Robot Construction Rules

1. Robot Size and Weight Limits

1.1 Chassis Size

- The robot chassis must fit within a **maximum perimeter of 1000 millimeters**
- Perimeter is measured as the **sum of the outermost edges of the robot chassis** when viewed from the top
- The chassis may be any shape

Example:
A 250 mm × 250 mm square chassis has a perimeter of 1000 mm and is legal

1.2 Mechanism Extensions

- All robot mechanisms must **start within the chassis perimeter**
- Mechanisms may extend **no more than 50 millimeters beyond the chassis perimeter**
- Extensions are permitted in **only one direction at a time**
- Mechanisms may not rotate, shift, or reconfigure in a way that exceeds the 50 mm extension limit in multiple directions

1.3 Robot Height (To Be Announced At Game Kickoff)

[redacted]

1.4 Robot Weight

- The robot may weigh **no more than 10 pounds**, excluding batteries

- Weight includes:
    - Chassis
    - Motors
    - Controllers
    - Motor controllers
    - Wiring
    - Fasteners
    - All mechanisms and attachments

2. Materials and Electronics

2.1 Allowed Materials

Robots may use the following materials for custom parts:

- Wood
- Composites
- Plastics
- Rubbers
- Aluminum

2.2 Control System

- Robots must use **one (1) XRP Controller** as the primary robot controller
    - ROB-26619
- Robots may use **any I2C sensor** compatible with the XRP controller
- Additional microcontrollers or coprocessors are **not permitted**

3. Actuators and Motors

3.1 Servos

- Robots may use any generic servo motor
- Only **6V servos** may be connected directly to the XRP controller
- Servos requiring higher current must use an approved Servo Power Module:
    - REV Robotics Servo Power Module (REV-11-1144)
    - goBILDA Servo Power Module (3125-0001-0001)

3.2 Motors Allowed for Actuation

The following motors are approved for robot actuation:

- SparkFun Hobby Motor with Encoder (ROB-24053)
- SparkFun Hobby Motor with Encoder - Metal Gear (ROB-16413)
- Micro Gearmotor - 460 RPM (ROB-12429)
- Micro Gearmotor - 900 RPM (ROB-12316)
- Micro Gearmotor - 90 RPM (ROB-12285)
- Micro Gearmotor - 175 RPM (ROB-12205)
- N20 Motor With Encoder (ROB-28633)

3.3 Motor Controllers

- XRP Motor Controller Ports
- SparkFun Qwiic Motor Driver (ROB-15451)

4. Power Rules

4.1 Allowed Batteries

Robots may use **one (1)** set of the following batteries:

- Basic 4-cell NiMH AA Battery Pack (6V)
- goBILDA 6V Battery (3100-0006-0003)

4.2 Power Requirements

- Power supplied to the XRP controller must be **6V**
- Power supplied to motors may not exceed **6V**
- Batteries must be **securely mounted** and may not shift during match play
- External power switch must be used between battery and robot power
- Power distribution devices/terminals are allowed and encouraged.
- Wire can not be bare, and all exposed wire should be properly covered by heat shrink terminal connectors, splices, and electrical tape

5. Safety and Mechanical Restrictions

5.1 General Safety

- Robots must not have burrs, sharp edges, or exposed fasteners that could cause injury
- All wiring must be:
    - Properly insulated
    - Secured
    - Free of exposed conductors
- All robot components must be securely mounted

5.2 Prohibited Mechanisms and Actions

- Robots may not damage, deform, or intentionally modify:
    - The field
    - Game elements
    - Field surfaces (including foam mats)
- Robots may not include mechanisms designed to **entangle, trap, snag, or damage**

other robots or game pieces
- Sharp spikes, hooks, or puncturing devices are not permitted

5.3 Restricted Systems

- Pneumatic systems are **not permitted**
- Hydraulic systems are **not permitted**
- Combustion engines, heating elements, and open flames are **not permitted**

6. Inspection and Modifications

- All robots must pass inspection before competing
- Inspectors have final authority on robot legality
- Robots may be repaired or modified between matches, provided they remain compliant with all construction rules

7. Software

7.1 XRP Code Editor

- Using the XRP code editor is the only allowed way to program the robot
    - https://xrpcode.wpi.edu/
- This streamlines the process for robot connection and gamepad use during matches.
- Custom libraries are allowed
- Use of Micro Python or Blocky is allowed
- Webserver is allowed for monitoring values during game play and may not be used to control robot actuation.
- Only Bluetooth connection is allowed to control a robot during matches. WIFI connection is allowed for Webserver.

7.2 Drive Station

- Any computer will work for the drive station, including chromebooks.
- Phones will not work for a drive station and will not be permitted.
- Wireless and wired gamepads are allowed
- Any gamepad may be used for controlling the robot, optionally a keyboard can be used if no gamepad is available.