Game Design Challenge Finalist Team 1306

Team Name: BadgerBOTS

Location: Middleton, Wisconsin USA

Game Name: Cargo Clash

Game Overview:

Cargo Clash is a fast-paced competition between two Shipping Companies who have hired Robots to deliver their Packages.

Over the course of the work day, Robots deliver Packages to the Small and Large Loading Bays. There are safe zones in front of all Loading Bays where fully enclosed Robots can't be touched by the opposing Company's Robots. Each Loading Bay is composed of Cargo Ports, which have chains hanging from the center and that start out neutral (possessed by neither team). Companies can claim a Cargo Port by sending a Package through the Port. A Company will earn instant points when claiming a Cargo Port, as well as passive points for each of their claimed Cargo Ports. However, a Company can send a Package through an opposing Company's Port to take it away from them: if it's a Large Loading Bay Port, the Port will switch possession; if it's a Small Loading Bay Port, it will turn back to neutral. Possession of Cargo Ports is shown with a red, blue, or white (for neutral) LED lights that are positioned below the curved polycarb in every Cargo Port. This data is also transmitted to the field management system through NetworkTables. We consciously designed the width and height of the Cargo Ports to 15" so that Packages scored will always trigger the line-break sensors (the diameter of the Packages are 8.5"). Additionally, each Loading Bay has reflective tape to assist Robots.

Humans Import Packages for the Robots to deliver. At the Import Station, a Human Player can load up to three Packages which they can drop onto the field using their conveyor belt. In addition to the two Human Players at each of the Import Stations, there's a third Human Player who collects the balls scored in the Small Loading Bay and returns them to the back Import Stations.

At the end of the work day, the Robots need to store themselves at their Company's Storage Site — the more compact, the more points they earn! The Company that meets the most demand claims the title of the best shipping Company in the world!

Describe Notable Field Elements:

The Large Loading Bay, located in the middle of the field, is the most contentious with teams racing to keep control over it. This Large Loading Bay has six Cargo Ports arranged in a triangle, with the bottom Ports off the ground, creating a challenge but also rewarding the most points. The three low Cargo Ports located at 20 inches high, middle two at 40 inches, and high one at 60 inches.

On the edges of the field, there are two Small Loading Bays, one for each Company. The Small Loading Bays are 40 inches tall, with three Cargo Ports on the ground and two more Cargo Ports located 20 inches off the ground (matching the height of the lowest Cargo Ports in the Tall Loading Bay). The bottom Ports are at ground level on the Small Loading Bay, making scoring easier but less rewarding. If all five of the Cargo Ports are lit up simultaneously at any time, that Company earns one Ranking Point.

Cargo Clash's endgame revolves around the Storage Site. Parking in the Storage Zone earns 12 points, climbing on the shortest crate (17 inches off the ground) earns 18 points, fitting in the Tall Crate (61 inches tall) earns 18 points, and fitting in the Small Crate (30 inches tall) earns 24 points. Additionally, Companies can earn 36 extra points if they are not supported by the floor by the end of the match—this could be by wall climbing independently or by driving onto a fellow Company member's ramp. If a Company earns more than 70 points from the Storage Site objectives, they earn one Ranking Point for all members of the Company.

What are robots expected to do?

Cargo Clash is designed to accommodate all skill levels of play, ranging from rookie teams to experienced veterans. To ensure this in our design process, we split teams into four categories: (average) rookie, qualification, playoffs, and worlds.

The Small Loading Bay is designed to fit the rookie and qualification teams' capabilities. Having 3 ground level Ports allows for simple "dozer" bots to still be able to score points. The two low-level Ports raise this skill bar slightly, allowing for more points to be scored without having to compete for the Large Loading Bay. Playoff and worlds-level teams will likely use this element as a source of passive points while contesting the Large Loading Bay.

The Large Loading Bay is a more challenging, more competitive, and more rewarding version of the Small Loading Bay. This element is designed for qualifiers, playoffs, and world's teams. With the three different tiers of Cargo Ports, the skill cap is high, with only playoffs and worlds-level teams expected to be able to hit the middle and top tiers consistently.

The Shipping Site endgame provides diverse challenges for each level of team. Rookie teams are expected to stay on the ground, either in one of the two hollow crates or the zone in front. The qualification teams have similar expectations, but climbing onto the small crate may also be within reach. Playoff teams are likely to climb the small crate with some possibly climbing the insides of the Shipping Site crates. Teams might also make a ramp for a teammate, so that their alliance can earn the extra points for having a Robot with its wheels off of the ground. World's teams are expected to all be in or on all of the crates, with most wall climbing independently for maximum points.

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

Yes

If yes, how?

In each Cargo Port, a one-foot steel chain (McMaster 3588T49) is attached to the middle of the Cargo Port interior using U-bolts. The purpose of these chains is to absorb the momentum of the Package, especially if teams decide to use a shooter design. The length of the chain and position of the line break sensors (used to determine scoring) is intentional. The chain is short enough that it can't oscillate at an amplitude large enough to activate the sensor after the Cargo Port's Processing Time, which is activated when a Package is scored. During the Processing Time period, the LED light in the Cargo Port flashes the scorer's Company Color and neither alliance can score through that Port. The Processing Time is equal to floor(2 + [current time remaining until passive point earned]). This is so that the chain has a chance to settle before the Cargo Port can be scored on again.