

Control Award Content Sheet

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

Team Name: US Robotics Team # 10237

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 multiple 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, a gyro sensor, a magnetic limit switch, encoders, and the camera on the phone.

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.

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 87-88: Developing driver controls and enhancements Page 89-91: Using Vuforia to reliably detect the pictograms

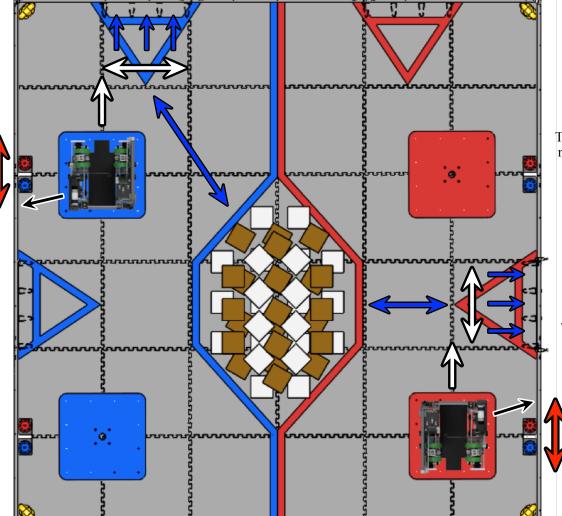
Page 96: Overview of autonomous strategy Autonomous program diagrams: Page 93: Autonomous reliability strategies and algorithms Page 94-95: Experiments with using vision algorithms for autonomous

The robot turns, enters the glyph pit, attempts to harvest a cube, and returns to the cryptobox and harvests 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 goes into the glyph pit, attempts to harvest more glyphs, then turns so that it is aligned with the cryptobox again (using the earlier angle)

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