Game Design Challenge Finalist Team 2370

Team Name: IBOTS

Location: Rutland, Vermont USA

Game Name: Hive Mind

Game Overview:

For the 2021 Game Design Challenge, Team 2370, the IBOTS, present Hive Mind. Hive Mind is a coopertition game celebrating and honoring the role that bees play in our environment and food chain. It is also intended to create awareness of the challenges bees face due to global warming, pesticides, colony collapse disorder and other issues.

Alliances have created bee-bots to help support failing hives and restore the ecosystem. Bee-bots need to work together to meet the goals of filling their hive and pollinating a blooming flower, overcoming their environmental challenges. Just as actual beehives have many tasks that all the bees work together to complete, the bee-bots need to work together as a "hive mind" to meet their own Alliance's challenges.

In play, Alliances of three robots collect nectar and can choose to place it directly into honeycombs or exchange nectar for honey at a rate of two nectar per honey. Once the initial supply of nectar on the field becomes depleted, robots can collect more at the opposite drive station, crossing the field and avoiding the opposing Alliance's defense. Each Alliance will have two honeycombs on their side of the field, partly surrounded by safe zones in which opposing robots are not permitted.

Completely filling at least one honeycomb is worth bonus points, plus a ranking point for the first honeycomb filled. This adds an element of strategy; since nectar is simpler to collect and score than honey but not as valuable, teams can choose between rushing to fill a honeycomb for the ranking point or working for a higher score. In the endgame, robots complete a variety of actions in order to "pollinate" and open a flower.

The Hive Mind game begins with a 15-second autonomous phase where preloaded nectar can be placed into the hive. Moving from the initiation line earns 5 points, and nectar placed during this period earns 14 points. A fast and well programmed robot can potentially score multiple nectar pieces in this phase. Following this, drivers control their robots manually until the end of the match, placing nectar for 5 points each, exchanging nectar for 3 points each, and placing honey for 12 points each. The final 30 seconds of the match make up the endgame phase, during which robots may also complete endgame tasks. Defense is allowed in the teleoperated and endgame phases, although robots may not interfere with endgame tasks.

In the endgame phase, robots are challenged to complete three actions in order to open a flower mounted over the field. Firstly, there is a button, which if pressed continuously for five seconds scores 20 points. The second task is to turn a vertically mounted wheel five times, for 30 points, and the final task is to rotate a loop of chain around pulleys, for 40 points. Each of these opens one of the flower's three petals as a visual indicator of completion. Achieving at least 60 total points from the endgame tasks grants an Alliance an additional ranking point.

Describe Notable Field Elements:

Nectar are standard 10-inch playground balls that have two main purposes. Teams may exchange the nectar for honey or score the nectar. You need to have two nectar in order to exchange for one honey. For each nectar exchange teams receive 3 points. In autonomous, teams will receive 14 points for scoring nectar into a hive, or 5 points in teleop.

Honey is an injection molded plastic hexagon that has one main purpose. Honey is to be scored in the hives for more points than nectar but you will have fewer honey in total. Teams receive 12 points for scoring honey into the hives.

Hives are scoring locations consisting of hexagons made of polycarbonate that are used to score nectar and honey. Hives can hold up to thirteen objects in total. Filling a hive is 30 points and awards a rank point.

Flowers sit atop trussing over the field. At the start of the end game, the flower will be closed and it is your job to open the petals. On your side of the field there are three end game tasks to complete, and it takes 60 points to earn a rank point.

Push Button - A button attached to the trussing that has to be pushed for 5 seconds to lower a petal.

Scores 20 points.

Wheel - A wheel connected to the petals on the trussing that has to be rotated 5 times to lower a petal.

Scores 30 points.

Chain - A loop of chain that hangs below the flower that has to be rotated to open a petal.

Scores 40 points.

What are robots expected to do?

In Hive Mind, the robots start touching the initiation line. In auto, they are expected to move across the initiation line and score their preloaded nectar ball into a hole in one of the two hives. Multiple nectar can be scored in auto if the robots move quickly and efficiently through their zones.

Nectar is placed around the field and may also enter through the loading stations to allow the robots to pick up additional pieces. In teleop, robots continue collecting and scoring nectar in their alliance's hives, cycling from the nectar throughout the field as well as the loading station across the field. Robots can exchange two nectars through their alliance station wall for a hexagonal honey piece used to collect and score in the hives for extra points. Robots may also choose to defend against the opposing alliance around the loader, exchange and hives. If any robot touches an opposing robot in the protected zone, it is a technical foul.

Once the endgame period starts, robots can do one of three actions: They can press a push button situated on the left post of the flower structure for five seconds, turn a wheel on the right post of that structure for five full rotations, or spin a loop chain directly under the flower. Completing one of the three actions makes one of the petals of the flower lower, as though it is opening up. If 60 or more points are scored in end game, then that team earns a rank point. Robots are free to continue placing nectar or honey into the hives during endgame, but they cannot interfere with opposing robots interacting with end game mechanisms in any way or they will receive a technical foul.

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

Yes

If yes, how?

We use the Game Design Challenge ELEMENT in End Game. Teams have three options to score points in End game, one using the chain. The chain is looped underneath the Alliance flower by two pulleys. Robots will need to rotate the chain once full around to score 40 points and make it possible to score a rank point. The chain is standard 2/0 zinc plated steel straight link chain.

The chain symbolizes how important the bees are to the food chain and the environment. Bees provide us with a significant proportion of the food we eat due to their pollination. We also chose the chain as a significant and unique challenge that we have not seen before in a FIRST FRC game. The turning of the chain aspect is one that would be unexpected and we believe even the best teams in FRC would not readily have an answer for it at this time, so teams will be encouraged to innovate.