**Clasper Manipulation Test Plan**

1. Clasper Interference and Servo Tangle

* What is the current mechanism that addresses clasper interference?
  + clasperCheck function. The clasperCheck function takes two input variables *instate* and *outstate*
  + state variables describe the claw and wrist orientations. They are of the form   
    [A1 A2 B1 B2], where A1, A2 describe the claw and wrist orientation of clasper A, and B1, B2 do the same for clasper B. For the claw, 0 represents open, 1 represents closed. For the wrist, 0 represents parallel to machine, 1 represents perpendicular.
  + To test interference avoidance, run clasperCheck for all possible *instates* and *outstates*.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| A-claw | A-orient | B-claw | B-orient | State | Valid in | Valid out |
| Open | Par | Open | Par | 00-00 |  |  |
| Open | Par | Open | Perp | 00-01 |  |  |
| Open | Par | Closed | Par | 00-10 |  |  |
| Open | Par | Closed | Perp | 00-11 |  |  |
| Open | Perp | Open | Par | 01-00 |  |  |
| Open | Perp | Open | Perp | 01-01 |  |  |
| Open | Perp | Closed | Par | 01-10 | 01-10 |  |
| Open | Perp | Closed | Perp | 01-11 | 01-11 | 01-11 |
| Closed | Par | Open | Par | 10-00 |  |  |
| Closed | Par | Open | Perp | 10-01 | 10-01 |  |
| Closed | Par | Closed | Par | 10-10 |  |  |
| Closed | Par | Closed | Perp | 10-11 | 10-11 |  |
| Closed | Perp | Open | Par | 11-00 |  |  |
| Closed | Perp | Open | Perp | 11-01 | 11-01 | 11-01 |
| Closed | Perp | Closed | Par | 11-10 | 11-10 |  |
| Closed | Perp | Closed | Perp | 11-11 | 11-11 | 11-11 |

* 21 possible transformations are possible given the 7 input states, 3 output states. Test will be to execute the continuous execution of these re-orientations.
* What is the current mechanism for addressing servo tangle?
  + servoTangle conditionals – servo becomes tangled when extent of stepper rotation exceeds 2 revolutions.
  + tangleCheck function and tangle global variable manages servo cable tangle. Every half turn adds 0.5 to *tangle[motorid]*.
  + tangleCheck function is called during clasperCheck. If A is being checked for tangle, B must be in [1,1] orientation, A must be open [0, - ]. Same for B.

1. Cube Re-orientation

* For each cube face, verify that the other 5 faces can be reached
* 6 faces, 5 transformations for each face -> 30 manipulations
* Alternatively, just verify that each face can be reached and turned. Turn each face once.