Catapult:

1. Operational sequence to pull back and lock catapult.
   1. Rotate dog gear to allow gear to engage.
   2. Set the dog gear. Reduces pressure on the ratchet.
   3. Set the ratchet.
   4. Turn on the winch.
   5. Stop winch when limit switch is touched.
2. Operational sequence to release the catapult.
   1. Release the dog gear.
   2. Release the ratchet.
3. Programming notes
   1. Need to note the time needed for pneumatics move into place
   2. A double solenoid will be used for the ratchet pneumatics
   3. A double solenoid will be used for the dog gear pneumatics
   4. A talon will be used to drive the winch motor
   5. Two momentary switches will be used as position sensors of the catapult.
   6. The momentary switches are normally open (5V). When closed, it connects to GND
   7. Setting the dog gear
      1. May require the motor to move at a very slow rate
      2. After the pneumatic is in place, turn off the motor to set the ratchet

Ball Retrieval

1. Operational sequence to gather the ball
   1. Lower the ball retrieval unit
   2. Turn on the ball retrieval rollers
2. Operational sequence to stop the ball retrieval
   1. Raise the ball retrieval unit
   2. Turn off the ball retrieval rollers
3. Programming notes
   1. A double solenoid will be used for each side of the retrieval unit
   2. There are two arms for the retrieval unit
   3. A window motor will be used to drive the ball retrieval rollers
   4. A victor will be used to drive the window motor

Autonomous Mode

1. Operational sequence
   1. Assumption: Catapult is drawn with ball in place
   2. Vehicle setup
      1. Position the vehicle by using the catapult as an aiming mechanism for the camera
      2. Validate switches were set correctly
   3. Game start
      1. Read vehicle position switches
      2. Attain picture of goal
      3. Determine if goal is hot
      4. Go to hot goal
      5. Shoot at goal
      6. Wait for Operator Control Mode
2. Programming notes
   1. The vehicle could be set in four different positions
      1. Two toggle button switches used to set the vehicle position.
         1. Switch type: single pole, single throw
         2. Closed position: connects to ground (GND)
         3. Open position: floats to high (5V)
      2. Left playing field, facing the left goal: toggleButtonOne=1 & toggleButtonTwo=0
      3. Right playing field, facing the goal: toggleButtonOne=0 & toggleButtonTwo=1
      4. Middle playing field, facing the left goal: toggleButtonOne=1 & toggleButtonTwo=1
      5. Middle of playing field, facing the right goal: toggleButtonOne=0 & toggleButtonTwo=0
   2. Vision processing takes about six seconds. Processed picture would have changed state from “not Hot” to “Hot” or from “Hot” to “not Hot.” Drive must take this into consideration
   3. Distance from goal to vehicle:
      1. Straight ahead: approximately 18 ft
      2. Center position: approximately 21 ft (verify)
   4. After driving forward, met the one of the autonomous goals of moving the robot forward

PWM (Digital Sidecar) Table

|  |  |  |  |
| --- | --- | --- | --- |
| PWM Channel | Type | Function | Color Code |
| 1 | TALON | leftFront | YELLOW |
| 2 | TALON | rightFront | YELLOW/PURPLE |
| 3 | TALON | leftBack | ORANGE |
| 4 | TALON | rightBack | RED/BLUE |
| 5 | TALON | catapultMotor | RED |
| 6 | VICTOR | ballRetrievalMotor | GREEN |
| 7 |  |  |  |
| 8 |  |  |  |
| 9 |  |  |  |
| 10 |  |  |  |

Digital IO (Digital Sidecar) Table

|  |  |  |
| --- | --- | --- |
| DIO Channel | Function | Color Code |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 | compressor | PURPLE/ORANGE |
| 6 | leftPositionSwitch | BLACK/YELLOW |
| 7 | rightPositionSwitch | ORANGE/BROWN |
| 8 | leftLimitSwitch (Catapult Stop #1) | YELLOW/GREEN |
| 9 | rightLimitSwitch (Catapult Stop #2) | RED/BLACK |
| 10 |  |  |
| 11 |  |  |
| 12 |  |  |
| 13 |  |  |
| 14 |  |  |

Spike (Digital Sidecar) Table

|  |  |  |
| --- | --- | --- |
| Relay Channel | Function | Color Code |
| 1 | backpack (Ring Light) | BLUE |
| 2 | compressor | PURPLE |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |

Solenoid (cRIO NI 9472 Relay) Table

|  |  |  |
| --- | --- | --- |
| Solenoid Channel | Function | Color Code |
| 1 | dogSolenoid (A input) | PURPLE/WHITE |
| 2 | dogSolenoid (B input) | PURPLE/RED |
| 3 | ratchetSolenoid (A input) | YELLOW/WHITE |
| 4 | ratchetSolenoid (B input) | YELLOW/RED |
| 5 | armSolenoidTwo (A input) | BROWN/WHITE |
| 6 | armSolenoidTwo (B input) | BROWN/RED |
| 7 | armSolenoidOne (A input) | ORANGE/WHITE |
| 8 | armSolenoidOne (B input) | ORANGE/RED |

Logitech Joystick

|  |  |  |  |
| --- | --- | --- | --- |
| Button | Button | Function | Color Code |
| 1 | X | Disable AutoLoad | BLACK |
| 2 | Y | **Shoot** Catapult | RED |
| 3 | B |  |  |
| 4 | A | **Draw** the Catapult | WHITE |
| 5 | Upper Left Trigger | **Start** Compressor Class | BLUE |
| 6 | Upper Right Trigger | **Lower** Ball Retriever Arm | ORANGE |
| 7 | Lower Left Trigger | **Stop** Compressor Class | YELLOW |
| 8 | Lower Right Trigger | **Raise** Ball Retriever Arm | GREEN |
| 9 | Back |  |  |
| 10 | Start |  |  |
| Joysticks |  | Function | Color Code |
| 1 |  |  |  |
| 2 |  | Left Drive | PURPLE |
| 3 |  |  |  |
| 4 |  | Right Drive | BROWN |