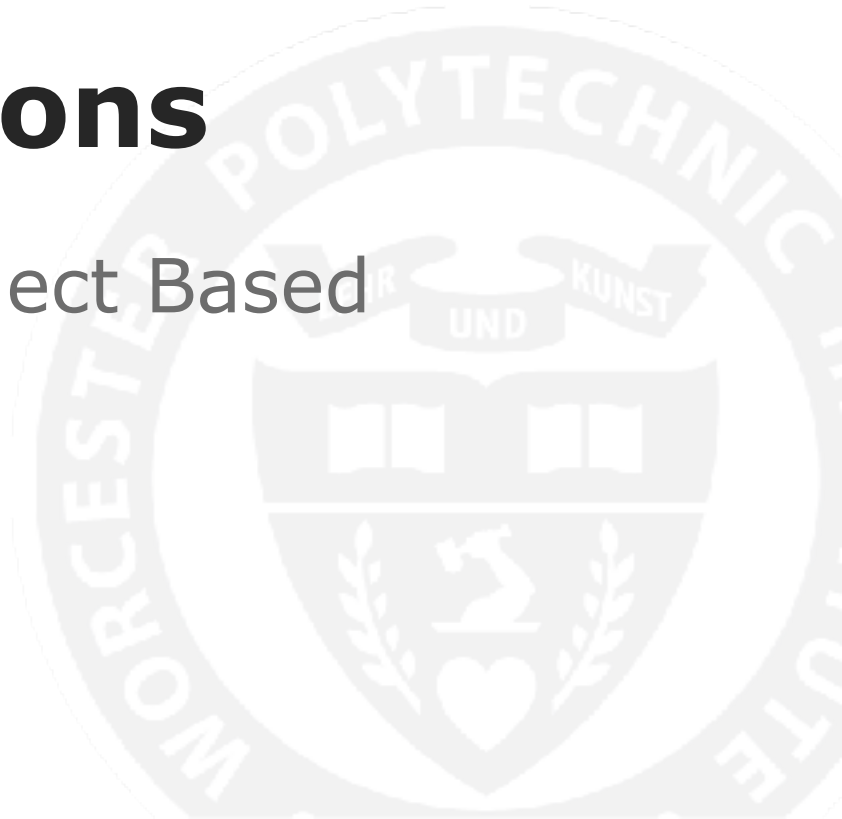


WPI

Robot Competitions

And how they fit with Project Based Learning



Why Have Robot Competitions?

- Gives students a competitive goal to solve a very complex problem that they want to learn how to solve
- Students get work in teams and utilize all the project-based learning we just discussed
- Students become very engaged because their pride is on the line - they compete to win
 - Students at WPI report that participating as mentors on our FRC team was the single most significant thing they did in their college career
- This is often a life-changing experience

Sample Design Process

- Understanding the Problem
- Brainstorming robot ideas
- Building prototypes
- Building the real robot
- Testing and breaking the robot
- Practice operating or driving

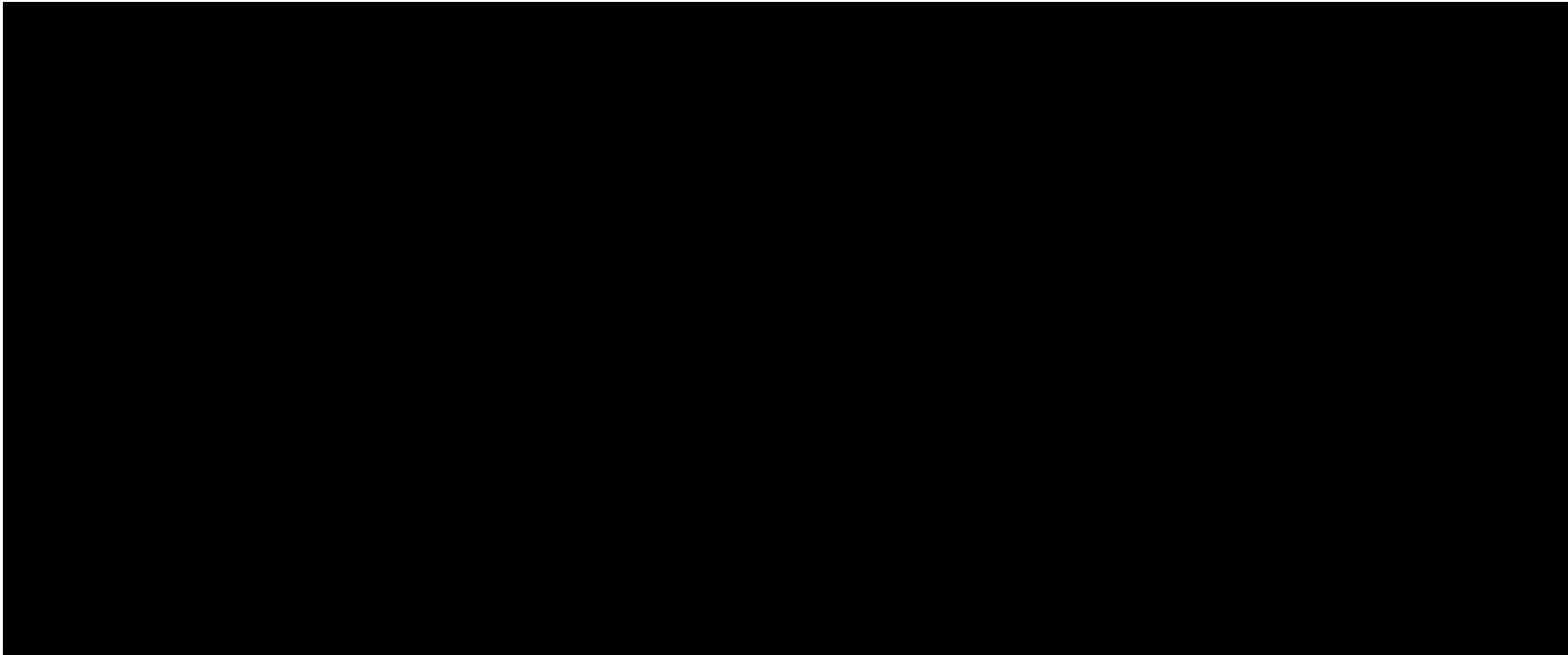
FIRST (For Inspiration and Recognition of Science and Technology)

The original robotics competitions



A Full Range of Robotics Programs

- JFLL - Junior FIRST Lego League
- FLL - FIRST Lego League
- FTC - FIRST Tech Challenge
- FRC - FIRST Robotics Competition



FIRST Robotics Competition (FRC)

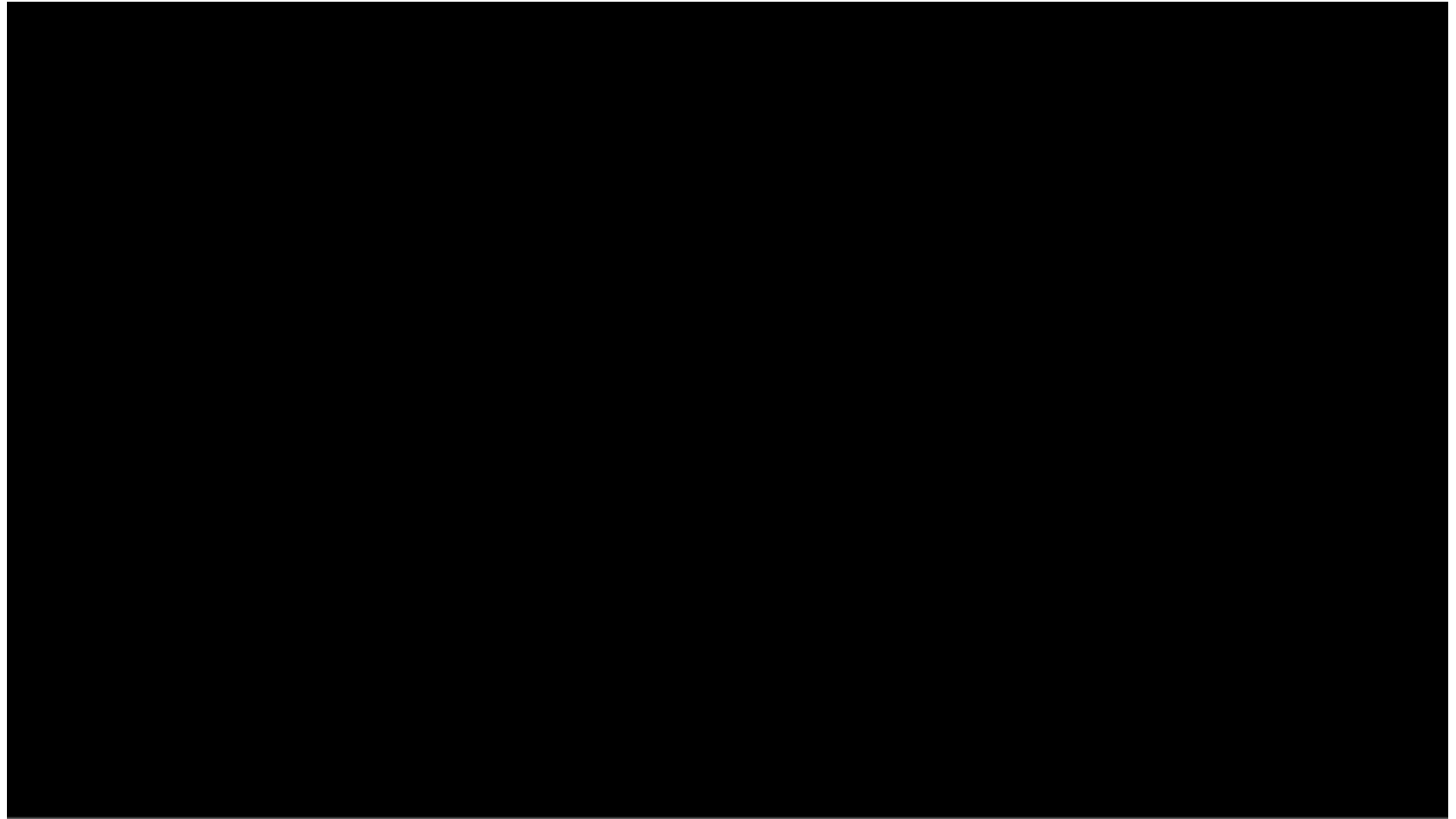


The First FIRST Competition

- Started in 1992 with 25 teams (including WPI)
- High school program with adult mentors designed to inspire students to pursue STEM careers
- 2018 has over 3400 teams participating from many countries

FIRST Robotics Competition

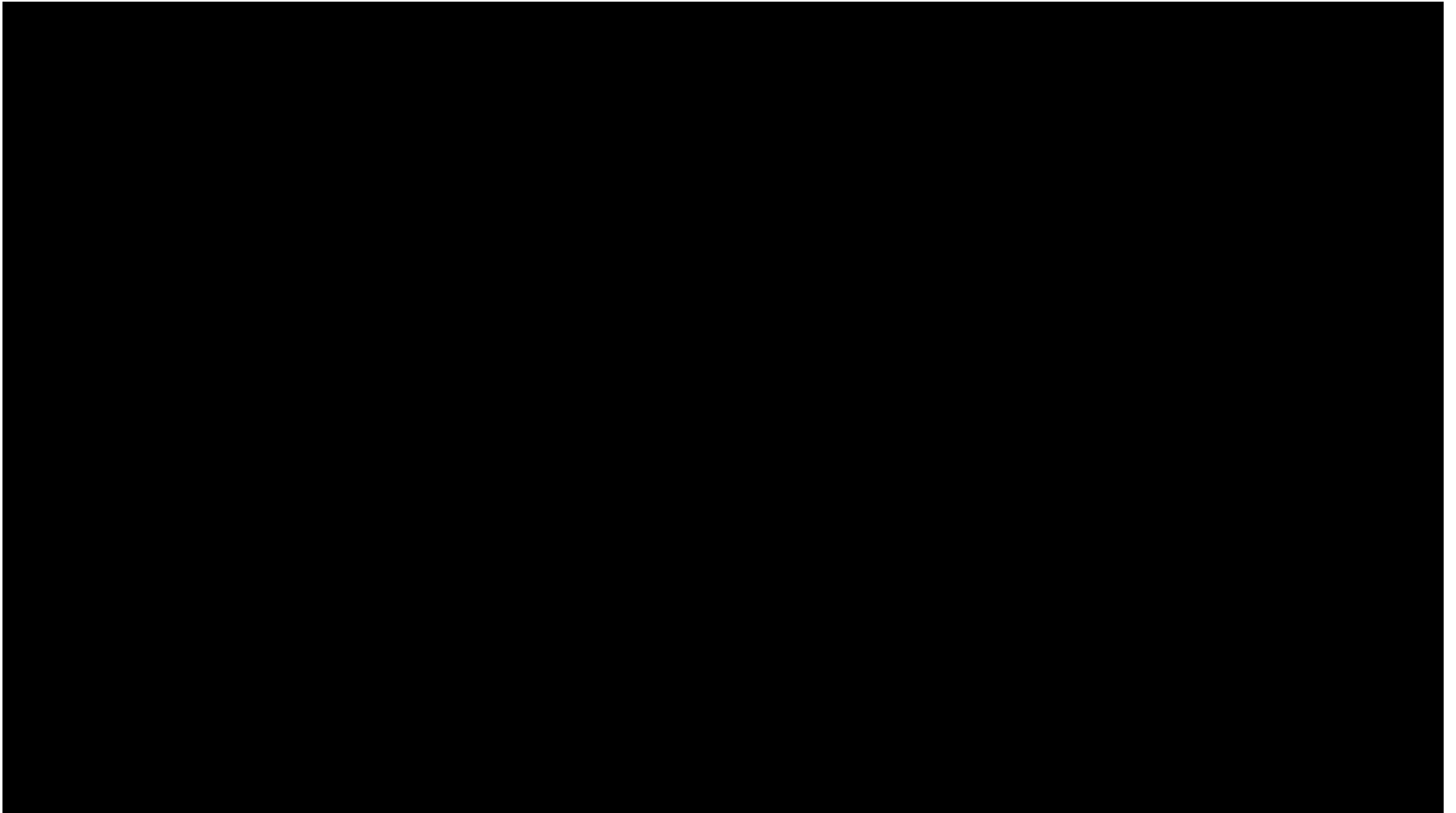
Competitions designed to celebrate STEM skills



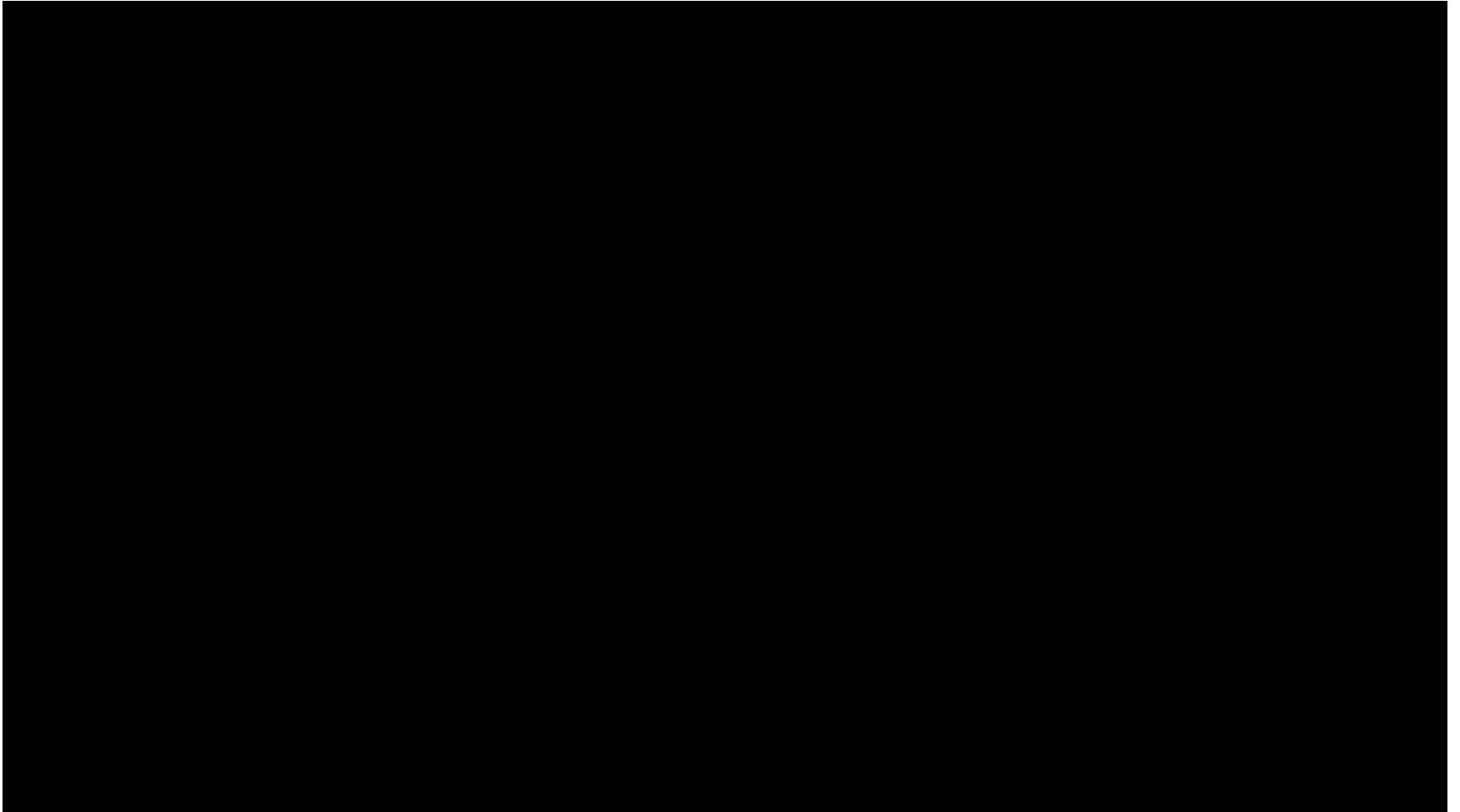
FIRST Lego League (FLL)



What's FIRST Lego League (FLL)



Lego Summer Program for 7-9th grade



Lego Robots - Not Just for Fun

Object Oriented
Programming
(Java) class for
WPI Juniors.

Learned about
Java
Programming
and Object-
oriented
program design

VEX Robotics



VEX Robotics

- Table-top sized robots (like the ones you used yesterday)
- 7th-12th grade target
- Can be programmed in C or graphically
- 16,000 teams from 40 countries

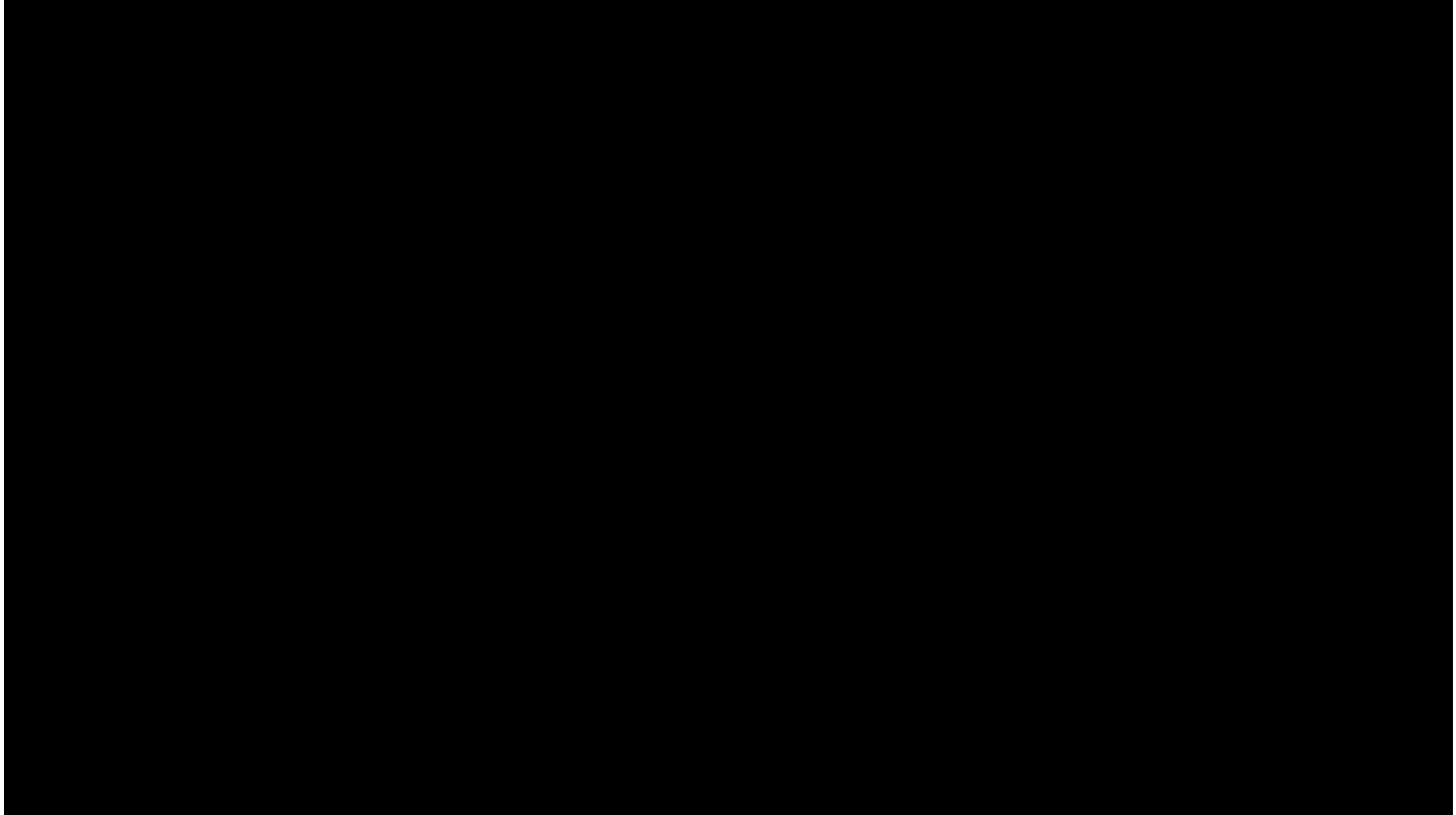
VEX Robotics

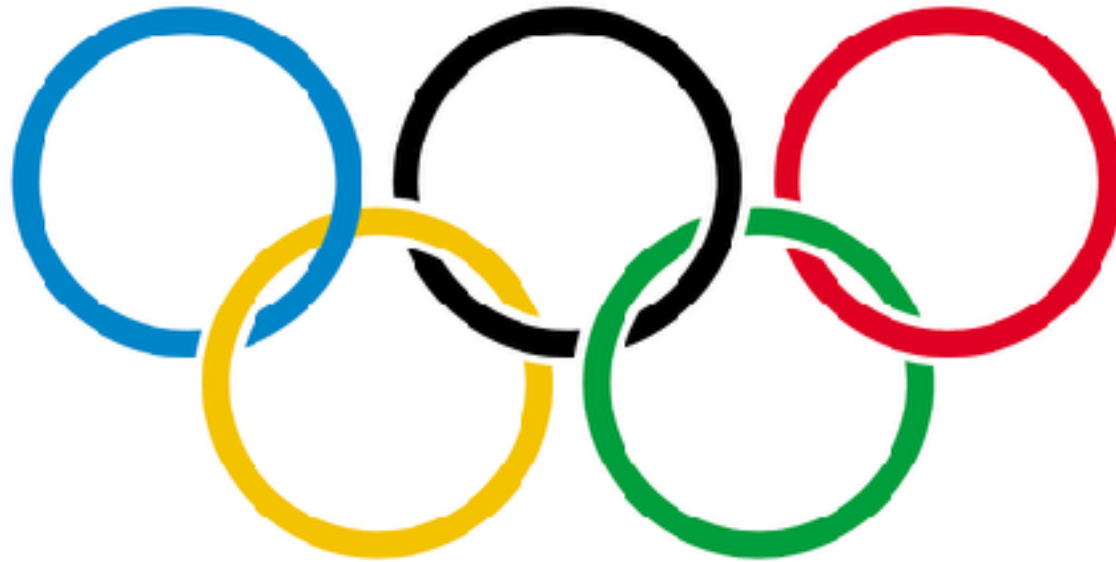
- **Middle school, high school, and college/university**
- More than **16,000 teams** from **40 countries** playing in over **750 tournaments**
- **Local, regional, national, and world competitions**
- **Standard Matches:** Two alliances of two teams each playing against each other
- **Robot Skills Challenge:** One robot playing alone against the clock
- **Online Challenges:** Unique contests using CAD, animation, essays, and more

Territory
Australia
Bahrain
Bermuda
Brazil
Burundi
Cambodia
Alberta
British Columbia
Ontario
Quebec
Saskatchewan
China
China
Colombia
Dominican Republic
Egypt
Ethiopia
Finland
France
Guam
Guatemala
Haiti
Honduras
Hong Kong
India
Indonesia
Ireland
Japan
Jordan
Kazakhstan
Lebanon
Macao
Malaysia
Mexico
Nepal
New Zealand
Paraguay
Peru

Territory
Philippines
Puerto Rico
Russia
Saudi Arabia
Senegal
Singapore
South Korea
Spain
Syria
Taiwan
Thailand
Turkey
Uganda
UAE
United Kingdom

VEX Championship each year





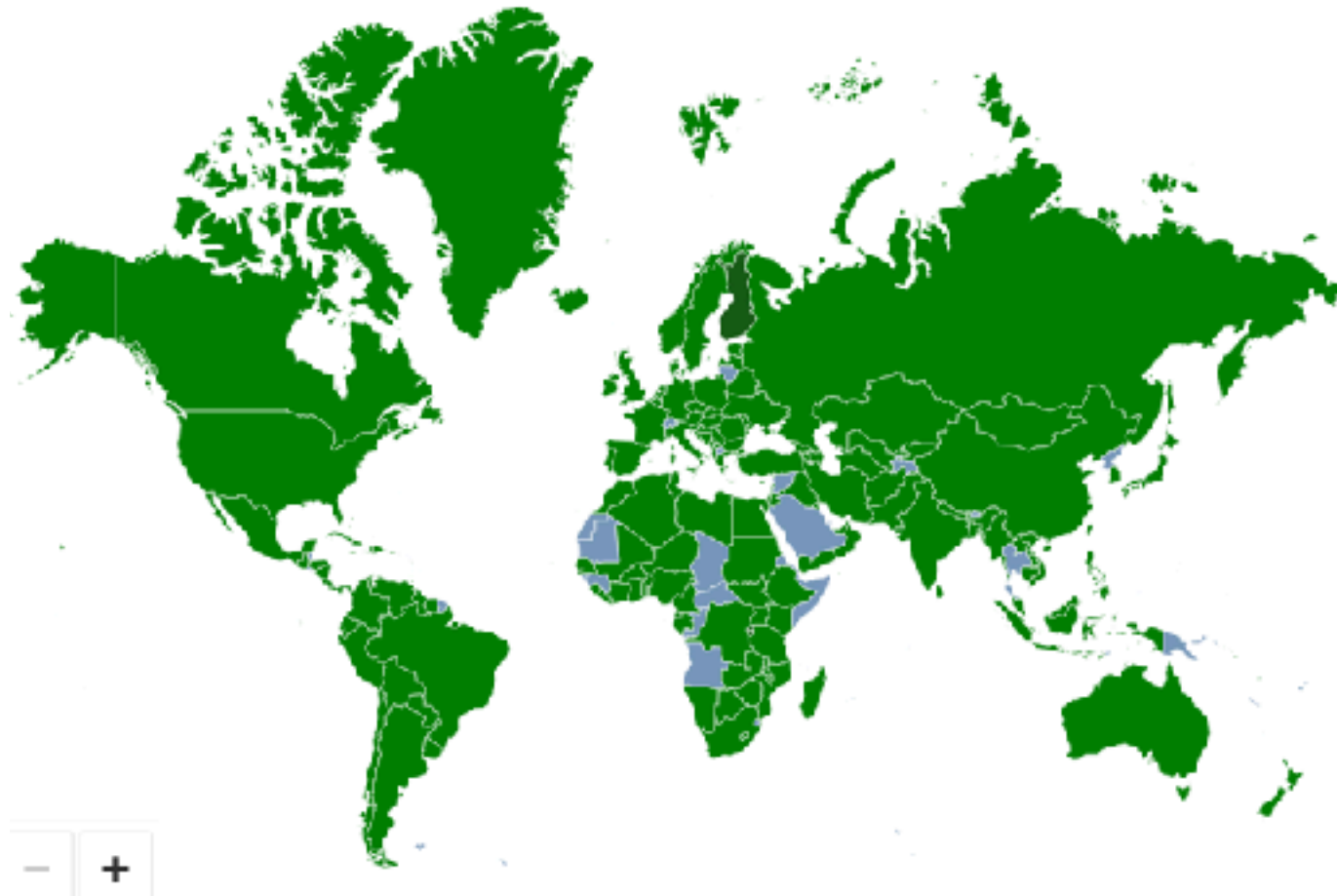
FIRST Global

Olympics of Robotics

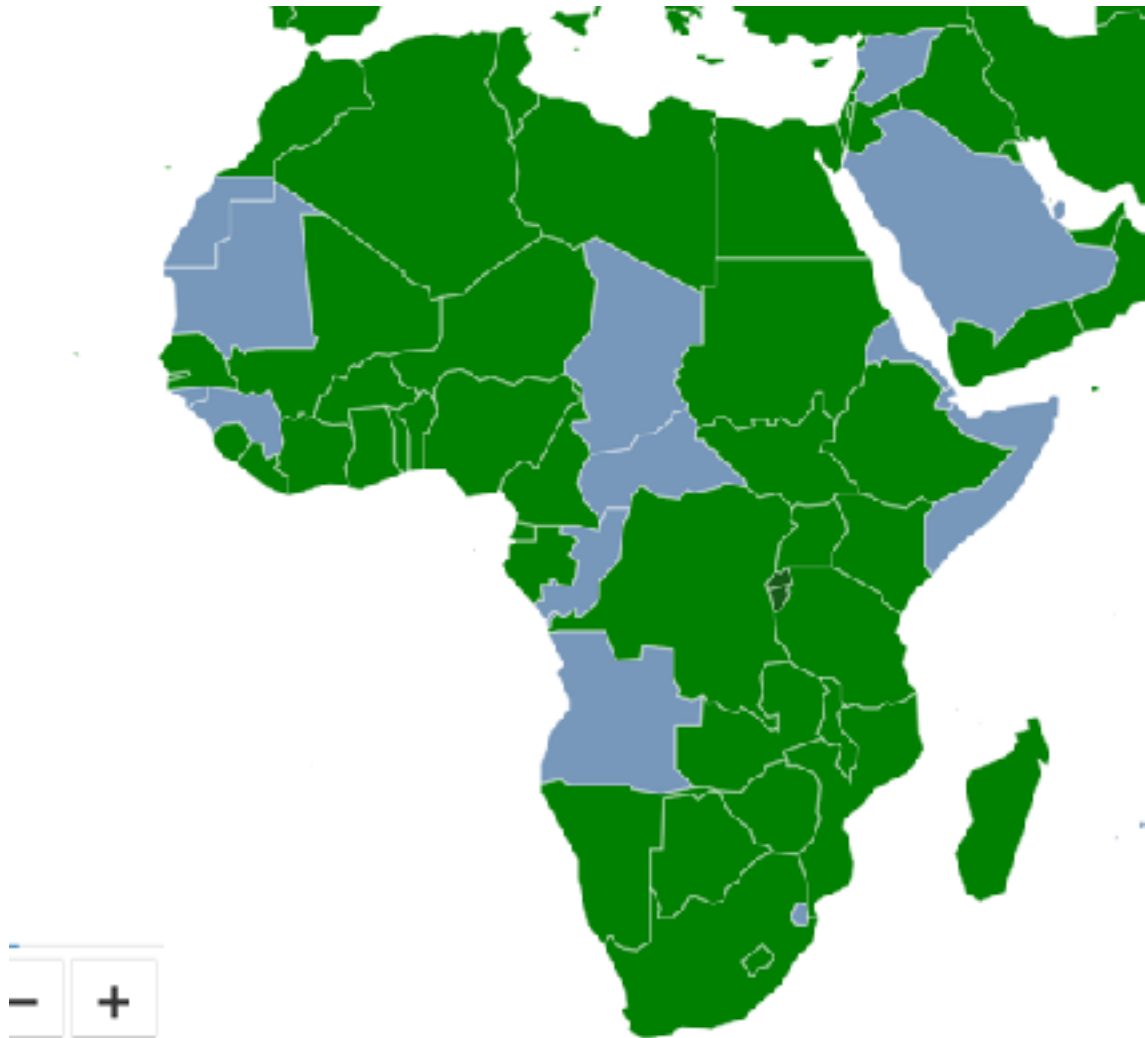
What is FIRST Global?

Olympics of Robotics

2017 FIRST Global National Teams



African FIRST Global Teams



FIRST Global Rwanda Team



Régis Aimé RUGERINYANGE	lycee de Kigali
Paola IKIREZI	Excella high school
Aubin Marc MUGISHA	Remera Rukoma secondary school
Serge BYISHIMO	SOS technical school
Frank MUHIRWA	Saint Andrew secondary school
Benita Olga ISHIMWE	Stella Matutina
Joselyne UWIHOREYE	Saint Ignace secondary school

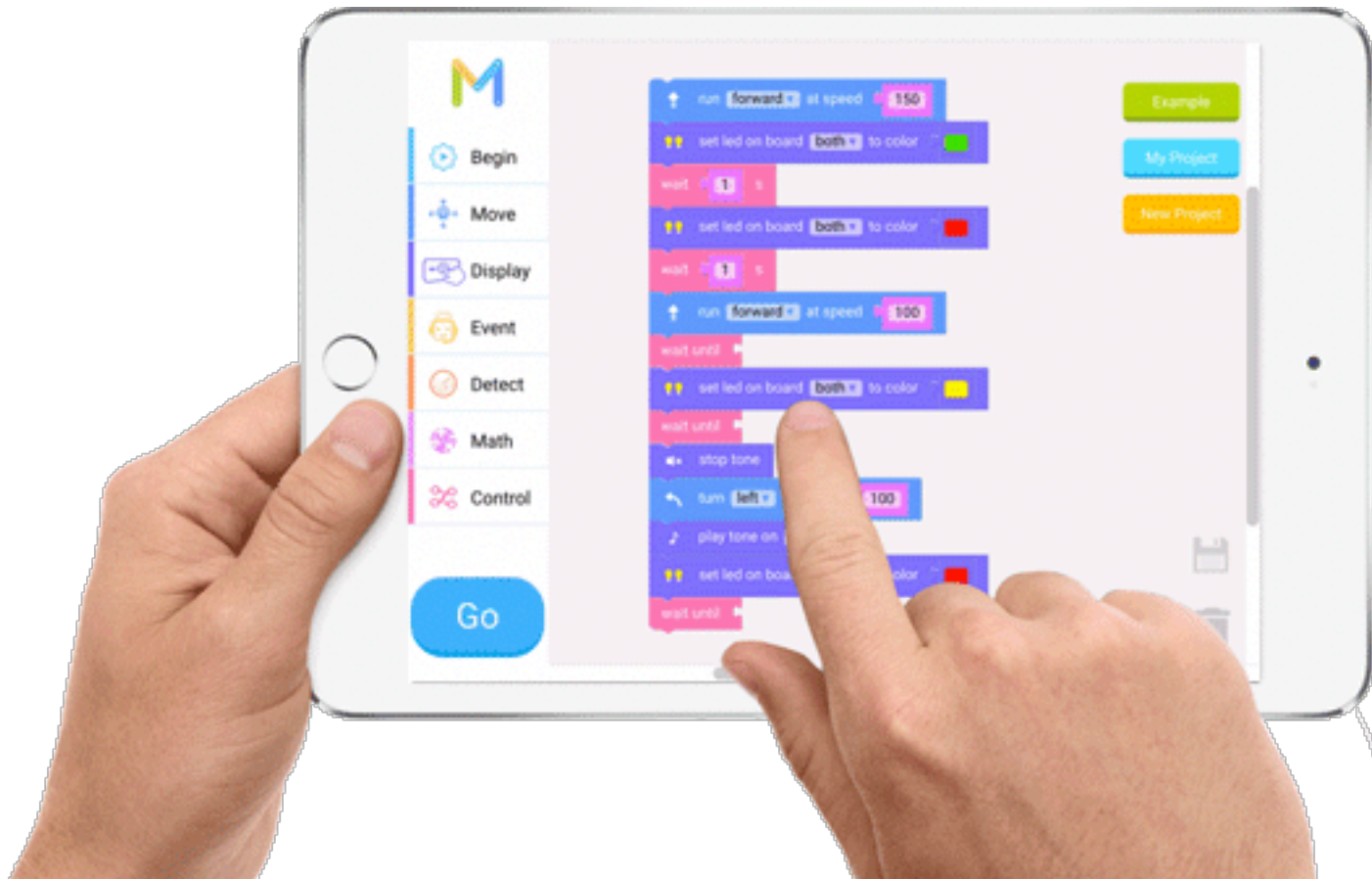
Follows Olympics Model

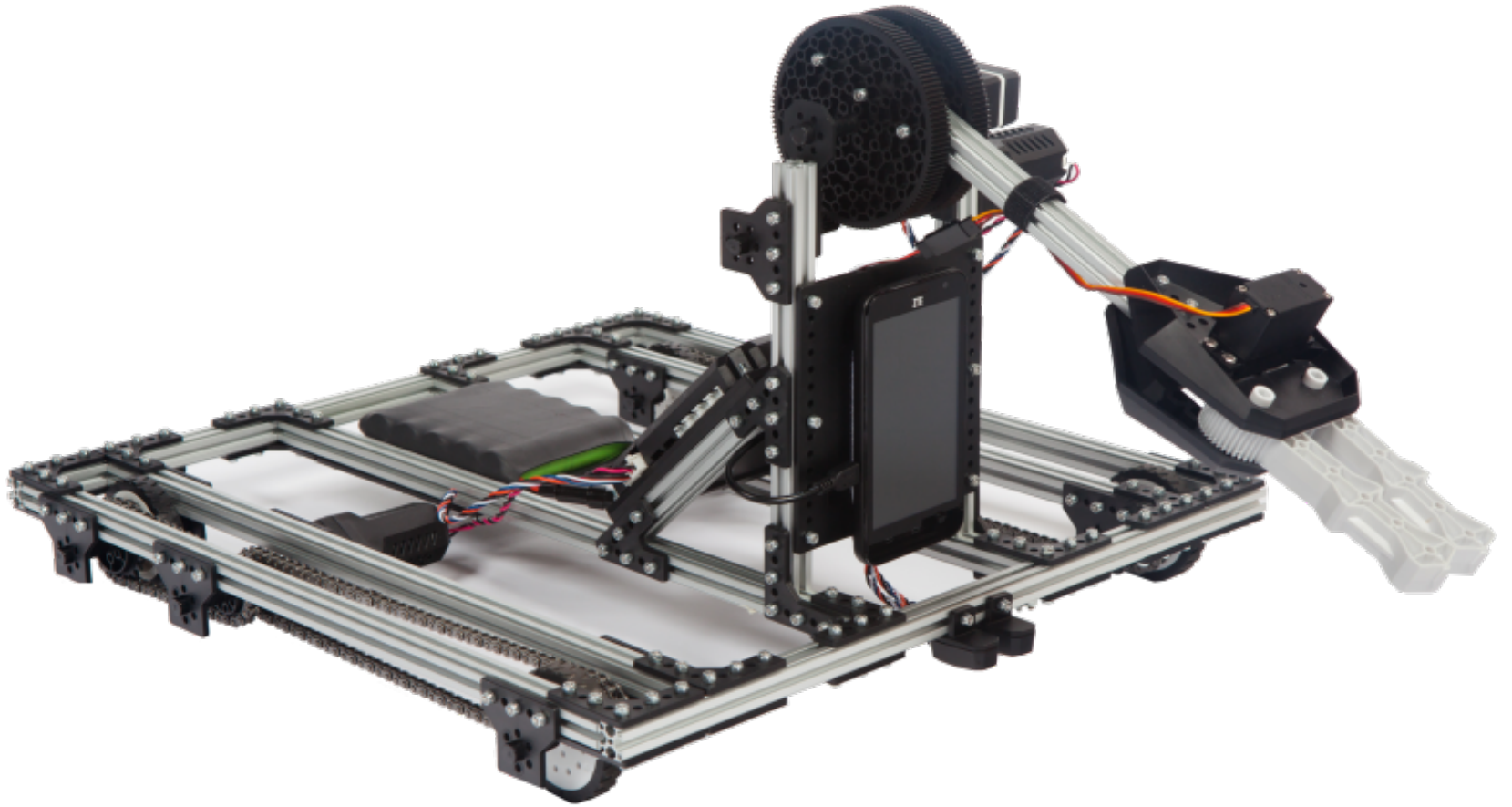
- Olympics-style robotics event with participation from over 157 countries
- Inaugural event was July 17-18, 2017 at DAR Constitution Hall in Washington DC
- Held yearly rotating through participating countries
- This summer in Mexico City

The 2017 Game

Programming

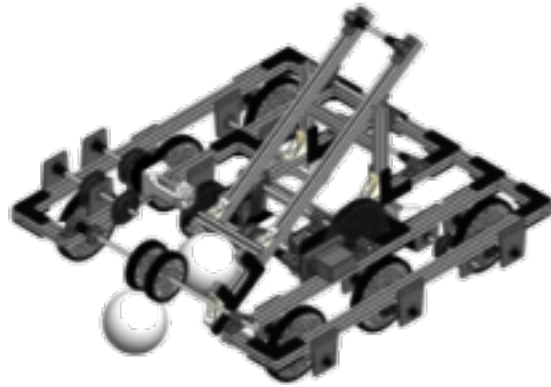
- Either Block- based or Java







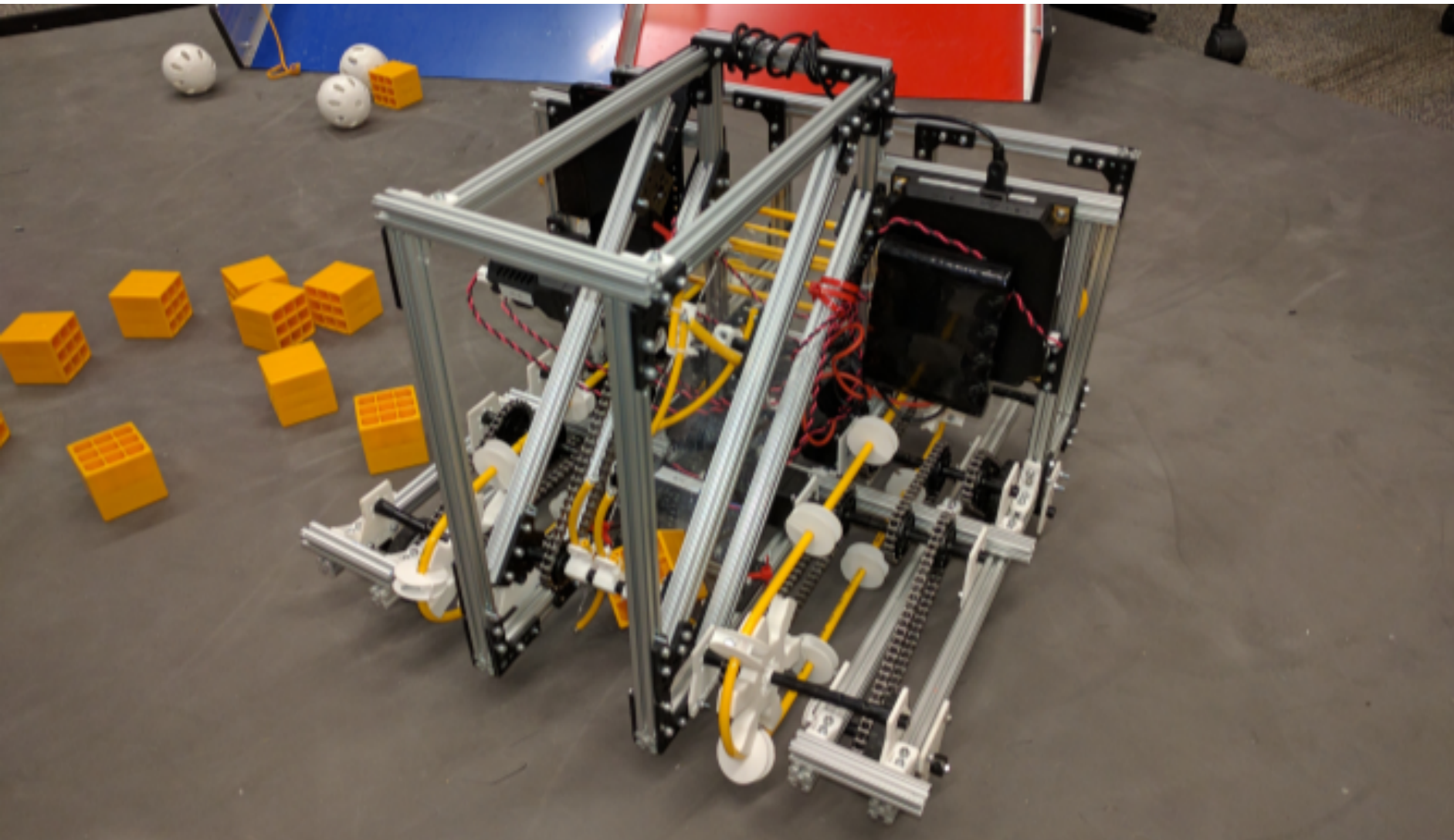
Elevator



Catapult



4 Bar Arm



2018 FIRST Global Competition

Mexico City, Mexico

Pan African Robotics Competition (PARC)



2018 Challenge

ONE-HEALTH INNOVATION

Africa has 6 out of 10 fastest growing economies but it also has the highest disease burden in the world. PARC 2018 challenges African students to devise solutions to provide access to quality Health services using science and technology – Surgical Robotics, Wearable Biosensors, Hand-held Point of Care Diagnostics, Virtual and Augmented Reality in Healthcare education, Organs on a chip, Internet of Things for Healthcare, Drug/Vaccine development, manufacturing, etc.

Multiple Competition Levels



TECH LEAGUE (MIDDLE SCHOOL)



STARS LEAGUE (HIGH SCHOOL)



MAKERS LEAGUE (HIGH SCHOOL)

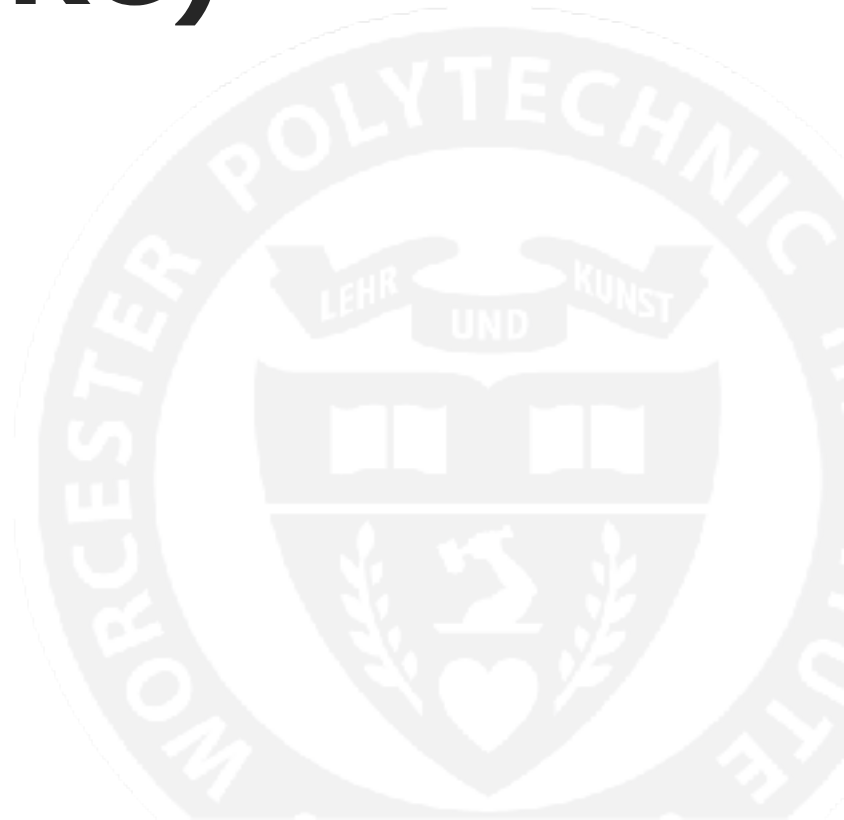


ENGINEERING LEAGUE
(COLLEGE)

Collegiate Level Competitions



DARPA Robotics Competition (DRC)



DARPA Robotics Competition

Summary

- Robot competitions bring out the best in students of all ages
- To be successful students are required to:
 - Learn about Science, Technology, Engineering and Math
 - Work in teams, just like in jobs they'll get
 - Lifelong skills they will make the students better and will improve the world
- Knowledge needed for building robots come from Math, Engineering, Physics, Computer Science