KICKSTART 2020

1. What is Student Robotics
2. Schedule for the year
3. Designing your robot
4. Building your robot
5. Developing your robot
6. Health and safety
7. The game
8. The rest of today
WHAT IS STUDENT ROBOTICS?
The Volunteers

We may be nerds, but we aren’t scary!

We’re here to help!
The Teams

There’s 37 of you!
(not all in this room)
You have ONLY 6 months to...
Design
Prototype
Build
Do all the electronics (Hopefully better than this)
Write lots of code
Work as a team
* Work as a team
Test it a *bajillion* times
Get your robot inspected
Compete,
Compete some more,
Compete *even* more!
Meet other robots
Meet other people
Score some points
Win some prizes
Have fun!
Schedule for the year

Kickstart (You are here!)

Christmas! 🎁

A whole host of tech days!

Competition (Around April)

Easter Holidays ☀️
WHAT DOES A ROBOT LOOK LIKE?
Design Tips

Read the rules first!

- Movement
- Exposed Mechanisms
- Servos
- Couplings
- Sensors
- Size
- Tooling
Design Tips

Read the rules first!

- Movement
- Exposed Mechanisms
- Servos
- Couplings
- Sensors
- Size
- Tooling
Design Tips

Sensors

- Camera
- Bump Sensor
- Light gates
- Potentiometer
- Wheel Encoders
- Accelerometer
- Gyroscope
Size

From the rules:

“At the beginning of each match, robots must fit within a cube with 500mm internal sides.”
Design Tips

Size

Exactly 50cm
Design Tips

Size

Exactly 50cm

More Than 50cm
Design Tips

Read the rules first!

- Movement
- Exposed Mechanisms
- Servos
- Couplings
- Sensors
- Size
- Tooling
Design Tips

Electronics

- Where do your electronics go?
- How long should the wires be?
- Start/Stop button needs to be accessible
- USB stick needs to be accessible
- Battery needs protecting
- Servo cables
Recommended Steps

1. Make a test base ASAP
2. Think about
   - Mechanics
   - Sensors
   - Game strategy
3. Iterate
   - Small improvements
   - Keep it working
4. Testing, lots and lots of testing
General Tips

Need some help?

- Volunteers
- Tech Days
- Forums
- Bus factor
- Keep it simple
- Prototype early, and often
THE KIT
Brain Board

The brains of the operation

- Controls boards
- Code runs here
Motor Board

Controls motors

- 12V DC motors, up to 10A
- * motors not included
Servo Board

*Controls servos*

- Up to 12 RC servo motors
- Careful how you load them, though!
- *servos not included*
Power Board

POOOWWWWWEEEFORERRR!

- Power distribution
  - High-current 12V
  - Low-current 12V
  - 5V
- On/Off button
- Start button
Ruggeduino

General Purpose IO

- Bump switches (Have I hit something?)
- Pressure sensors (How hard have I hit it?)
- Light gates (Have I captured something?)
- Ultrasound (How far away is something?)
- * sensors not included
Batteries
Batteries

- Should be respected
- Follow battery charging procedure to the letter, every time (one of the microgames)
- Only ever connect to:
  - power board
  - supplied battery charger
- Protect it from mechanical damage
- Do not over-discharge
- If you’re unsure, read the docs!
Vision

- On Arena walls & tokens
- Properties:
  - Type
  - Number
  - Distance from webcam
  - Position relative to webcam
  - Rotation
Your Code

- Python 2.7
- The IDE
  - Collaborative development
  - History of changes
- robot.zip
Read The Docs!
They’re really useful!
studentrobotics.org/docs

Our documentation
The Forum

● Communicate with us and your fellow teams
● Get support
● Share tricks
● Brag about how good your team is!
HEALTH AND SAFETY
Health and Safety

- How easy is it to turn off
- If we pick it up, can it hurt us?
- Is the wiring messy or loose?
  - Colour code your wiring!
- Is the kit loose?
- Is the battery protected?
Any questions so far?

Before we get onto the main event...
THE GAME

The moment you’ve all been waiting for!
TWO COLOURS
1 Point

Robot left scoring zone
3 Points
(+1 for robot leaving zone)
3 Points
(+1 for robot leaving zone)
0 Points

Cubes must be on floor

(+1 for robot leaving zone)
3 Points

(+1 for robot leaving zone)
2 Points

TWO COLOURS MEANS 1 POINT EACH

(+1 for robot leaving zone)
4 Points

TWO COLOURS MEANS 1 POINT EACH

(+1 for robot leaving zone)
6 Points

(+1 for robot leaving zone)
6 Points

(+1 for robot leaving zone)
3 Points

(+1 for robot moving)
3 Points

(+1 for robot moving)
6 Points

(+1 for robot moving)
6 Points

(+1 for robot moving)
3 Points

(+1 for robot moving)
3 Points
(+1 for robot moving)
The Rules

Read them!

They’re very helpful!

Student Robotics 2020
Rulebook

1st Revision
October 24, 2019

The following defines the rules and regulations of the Student Robotics 2020 competition. The latest version of this document can be found at https://www.studentrobotics.org/docs/rules/.

1. Game Rules

1.1 The game, called Two Colours, will be played in the arena defined in section 3.3. The objective of this game is to capture the most tokens, but without mixing the two colours.

1.2 Before a match begins, participating teams must:
   a) Present their robot in the staging area, adjacent to the arena, before the scheduled close of staging time. The staging area will be clearly marked on the day.
   b) Attach a robot flag. Robot flags will be provided by Student Robotics officials in the staging area. Section 3.2 provides more information about these flags, as well as their dimensions and mounting requirements.
   c) Follow the directions of the match officials.

Teams that fail to comply with these rules—such as by arriving late—may forfeit the match, at the discretion of the judge.

1.3 A match lasts 150 seconds.

1.4 There will be a maximum of 4 robots in a match.

1.5 Robots will be started by, or at the direction of, match officials.
<table>
<thead>
<tr>
<th>NOW</th>
<th>Kit handout</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEXT</td>
<td>Introduction to Micro Games</td>
</tr>
<tr>
<td>THEN</td>
<td>Micro Games</td>
</tr>
<tr>
<td>12:30 - 13:00</td>
<td>Lunch + Robot Brainstorming</td>
</tr>
<tr>
<td>13:00 - 17:00</td>
<td>Micro Games (Continued)</td>
</tr>
</tbody>
</table>
ANY QUESTIONS?
GOOD LUCK!