



BEST Robotics



2023 Competition



October 21, 2023

Trojan Arena

Troy University

Troy, AL

Welcome

TROY University's BEST Robotics Planning Committee, would like to welcome all students, teachers, coaches, mentors, parents, and sponsors to the 2023 TROY University BEST Robotics competition. The mission of BEST is to inspire students to pursue careers in science, technology, engineering, and mathematics through participation in a competitive robotics program that fosters knowledge, teamwork, and communication. Students learn to work through the engineering design plan, develop strong communication skills, effective leadership and teamwork abilities, understand the entrepreneurial process, and comprehend the global business environment.

The theme of this year's competition is "Incision Decision". Students are afforded the opportunity to design, build, and test robots to perform multiple functions that can aid surgeons in accomplishing several surgeries in a short time.

On behalf of TROY University BEST Robotics, and with sincere gratitude, we extend a special thank you to all of our sponsors for making TROY University BEST Robotics possible.

Good luck teams!

----- *TROY University BEST Robotics Planning Committee*

OFFICE OF THE GOVERNOR

KAY IVEY
GOVERNOR



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STATE OF ALABAMA

October 21, 2023

Greetings:

I would like to welcome you to the Wiregrass BEST Robotics Competition held in collaboration with TROY University BEST Robotics Competition Game Day held on Saturday, October 21, 2023 in Troy, Alabama.

The State of Alabama is proud to host this exciting event and to welcome you with true Southern hospitality. I would like to congratulate the teams who are competing at this year's competition. I encourage you to continue your education and to make service to the state and nation a priority in your life. You represent America's bright and shining future.

Upon completion of the event, many of you will return to your homes. I wish you a safe and pleasant journey and hope you will come back to Alabama often.

Again, welcome to the Wiregrass BEST Robotics Competition held in collaboration with TROY University BEST Robotics Competition Game Day and best wishes for a memorable event.

Sincerely,

A handwritten signature in black ink that reads "Kay Ivey".

Kay Ivey
Governor

KI/pb/aw



Office of the
Chancellor

216 Adams
Administrative
Building
Troy, Alabama
36082

334-670-3209
334-670-3374 FAX

October 21, 2023

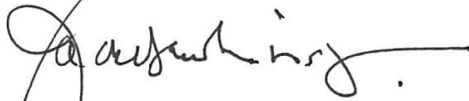
Dear Participants, Family, and Friends:

It is my pleasure to welcome each of you to the Troy University Wiregrass BEST Robotics Competition. TROY places a high value on the disciplines of science, technology, and mathematics. These areas are vital to the continued growth and progress of our region, state, and nation.

For 136 years, Troy University's mission has been to prepare leaders for Alabama, originally in education, and today in all disciplines and areas of service. Our founding motto, "Educate the mind to think, the heart to feel, and the body to act" is as true today as it was in 1887, and it captures perfectly the spirit of this competition.

Today's participants may one day develop technologies that will change our lives. Maybe dozens of groundbreaking ideas will have their genesis at the Troy University Wiregrass BEST Robotics Competition. Regardless, we want all competitors to have fun and enjoy their day at Troy University!

Sincerely,



Jack Hawkins, Jr., Ph.D.
Chancellor





Wiregrass BEST Robotics
BOOSTING ENGINEERING, SCIENCE, AND TECHNOLOGY
www.wiregrassbestinc.org

Welcome Parents, Teachers, Students, and Community Members:

Welcome to the Trojan Arena for a day of operation. Incision Decision has been innovative and creative for our hubs in BEST Robotics and for our students, even here in the Wiregrass.

On behalf of the Wiregrass BEST Robotics Board of Directors, we welcome you to our 2023 Game Day. We are excited to collaborate with TROY University BEST for another game season and are very happy to see what the students from both hubs have created.

Today, you will see the students' products and what they accomplished over the 56 days. It is impressive to see from even yesterday at the Marketing Presentations how much our students have learned about medical operations that are done with robots.

We invite you to enjoy this day and look at all the exhibit booths, talk with all the students, and see what they have learned from this experience. For any social media post, we ask you to use the hashtags #thanks2BESTRobotics, #IncisionDecision2023, and #BESTRobotics2023.

Concessions are also available for you, and the Dorothy Adams Student Center has its food vendors also open.

Again, my board and I welcome you, and we hope you will enjoy your day here at the Trojan Arena.

Sincerely,

Stephen L. Tsukuda

Stephen L. Tsukuda
Executive Director
Hub Director

Game Day 2023



Saturday, October 21, 2023

8:00 AM – 10:00 AM	Registration – <i>Trojan Arena Lobby</i>
8:30 AM – 9:30 AM	Compliance Check-in – <i>Pit/ Trojan Arena Floor</i>
9:30 AM	Drivers/ Spotters/ Mentors Meeting - <i>Pit/ Trojan Arena Floor</i>
10:00 AM	Opening Ceremony <ul style="list-style-type: none">- Welcome- Pledge of Allegiance- National Anthem- Recognition of Sponsors- Parade of Robots
10:30 AM – 1:00 PM	Competition Matches Seeding Rounds <i>[5 matches per team]</i>
10:30 AM – 4:00 PM	Team Exhibits Fair – <i>Trojan Arena Lobby</i>
1:00 PM – 1:45 PM	Lunch Break
2:00 PM – 2:10 PM	Recognition Awards Wiregrass BEST Robotics
2:15 PM – 4:00 PM	Competition Matches Semi-Final Rounds <i>[3 matches per team]</i>
4:00 PM	Team Exhibits may be dismantled
4:00 – 5:30 PM	Competition Matches Final Rounds <i>[3 matches per team]</i>
5:30 PM – 5:45 PM	Break
5:45 PM – 6:45 PM	Awards Ceremony
7:00	Teams Advancing to South's BEST Competition Meeting – <i>Pit/Trojan Arena Floor</i>



BEST Robotics

2023 Participating Teams

Team Number	Team Name	Sponsor	Competition Type
2251	Abbeville High School	Mr. Alvin Wiggins	Head-to-Head Competition
2280	Clark-Shaw Magnet School	Dr. Angela Atchison	BEST Award
2274	Hillcrest High School	Ms. Tieka North	Head-to-Head Competition
2278	South Dale Middle School	Mr. Michael Heer	Head-to-Head Competition
2279	St. Paul's Episcopal School	Dr. Stacey Burt	BEST Award
2271	Straughn High School	Mr. Stephen Bowen	BEST Award
2267	Thurgood Marshall Middle School	Mrs. Patricia Redford	BEST Award

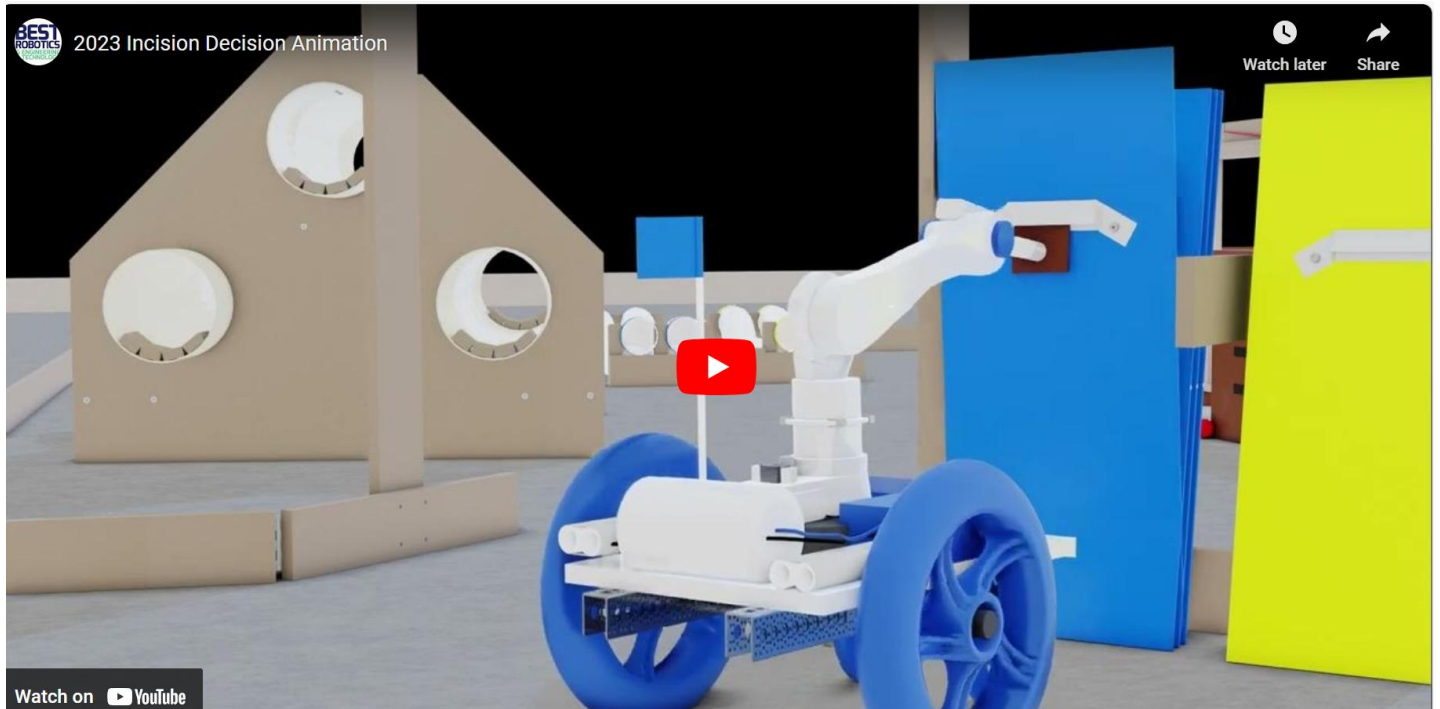


2023 Participating Teams

Team Number	Team Name	Sponsor	Competition Type
1354	Ashford High School	Kayla Martin	BEST Award
1355	Houston Academy	Andrew Kirk Jeanne Davis	BEST Award
1352	Northside Methodist Academy	Laura Renze Shanna Rhodes	Head-to-Head Competition
1351	Ridgecrest Christian School	Greg Summerlin	BEST Award

2023 Incision Decision Animation

[2023 Incision Decision Animation - YouTube](#)



Field Layout

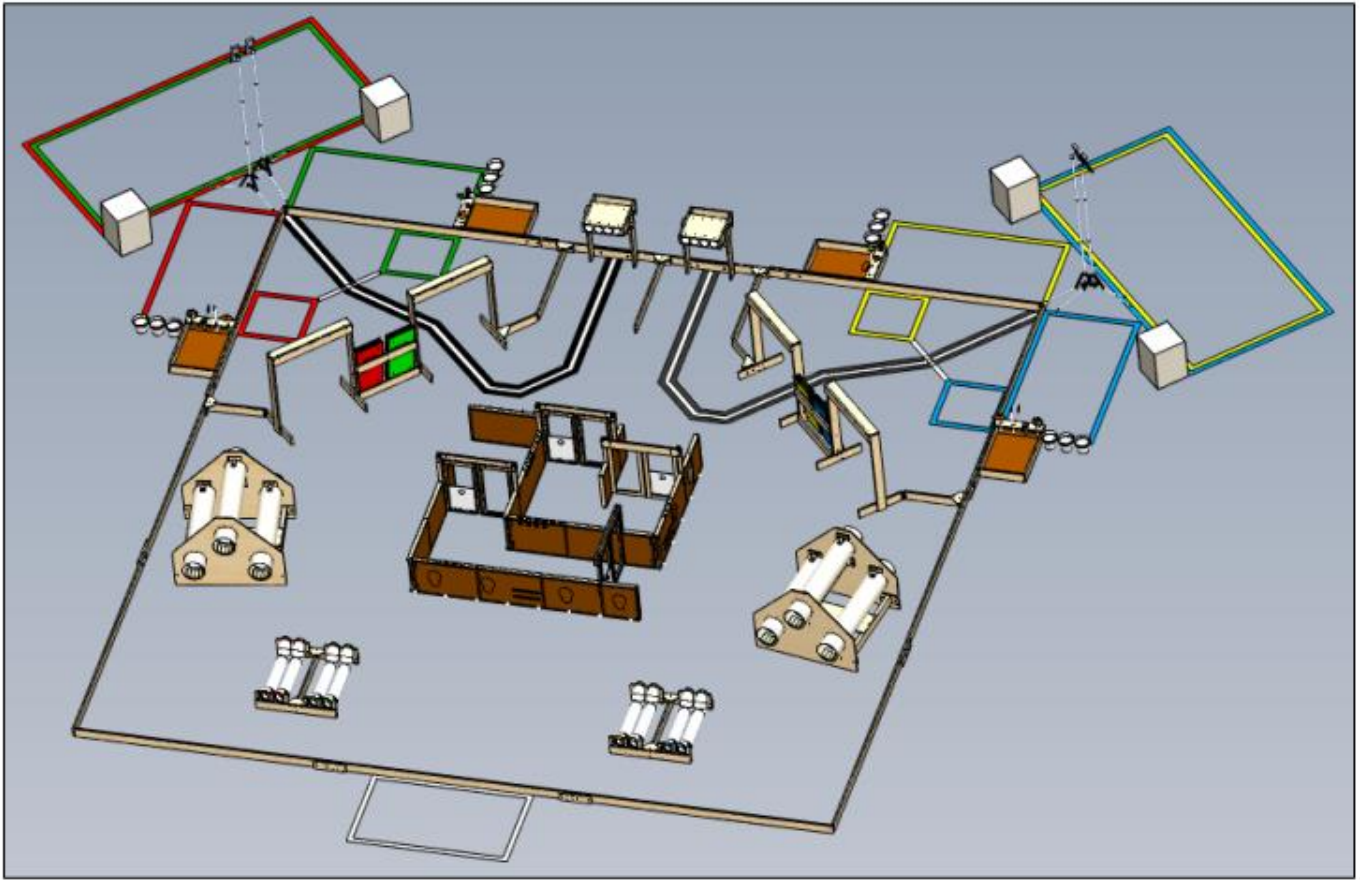


Figure 3.1 Game Field Overview

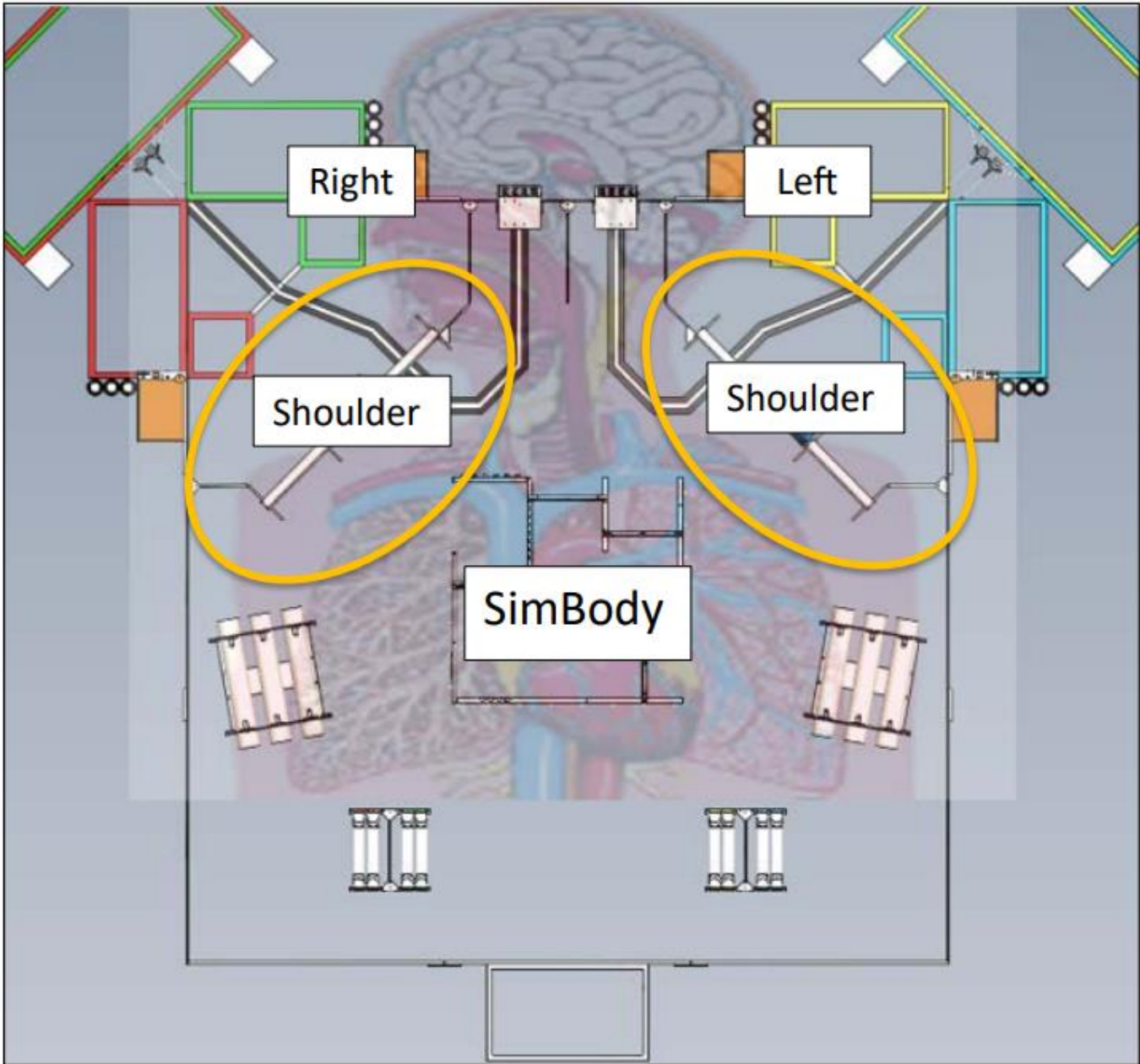


Figure 3.2 Game Field / SimBody Overview

How to Score Points

Table 3.8 Scoring Summary

Task Completed	End of Match Location	Points Each	Max # Possible Per Team	Max Pts Per Team
Heat Valve Replacement				
Faulty Valve Membrane Disposal	Faulty valve membrane is inside the Biowaste container	30	4	120
Artificial Valve Membrane Installed at Ventricle (i.e., outside heart)	Valve membrane is installed in a valve frame at a ventricle opening (i.e., valve frame swinging away from the heart).	125	4	500
Artificial Valve Membrane Installed at Atrium (i.e., inside heart)	Valve membrane is installed in a valve frame at an atrium opening (i.e., valve frame swinging into the heart).	150	4	600
Cardiac Procedures (Heart Electrical System)				
Pacemaker Electrode Attached	Electrode is attached to the receiver pad	22	6	132

Heart Ablation Tag Attached	Ablation tag is attached to the ablation pad	10	6	60
Heart Ablation Tag Attached at blind location	Ablation tag is attached to the ablation pad on the blind side of the heart.	30	6	180
Vein Harvesting and Coronary Artery Bypass				
Harvested Vein Stored	Harvested vein is inside the Vein Harvesting Storage Area.	70	2	140
Heart Bypass Vein Connected (per end)	One end of harvested vein is connected to coronary artery bypass location.	150	2	300
Heart Bypass Vein Connected at blind location (per end)	One end of harvested vein is connected to a coronary artery bypass location on the blind side of the heart.	225	4	900
Hemorrhage Damage Control				
Blood Droplet Removed	Blood droplet is inside the Robot Start Box.	3	18	54
Blood Droplet Disposal	Blood droplet is inside the Biowaste container.	5	18	90
Artery Procedures				
Plaque Brick Removed	Plaque brick is fully supported by the robot	10	24	480
Plaque Brick Disposal	Plaque brick is inside the Biowaste container	20	24	
Stent Inserted (lower)	Stent is fully inserted into a lower artery	25	3	75
Stent Inserted (upper)	Stent is fully inserted into an upper artery	35	2	
Artery Procedures (Blind Side)				
Plaque Brick Removed	Plaque brick is fully supported by the robot	15	24	480
Plaque Brick Disposal	Plaque brick is inside the Biowaste container	30	24	

Stent Inserted (lower)	Stent is fully inserted into a lower artery	40	3	120
Stent Inserted (upper)	Stent is fully inserted into an upper artery	53	2	
Brain Biopsy				
Biopsy Sample Collected	Biopsy sample is resting on the robot.	200	2	400
Bonuses				
Brain Biopsy Surgical Team Bonus	For each biopsy sample resting on the partner's robot.	50	2	100
Diversity Bonus 3	For completing 3 – 4 procedures.	50	1	50
Diversity Bonus 5	For completing 5 – 6 procedures.	100		100
Diversity Bonus 7	For completing 7 or more procedures.	150		150

Bonuses

3.7.3.1 Brain Biopsy Surgical Team Bonus

Additional bonus points are awarded to a team for each brain biopsy sample that is collected by their [Surgical Team partner](#).

- a. 50 bonus points are awarded to the Red team for each brain biopsy sample that is [resting](#) on the Green team's robot at the end of the match.
- b. 50 bonus points are awarded to the Green team for each brain biopsy sample that is [resting](#) on the Red team's robot at the end of the match.

3.7.3.2 Surgical Diversity Bonus

Robots that are diverse in their functionality and can perform multiple surgical procedures may receive additional bonus points in a match. There are 10 possible surgical procedures in SimBody.

1. Faulty heart valve membrane(s) [stored](#).
2. Heart valve replacement membrane(s) [installed](#).
3. Pacemaker electrode(s) [attached](#).
4. Heart [ablation](#).
5. Harvested vein(s) [stored](#).
6. Heart bypass [connected](#).
7. Blood droplet(s) [removed](#) and/or [stored](#).
8. Plaque [removed](#) and/or disposed of.
9. Stent(s) [inserted](#).
10. Brain biopsy sample [collected](#) by the team.

Surgical diversity bonus points are awarded for completing (scoring at least one game piece) in the number of procedures indicated:

- a. 50 points are awarded for completing 3 or 4 procedures.
- b. 100 points are awarded for completing 5 or 6 procedures.
- c. 150 points are awarded for completing 7 or more procedures.

**Thank you to all of the generous sponsors of
TROY University BEST Robotics**



BEST Robotics

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CONGRATULATIONS ON YOUR SUCCESS



ROBOTICS

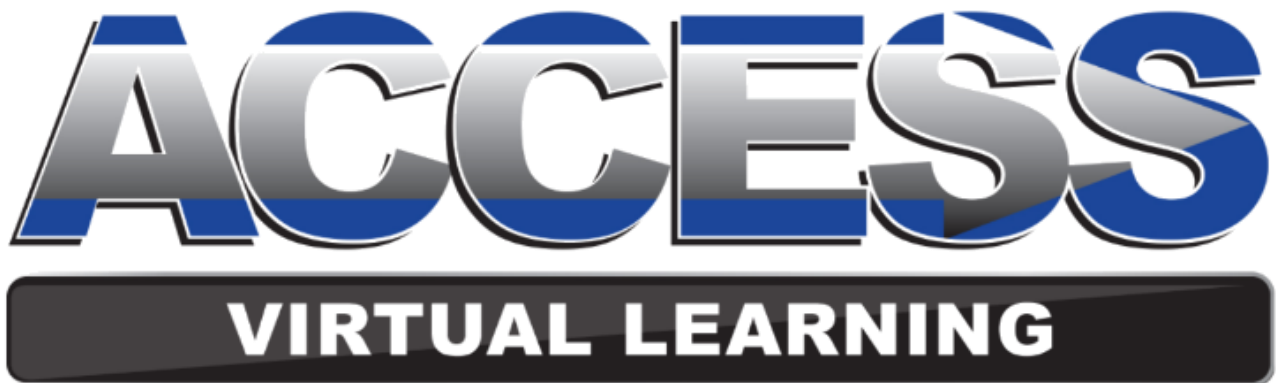
BEST



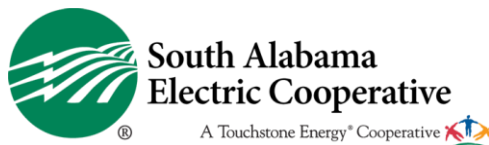
Southeast Gas

May the **EXCITEMENT** of the day **THRILL** you.
May the **CHALLENGE** of the project **GROW** you.
May the **SUPPORT** of your community **INSPIRE** you.

**Best wishes as you continue your
successful path!**



Thank you to all of our sponsors and supporters of TROY University BEST Robotics!



**Folmar
Consulting, LLC
Brantley, AL**





BEST Robotics

Planning Committee

Name	Affiliation	Committee
Mr. Mondarious Brantley	Budget Specialist Southeast Alabama Regional Inservice Center College of Education	Scoring Software Volunteers Hub Logistics/ Awards
Dr. Robin Bynum	Executive Director of Educational Outreach Professor College of Education	Hub Logistics/ Awards Volunteers/ Judging
Dr. Hyung Jae (Chris) Chang	Associate Professor Computer Science College of Arts and Sciences	Volunteers/ Judging Software Support
Mr. Tom Dreilinger	Director, eLearning Alabama College of Education	Volunteers/ Judging Software Support
Dr. Shirley Farrell	Associate Professor College of Education	Volunteers/ Judging
Mrs. Margaret Folmar	Program Development Consultant Southeast Alabama Regional Inservice Center College of Education	Hub Logistics/ Awards Recruitment of Teams
Dr Byungkwan Jung	Assistant Professor Department of Computer Science College of Arts and Sciences	Software Support
Dr. Long Ma	Assistant Professor Department of Computer Science College of Arts and Sciences	Kit Assembly/ Software Support
Mrs. Jessica Moran	Instructor, Troy City Schools Troy, AL	Game Field Assembly
Dr. Charisse Snell	Alabama Technology in Motion Specialist Troy University, College of Education	Volunteers/ Judging Software Support

Good luck to all teams!

Thank you to all of the generous sponsors of Wiregrass BEST Robotics



Kim Sheppard



Karen Cooper

In-Kind Donors





Board of Directors

Stephen Tsukuda - Hub Director

Everett Chritten

Rebecca Chritten

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Matthew Monday

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Glenn Waterworth

