Control Award Content Sheet

Updated 9.9.2017

****Please turn in this sheet during your Judge Interview along with your Engineering Notebook****

Team # 10237	**Team Name:** US Robotics

Autonomous objectives:

We knock the correct color jewel off of the platform and we place the glyph in the correct column according to the pictogram. We then go into the glyph pit in order to attempt to harvest two additional glyphs and we return to the cryptobox to attempt to deposit them and we park in the safe zone.

Sensors used:

We use a color sensor to detect the jewel, a gyro sensor for turning, a limit switch for our lift, encoders, the camera on the phone, and a range sensor to detect when we've harvested glyphs.

Key algorithms:

PID turning control and modified PID for asymmetric control. Vuforia VuMark algorithm used to read the pictogram and to move the phone in order to try to get another reading of pictogram from a different angle using our servo-mounted phone camera. Proportional movement to keep the heading straight while moving forward.

Driver controlled enhancements:

Multiple speed modes that are easily accessible as well as toggleable brakes in order to finely control the speed while depositing glyphs, recovering the relic, and parking. Backwards mode for the driver so adjusting on the far/corner cryptobox isn't confusing. Automatic setup for parking (enabling brakes, bringing up harvester and flipper, and enabling brakes). Automatic modulation for harvester motors which allows the harvester controller to easily modulate the harvester motors (which helps with harvesting cubes). Modified PID controller to maintain the position of the lift (to counteract gravity). Auto-reset for flipper and harvester. Preset positions as well as fine control for the relic gripper, extension, and flipper to make recovering the relic both quick and robust.

Engineering notebook references:

Pages 119-122: Developing driver controls and enhancements
Page 123-125: Using Vuforia to reliably detect the pictograms
Page 150-151: Overview of autonomous strategy
Page 143: Autonomous reliability strategies and algorithms
Page 144-146: Experiments with using vision algorithms for autonomous

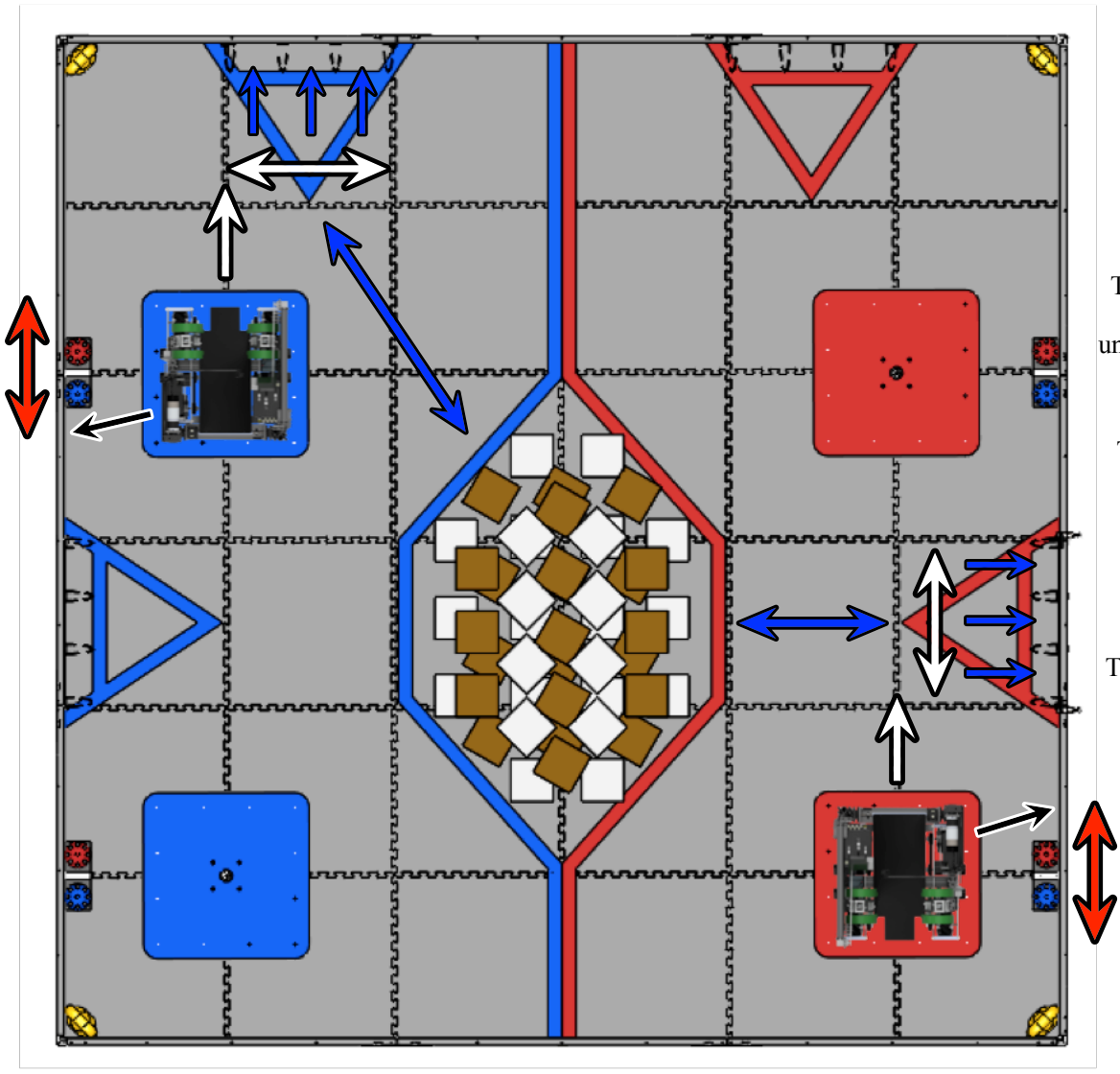
Autonomous program diagrams:

The robot turns, drives aggressively into the glyph pit in order to spread out the glyphs, harvests using an unjamming algorithm until it detects it has 2 glyphs, then returns to the cryptobox and deposits them

The robot has to turn 180˚ so that it can deposit the glyph into the cryptobox

The robot reads the color and knocks off the appropriate color jewel

The robot takes 3 readings of the pictogram using Vuforia for consistency



The robot drives aggressively into the glyph pit in order to spread out the glyphs, harvests using an unjamming algorithm until it detects it has 2 glyphs, then returns to the cryptobox and deposits them

The robot records its angle when it is pushed up against the cryptobox for later use

The robot strafes to the correct column

The robot turns 90˚ using the gyro and PID control for a combination of speed and accuracy

The robot takes 3 readings of the pictogram using Vuforia for consistency

The robot reads the color and knocks off the appropriate color jewel