

Game Design Challenge Finalist Team 33

Team Name: Killer Bees

Location: Auburn Hills, Michigan USA

Game Name: Rainforest Resupply

Game Overview:

In RAINFOREST RESUPPLY, teams have 2:30 to work with two other Rainforest Explorers to deliver FRUIT (small balls) to the MONKEYS, SLOTHS, and TOUCANS in the TREES (high goals), as well as to the TORTOISES (low goals) on the ground. In this game, teams have the ability to switch each goal's alliance color by tapping the CHAMELEON (switch). There are three TREES on each end of the field. Before nightfall, they will climb up the VINE (chain) and secure SUPPLIES (large balls) on the CANOPY.

The alliances begin with robots starting on their alliance's color line, preloaded with two FRUIT per robot. The center TREE on each DRIVER STATION side is the color of its respective alliance and the other two TREES are the opposing alliance's color. During the 15-second autonomous period, robots press the CHAMELEON to change the TREES to their alliance color. Points are earned by delivering FRUIT to the TREES and TORTOISES. Robots collect more FRUIT located on their FRUIT line, but may only carry two at once. Scoring is doubled during autonomous for the TORTOISES (2 points), the MONKEY and SLOTH TREES (4 points), and the TOUCAN TREES (6 points). Teams receive a RANKING POINT for all three robots moving off the line, claiming all three TREES, and scoring at least one FRUIT in the TREES during autonomous.

When TeleOp begins, robots drive around the field picking up FRUIT and scoring them in the TORTOISES (1 point), MONKEY and SLOTH TREES (2 points), and TOUCAN TREES (3 points). When the field runs low with FRUIT, the HUMAN PLAYERS use their DELIVERY STATIONS to catapult FRUIT into the field. The TORTOISES permanently stay the alliance color, but the TREES may be switched by tapping the CHAMELEON. The CHAMELEONS do not award points, but they allow the teams to gain control of a TREE and score FRUIT while it is their color. Points are awarded in real-time as FRUIT is scored while the TREE is set to a certain alliance color. After activation the CHAMELEON times out for 10 seconds so that robots have time to score.

In the last 30 seconds, the ENDGAME period begins. The HUMAN PLAYERS receive SUPPLIES, which they catapult via the DELIVERY STATIONS within the first 10 seconds of ENDGAME. The robots carry the SUPPLIES and place them on top of the CANOPY within their respective colors earning points per SUPPLIES ball (7 in quals, 10 in playoffs). SUPPLIES can optionally be placed in the safe zone. If there is a robot guarding the SUPPLIES in the safe zone at the end of the match, that alliance receives 3 points per ball of SUPPLIES. In addition, there are two VINES on each alliance's side of the CANOPY that a robot may hang on for points (7 in quals, 10 in playoffs). Alliances will receive one RP for earning 20 points during ENDGAME. Robots are not permitted to hit a hanging robot or attach to each other as they climb the VINES.

Describe Notable Field Elements:

FRUIT (Small balls)

~ Size 3 soccer balls

~ 20 start on the field 12 start off field

SUPPLIES (75 cm Yoga balls)

~ Introduced during ENDGAME by the four catapults



TREES (High goals)

- ~ Above the DRIVER STATIONS
- ~ TOUCAN TREE (middle goal)
- ~~ Hole Diameter 15 in.
- ~~ 115.5 in. from the center to the ground
- ~ SLOTH and MONKEY TREES
- ~~ Hole Diameter 22 in.
- ~~ 98 in. from the center to the ground
- ~ Balls scored are recycled through the Human Player station
- ~ LEDs around each goal to signify which alliance owns it
- ~ Reflective Tape located on the sides of the goals

TORTOISES (Low goals)

- ~ Located between the MONKEY and TOUCAN TREES for each alliance
- ~ Bottom edge 1.5 in. from ground
- ~ 20 x 10 in. opening

CHAMELEONS (Switches)

- ~ Change goal ownership by pressing it
- ~ 1 ft. off the ground, centered below each DRIVER STATION
- ~ 8 x 6 in.
- ~ Everyone can use all 6 switches
- ~ The CHAMELEON and associated high goal light up blue or red to indicate who owns the goal
- ~ Reflective Tape located above the switch

CANOPY (Center structure)

- ~ Used during ENDGAME to hold SUPPLIES
- ~ Used for hanging from the VINES, 2 per alliance
- ~ Each alliance has their own side
- ~ 6 ft. 6 in. tall
- ~ Space between the bars 24 in.
- ~ Constructed of black pipe with center supports and rungs

VINE (The Element)

- ~ Grade 30 steel chain with 1300 lbs. capacity
- ~ Inner dimensions of chain links are .48 in. and 1.24 in.



~ 2 VINES are 3 ft. from the field edge

~ 2 are 9 ft. from the field edge

DELIVERY STATIONS (Catapults)

~ Two DELIVERY STATIONS per alliance

~ 4 catapults, one for each alliance located across from each other at each end of the field.

~ Used to introduce more FRUIT, and SUPPLIES once ENDGAME begins

~ Can catapult two FRUIT simultaneously

What are robots expected to do?

In RAINFOREST RESUPPLY, teams will need to make strategic choices when designing their robot because one robot may not be able to complete every action on the field. This game is designed to be played with the 2021 rules with a few exceptions. R3 is revised to allow robots to be 48 in. tall and in ENDGAME robots may extend past 48 in. During ENDGAME R4 is suspended to allow robots to extend farther than 12 in. past their frame perimeter.

A new team building a kitbot will likely be able to perform the following actions in addition to driving and navigating the field:

AUTONOMOUS (15 seconds)

~ Tap switches to claim high goals

~ Push balls into low goal

TELEOP (1 minute 45 seconds)

~ Tap switches to change goal color

~ Move size 3 soccer balls around the field

~ Move balls into low goal

ENDGAME (30 seconds)

~ Push yoga balls into safe zone

~ Park in safe zone to earn points for guarding yoga balls

More experienced teams will likely be able to perform the following actions in addition to driving and navigating the field:

AUTONOMOUS (15 seconds)

~ Tap switches to claim goal color

~ Pick up size 3 soccer balls from center

~ Move balls into low goal

~ Shoot balls into higher goals

TELEOP (1 minute 45 seconds)

~ Tap switches to change goal color



- ~ Pick up size 3 soccer balls from the ground
- ~ Move balls into low goal
- ~ Shoot balls into higher goals

ENDGAME (30 seconds)

- ~ Pick up yoga balls from ground
- ~ Place yoga balls onto center structure
- ~ Hang from the chain
- ~ Push yoga balls into safe zone
- ~ Park in safe zone to earn points

Did you use the Game Design Challenge Element in your concept?

Yes

If yes, how?

In our game RAINFOREST RESUPPLY, the robots will attempt to climb the element, or VINE, in the ENDGAME. The chain is a grade 30 steel chain with 1300 lbs. capacity. This chain is strong enough to allow a single robot to safely hang without concern. Climbing is defined as the robot must not be touching the ground or the overhead bars of the CANOPY.

The VINES will be suspended from the CANOPY, which spans the width of the field at a height of 6 ft. 6 in. There will be 4 VINES, spaced 3 ft. and 9 ft. from the edges of the field. Each alliance has their own CANOPY zone to hang from the VINES and place the SUPPLIES. There are 4.5 ft. in-between alliance zones. This spacing will allow for robots to hang from the VINES without hitting another hanging robot from either alliance. To further prevent robot collisions, the chains are on separate crossbars. Each VINE is 3.5 ft. long, leaving a 3 ft. space for the robots to maneuver under, but they must be careful to avoid entanglement.

During the match, the VINE should not impede Rainforest Explorers' view of their robot from behind the DRIVER STATIONS, but it is something for them to think about when navigating the field. During ENDGAME, only one robot is allowed to climb each VINE. While the VINES are always hanging from the CANOPY throughout the match, the Rainforest Explorers will not be able to climb them until the last 30 seconds. In order to facilitate climbing, robots are able to extend past 4 ft. in the ENDGAME. Robots are not allowed to climb from the support structure and can only use the VINE when climbing.