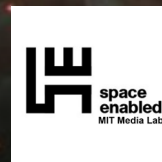


# ZERO ROBOTICS

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ISS PROGRAMING CHALLENGE





# What is Zero Robotics?



## **A Competition**

- Middle School (Summer)
- High School (Fall Semester)

## **A Programming Challenge**

- Students program autonomous “players”
- Students compete to win a game
- A software-based complement to FIRST



## **Zero Cost**

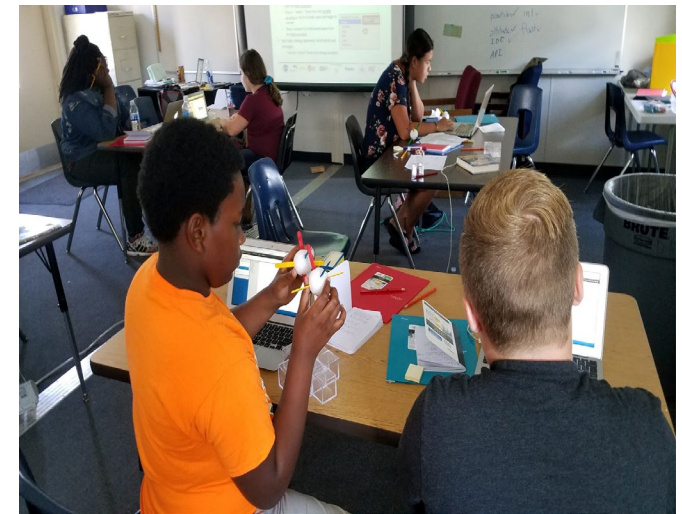
*No entry fees*

## **Zero Configuration**

*Everything is programmed online*

## **Zero Gravity**

*Student developed codes run on ISS*



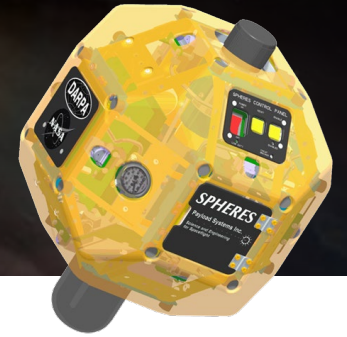
# Thanking the Zero Robotics Team!



- Danielle Wood, MIT, Principal Investigator
- Katie Magrane & Team, Innovation Learning Center
- Alvar Saenz Otero, MIT ZR Co-Founder and Technical Expert
- Wendy Feenstra, Aurora Flight Sciences
- Mizanul Chowdury, Varset Engineering, Technical Expert
- Javier Stober, MIT Research Engineer
- Regina Apodaca Moreno, MIT Grad Student
- Michael Mazumder, MIT Undergrad Student
- + Many collaborators, educators and supporters around the world!



# ZR Competitions



- All Zero Robotics Competitions have:
  - Several elimination rounds
  - Alliance phase
  - Finalists' code tested aboard the ISS
- High School (grade 9-12) Tournament
  - International competition
    - United States, Europe, Russia, Mexico, Australia
  - Runs through the Fall (Sept to Dec)
  - Students self select into the competition
- Middle School (grade 6-8) Tournament
  - Five week *summer* program
  - Educator Training & Curriculum Provided
  - Regional partnerships provide support





# Zero Robotics: Our Impact

**10** Years of ZR on the International Space Station!

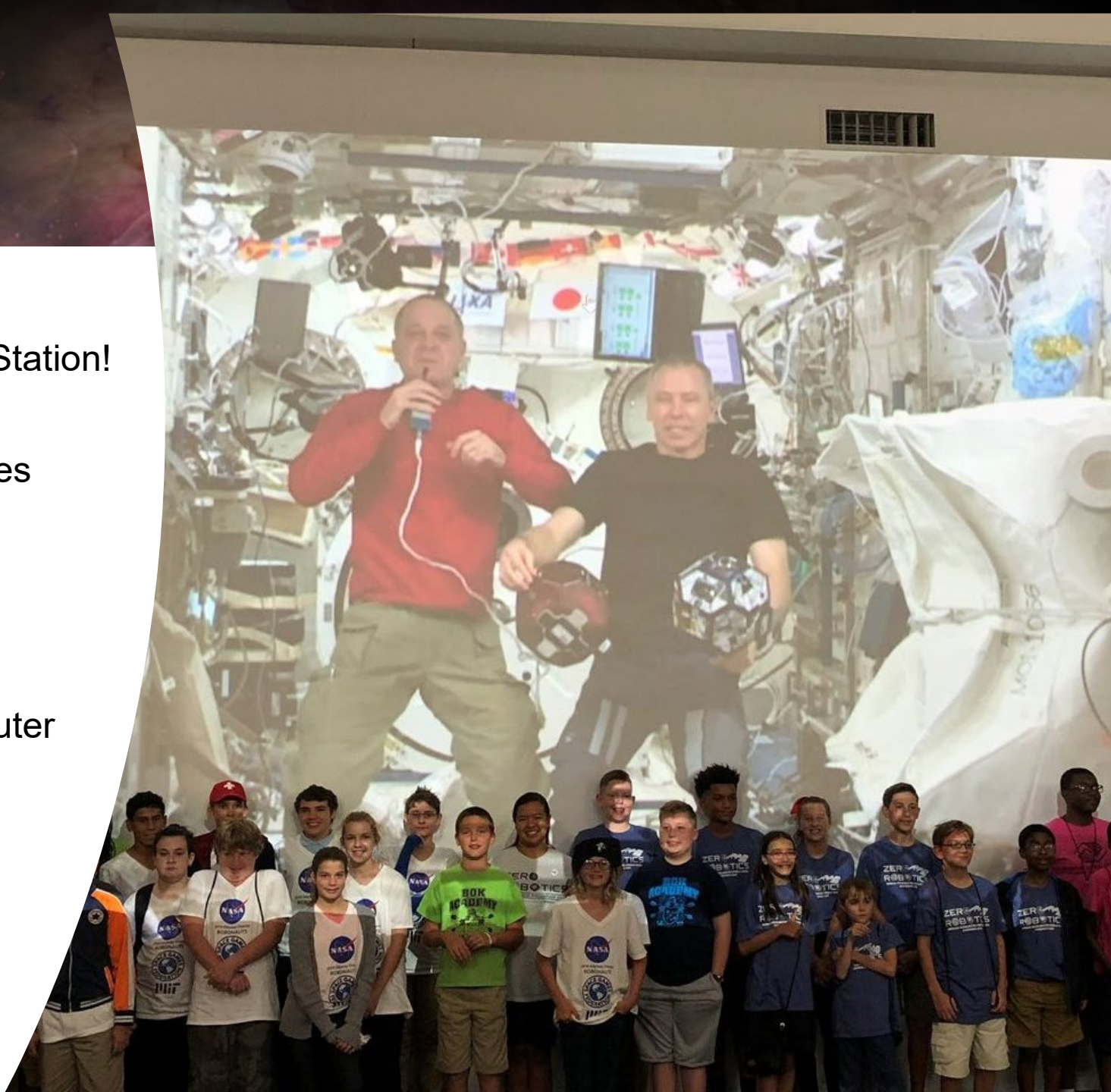
**20,000** Students writing code for satellites

- 15,000 HS students;
- 5,000 MS students
- 1M student/hrs

**4,500** Educators learning to teach Computer Science and Computational Thinking!

**16** states; **16** countries

- 14,000 US students;
- 6,000 International students



# AWARD WINNING DOCUMENTARY



***Zero Gravity*** is a feature documentary that follows a diverse group of middle-school students from San Jose, CA, who compete in the ZR nationwide tournament to code satellites aboard the International Space Station.

<http://zerogravityfilm.com/>



54th Worldfest Houston International Film Festival - April 2021 (WINNER - Gold Award - ***Best Feature Documentary***)

Only The Best International Film Awards - May 2021 (WINNER - Jury Award - ***Best Feature Documentary***)

Desertscape International Film Festival - June 2021 (WINNER - ***Best Feature Documentary***)

ZR also hosted our first educational test screening of the Zero Gravity Film. Special thanks to the 27 - 6th grade students from the Carolyn A Clark Elementary School in San Jose and their teacher, Ms. Debbie Olivia. Student Reviews are available upon request.



# Transition to Astrobees



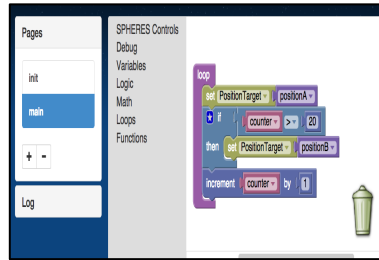
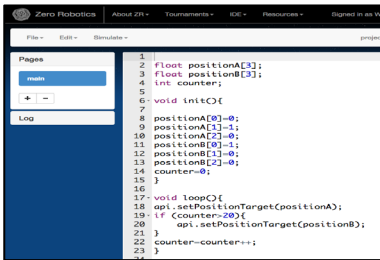


# Transition to Astrobbee : *Impact Areas*



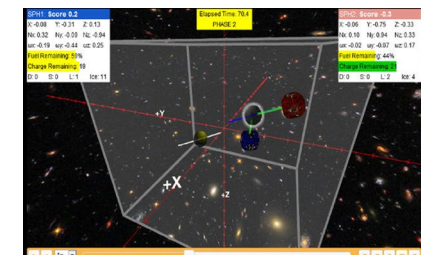
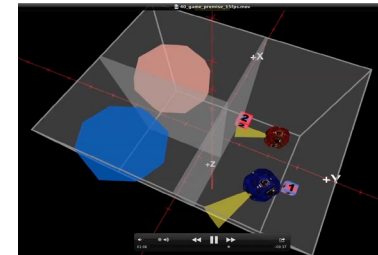
## Programming Environment:

Integrated Development Environment (IDE)  
Text Editor & Graphical Editor available to Students



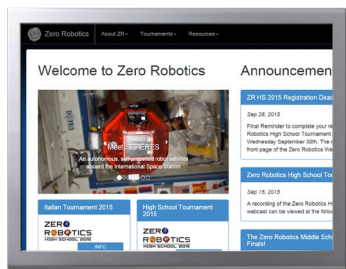
## Simulation Environment:

Students compile & simulate code online  
Venue for intramural competitions



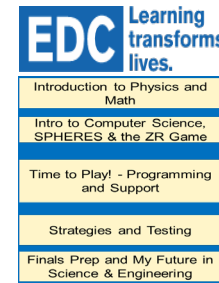
## Online Mentor Resources

Online Forums, LiveTechnical Support  
Tutorials, Game Documents, Outreach



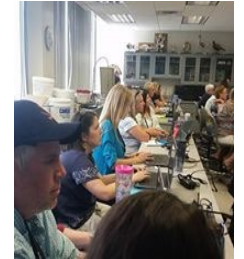
## Middle School Curriculum

Free Online Curriculum  
5-Week Summer Program



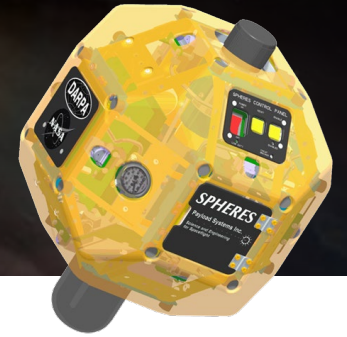
## Teacher Training

Free Training for Summer Educators  
Live, web-based & hybrid trainings





# Summer 2021: Zero Robotics Competition using SPHERES Simulation



*During July 2021, Zero Robotics will host a virtual program with student and educator teams from across the United States using the existing SPHERES simulation.*

## **Mission:**

- Collect data from a defunct satellite
- Spy on opponents

## **Command your robotic SPHERES to:**

- Collect data
- Take pictures of opponents
- Avoid having its picture taken

## **Goal:**

Collect most points while managing energy and fuel in LEO



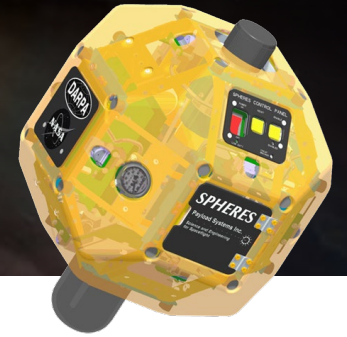
ZR 2021 is sponsored by:



- **30** Participating Teams registered from across the US
- **200+** Middle School students will participate
- **85** In/Formal Educators trained in ZR Coding
- **2** MIT Students supporting the ZR/Astrobee transition
- **30 College Interns** provided by The Aerospace Corporation to virtually support ZR's Summer 2021 Space Coders Camp







**Recent focus: Proposals for  
funding and Astrobee  
payload status**

# DISCUSSION

