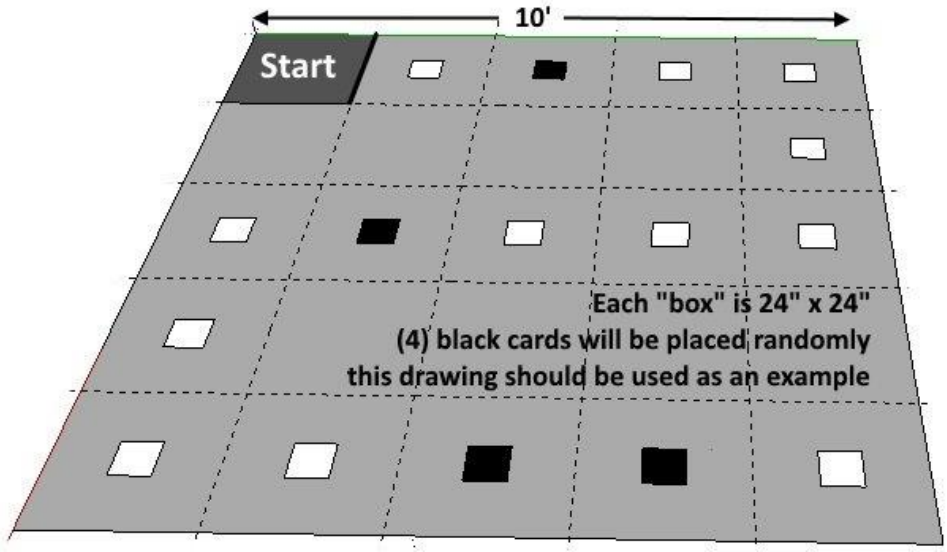
Autonomous Control challenge

The Mars 2020 rover is designed to study the rock record to reveal more about the geologic processes that created and modified the Martian crust and surface through time. Each layer of rock on the Martian surface contains a record of the environment in which it was formed. The rover seeks evidence of rocks that formed in water and that preserve evidence of organics, the chemical building blocks of life. (https://mars.nasa.gov/mars2020/mission/science/goals/#mars2020-goal-3)

In this challenge your robot is going to be taking pictures of different rocks. Your robot will get points by stopping at every card for at least 1 second and evaluating the color of it. White cards will have no need for further evaluation. Black cards will require further input from Earth (either a joystick or push button on the robot). You will have 1 minute to evaluate as many cards as possible. Each card can only be evaluated once. The picture below shows the layout of path your rover will take. The color of the cards will be placed randomly.

Points collected throughout the maze.

- Pausing at each white card for 1 second: 5 pts each (60 pts total)
- Pausing at each black card and waiting for an external input either from the joystick or touch sensor: 10 pts each (40 pts total)
- Completion of full maze: 10 bonus points



Autonomous Control challenge

Develop a **dance routine** (**30 to 45s**) which will be performed under autonomous control. The dance competition will be the main event of the afternoon. You may perform a solo, duet or trio dance. Because choreographing duets and trios are harder, you will get a 10 point bonus (duet) or a 20 point bonus (trio) adjustment to your score.

- **You are required to use an instrumental soundtrack to accompany your routine** (no vocals with music.)
- Your options for music are as follows:
    - If possible, you must send a digital sound file before the competition, so we can have it loaded on our hard drive.
    - If you bring it on a flash drive, please give it to the DJ before lunch on competition day in an mp3 format. Please be sure that your flash drive is labeled with you school and team name. Music will not be accepted after 12pm. Judges will not be searching for files on YouTube the day of the competition.
- Incorporating arm and claw movements, a variety of different wheel movements, lights/sounds or "robot wiggles" is encouraged.
- *Please* try to use a sensor, timer, or even a joystick button to start your robot dance at the right moment. Once the dance begins it should be completely autonomous.
- Dance floor props or robot decorations will be allowed if they are appropriate:
    - No people are to be in the dance area once the dance has started.
    - Nothing is to be attached to the robots that will damage or harm them in any way. This includes duct tape, glue, paint, etc.
    - Nothing can be attached to (or damage) the floor at the Wings of Eagles. Must be freestanding and safe.

Routines will be scored by independent judges on Technical merit and Creativity.

Points

- **Technical merit (20 pts) – scored by STEM judges**
    - Includes Forward and Reverse movements 5pts
    - Shows off different types of Turn movements 5pts
    - Additional pieces move (Arm, Claw) 5pts
    - Speed changes throughout the dance 5pts
    - *Movement out of 12'x12' dance area ..... 8pt penalty*
    - *Routine lasts longer than 50s ..... 10pt penalty*
- **Creativity /Originality (30 pts possible)**
    - Music fit the "Ready for Liftoff" theme
        - Students will introduce their robots, song and explain how/ why they picked their songs.
    - Props and/or movements that match the theme
- **Music sent to catcooke@gstboces.org before May 23, 2019** (must meet requirements above.) **(30 pts)**
- **Duets (10 pts) or Trio (20 pts)**
- Each robot on a team may only dance ONE time
- A dance may be re-attempted once if there is problem in the first 10s of the routine. Robot may be stopped, removed and then re-attempt dance when the issue is resolved.

VEX Science Fair Communication Rubric **Team:**

Outstanding — *Viewed as Unimportant* — *Satisfactory*

PRESENTATION						
When speaking, team members are:						
• using appropriate vocabulary, scientific concepts, and facts to support ideas	*5*	*4*	*3*	*2*	*1*	*0*
• organizing the discussion in a logical sequence that the audience can follow by maintaining a proper volume, rate, and level of enthusiasm	*5*	*4*	*3*	*2*	*1*	*0*
• use of visuals (photographs, charts, graphs, design drawings, engineering notebooks, slideshows, posters, etc) to help explain the learning that took place	*5*	*4*	*3*	*2*	*1*	*0*
QUESTIONING						
When questioned, team members are:						
• providing the audience with the information needed to fully understand the task	*5*	*4*	*3*	*2*	*1*	*0*
• answering all questions with clear explanations and further elaborations	*5*	*4*	*3*	*2*	*1*	*0*
• enthusiastic and confident about answering questions.	*5*	*4*	*3*	*2*	*1*	*0*
DEMONSTRATING EXPERIENCE						
Students have discussed the following points about their experiences of designing, building, testing, and operating their ROV:						
• first hand experiences about the robot build and any modifications used	5	4	3	2	1	0
• details about what they learned to successfully operate their robot	5	4	3	2	1	0
• details about what types of problems they experienced and how they solved them when writing their code to solve the challenges	5	4	3	2	1	0
• *How do they answer:* How are robotics used in our region and how might your experience programming and building robots help you outside of school?	5	4	3	2	1	0

Total Points: (50)

GST BOCES VEX Robotics Competition, update 10/2018

MEDIA, WEB PAGE, AND SOCIAL MEDIA RELEASE

Student's Name _____

School District: _____

The school district website and social media accounts include photographs of students, often without names. In addition, local newspaper and occasionally TV stations attend school events outside the school day and have interviewed students about important issues. Please read the following two sections.

If you deny permission for your child to be included in media coverage of our schools, please check the appropriate boxes and submit back to your child's administrator.

If nothing is returned, the school district will assume permission is granted under each of the sections identified below.

☐ I DO NOT give permission for school officials to photograph or record my child for school (for example yearbook and ID badges), school district, and/or BOCES publications (including web sites and district social media).

☐ I DO NOT give permission for my child to be photographed, recorded, or interviewed by the media during the regular school day.

Parent/guardian signature: _____ Date: _____