

Supplementary Materials: Structural Synthesis of Parallel Robots via Geometric Permutation of Coupling-Joint Alignments and Leg Chains

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The results of the parallel robot structural synthesis are presented in detail in the following pages. The table descriptions follow the explanations in the main document. First, leg chains with different numbers of joints are given in Section 1 of this supplementary material. They constitute the parallel-robot candidates listed in Section 2 (3T), Section 3 (3T1R), Section 4 (3T2R), and Section 5 (3T3R). The term “parallel robot” is used for all PR “candidates” to maintain readability, despite that the rank-deficient mechanisms (marked by “R.D.”) do not literally constitute a robot.

1. Leg Chains

The leg chains created by the synthesis algorithm of Section 3 of the paper are numbered consecutively for each case of joint DoFs. The naming scheme of the structures is oriented at [1] by noting the parallelity of joints by an accent over the respective letter R (for revolute joints) or P (for prismatic joints). The usage of the chains in a parallel robot (PR) is reported with the running number of the PR in the respective table. Vice-versa, the referenced leg numbers in the PR tables refer to the legs with the DoFs that can be recognized by the number of joints in the leg name. The PR numbers only refer to the respective PR DoFs and are not unique among all parallel-robot DoF for compactness. For instance, the chain $\grave{R}\grave{P}\grave{R}\grave{R}$ (number 2 in Table S1) is used in the 3T parallel robot 9 in Table S4. In Table S4, the reference to leg 2 leads back to the four-joints leg Table S1.

Some leg chains do not lead to a valid parallel robot in terms of an inverse-kinematics solution, such as, e.g., $\grave{R}\grave{P}\grave{R}\grave{R}\grave{R}$ (number 9 in Table S2). In these cases, either the numeric approach for the parallel-robot synthesis fails, or the leg chain is infeasible due to wrong assumptions within the leg-chain synthesis. A manual analysis would be required to distinguish the cases, but is out of this thesis’ scope. The free Denavit-Hartenberg parameters (in the modified notation of [2]) in the last column of the results tables are subject to optimization within the dimensional synthesis. The distance parameters d_i and a_i are always free. In the case of parallelism or orthogonality (visible by the accents), the corresponding α_i are fixed to 0 or 90° .

Table S1. Structural-synthesis results for leg chains with four joints

#	Structure	Usage in PR#		Free parameters	Fixed parameters
		3T0R	3T1R		
1	$\grave{P}\grave{R}\grave{R}\grave{R}$	1	1	$a_2, a_3, a_4, d_2, d_3, d_4, \theta_1$	$\alpha_2=\alpha_3=\alpha_4=0$
2	$\grave{R}\grave{P}\grave{R}\grave{R}$	9	9	$a_2, a_3, a_4, d_1, d_3, d_4, \theta_2$	$\alpha_2=\alpha_3=\alpha_4=0$
3	$\grave{R}\grave{R}\grave{P}\grave{R}$	19	19	$a_2, a_3, a_4, d_1, d_2, d_4, \theta_3$	$\alpha_2=\alpha_3=\alpha_4=0$

Table S2. Structural-synthesis results for leg chains with five joints (part 1 of 2)

#	Structure	Usage in PR#			Free parameters	Fixed parameters
		3T0R	3T1R	3T2R		
1	$\dot{P}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	2	2	1	$a_2, a_3, a_4, a_5, d_2, d_3, d_4, d_5, \theta_1$	$\alpha_2=\alpha_3=\alpha_4=0, \alpha_5=90^\circ$
2	$\dot{P}\ddot{R}\ddot{R}\ddot{R}\dot{R}$	3	3	2	$a_2, a_3, a_4, a_5, d_2, d_3, d_4, d_5, \theta_1$	$\alpha_2=\alpha_3=0, \alpha_4=90^\circ, \alpha_5=0$
3	$\dot{P}\ddot{R}\ddot{R}\dot{R}\dot{R}$	4	4	3	$a_2, a_3, a_4, a_5, d_2, d_3, d_4, d_5, \theta_1$	$\alpha_2=90^\circ, \alpha_3=0, \alpha_4=90^\circ, \alpha_5=0$
4	$\dot{P}\ddot{R}\ddot{R}\ddot{R}$	5	5	4	$a_2, a_3, a_4, a_5, d_2, d_3, d_4, d_5, \theta_1$	$\alpha_2=\alpha_3=90^\circ, \alpha_4=\alpha_5=0$
5	$\dot{P}\ddot{R}\ddot{R}\ddot{R}$	6	6	—	$a_2, a_3, a_4, a_5, \alpha_2, d_2, d_3, d_4, d_5, \theta_1$	$\alpha_3=90^\circ, \alpha_4=0, \alpha_5=90^\circ$
6	$\dot{P}\ddot{R}\ddot{R}\ddot{R}$	7	7	—	$a_2, a_3, a_4, a_5, \alpha_2, d_2, d_3, d_4, d_5, \theta_1$	$\alpha_3=\alpha_4=90^\circ, \alpha_5=0$
7	$\dot{P}\ddot{R}\ddot{R}\ddot{R}$	8	8	—	$a_2, a_3, a_4, a_5, \alpha_2, \alpha_3, d_2, d_3, d_4, d_5, \theta_1$	$\alpha_4=\alpha_5=90^\circ$
8	$\dot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	10	10	5	$a_2, a_3, a_4, a_5, d_1, d_3, d_4, d_5, \theta_2$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=\alpha_5=0$
9	$\dot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	11	11	6	$a_2, a_3, a_4, a_5, d_1, d_3, d_4, d_5, \theta_2$	$\alpha_2=\alpha_3=\alpha_4=0, \alpha_5=90^\circ$
10	$\dot{R}\ddot{P}\ddot{R}\dot{R}\dot{R}$	12	12	7	$a_2, a_3, a_4, a_5, d_1, d_3, d_4, d_5, \theta_2$	$\alpha_2=\alpha_3=0, \alpha_4=90^\circ, \alpha_5=0$
11	$\dot{R}\ddot{P}\dot{R}\dot{R}\dot{R}$	13	13	—	$a_2, a_3, a_4, a_5, d_1, d_3, d_4, d_5, \theta_2$	$\alpha_2=0, \alpha_3=90^\circ, \alpha_4=0, \alpha_5=90^\circ$
12	$\dot{R}\ddot{P}\dot{R}\dot{R}\dot{R}$	14	14	—	$a_2, a_3, a_4, a_5, d_1, d_3, d_4, d_5, \theta_2$	$\alpha_2=0, \alpha_3=\alpha_4=90^\circ, \alpha_5=0$
13	$\dot{R}\ddot{P}\dot{R}\dot{R}\dot{R}$	15	15	8	$a_2, a_3, a_4, a_5, d_1, d_3, d_4, d_5$	$\alpha_2=\alpha_3=\alpha_4=90^\circ, \alpha_5=0, \theta_2=0$
14	$\dot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	16	16	—	$a_2, a_3, a_4, a_5, d_1, d_3, d_4, d_5, \theta_2$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=0, \alpha_5=90^\circ$
15	$\dot{R}\ddot{P}\dot{R}\dot{R}\dot{R}$	—	—	—	$a_2, a_3, a_4, a_5, d_1, d_3, d_4, d_5, \theta_2$	$\alpha_2=90^\circ, \alpha_3=0, \alpha_4=90^\circ, \alpha_5=0$
16	$\dot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	17	17	—	$a_2, a_3, a_4, a_5, d_1, d_3, d_4, d_5$	$\alpha_2=\alpha_3=90^\circ, \alpha_4=0, \alpha_5=90^\circ, \theta_2=90^\circ$
17	$\dot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	—	—	—	$a_2, a_3, a_4, a_5, d_1, d_3, d_4, d_5$	$\alpha_2=\alpha_3=\alpha_4=90^\circ, \alpha_5=0, \theta_2=90^\circ$
18	$\dot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	18	18	—	$a_2, a_3, a_4, a_5, \alpha_2, \alpha_3, d_1, d_3, d_4, d_5, \theta_2$	$\alpha_4=\alpha_5=90^\circ$
19	$\dot{R}\ddot{R}\ddot{P}\ddot{R}\ddot{R}$	20	20	9	$a_2, a_3, a_4, a_5, d_1, d_2, d_4, d_5, \theta_3$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=\alpha_5=0$
20	$\dot{R}\ddot{R}\ddot{P}\ddot{R}\ddot{R}$	21	21	10	$a_2, a_3, a_4, a_5, d_1, d_2, d_4, d_5, \theta_3$	$\alpha_2=\alpha_3=\alpha_4=0, \alpha_5=90^\circ$
21	$\dot{R}\ddot{R}\ddot{P}\dot{R}\dot{R}$	22	22	11	$a_2, a_3, a_4, a_5, d_1, d_2, d_4, d_5, \theta_3$	$\alpha_2=\alpha_3=0, \alpha_4=90^\circ, \alpha_5=0$
22	$\dot{R}\ddot{R}\ddot{P}\dot{R}\dot{R}$	23	23	12	$a_2, a_3, a_4, a_5, d_1, d_2, d_4, d_5, \theta_3$	$\alpha_2=0, \alpha_3=90^\circ, \alpha_4=\alpha_5=0$

Table S2: Structural-synthesis results for leg chains with five joints (part 2 of 2)

#	Structure	Usage in PR#			Free parameters	Fixed parameters
		3T0R	3T1R	3T2R		
23	$\dot{R}\dot{R}P\dot{R}\dot{R}$	–	–	13	$a_2, a_3, a_4, a_5, d_1, d_2, d_4, d_5, \theta_3$	$\alpha_2=0, \alpha_3=\alpha_4=90^\circ, \alpha_5=0$
24	$\dot{R}\dot{R}P\dot{R}\dot{R}$	24	24	14	$a_2, a_3, a_4, a_5, d_1, d_2, d_4, d_5$	$\alpha_2=0, \alpha_3=\alpha_4=90^\circ, \alpha_5=0, \theta_3=90^\circ$
25	$R\dot{R}\dot{P}\dot{R}\dot{R}$	25	25	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_4, d_5, \theta_3$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=0, \alpha_5=90^\circ$
26	$R\dot{R}\dot{P}\dot{R}\dot{R}$	–	–	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_4, d_5, \theta_3$	$\alpha_2=90^\circ, \alpha_3=0, \alpha_4=90^\circ, \alpha_5=0$
27	$R\dot{R}\dot{P}RR$	26	26	–	$a_2, a_3, a_4, a_5, \alpha_2, d_1, d_2, d_4, d_5, \theta_3$	$\alpha_3=0, \alpha_4=\alpha_5=90^\circ$
28	$R\dot{R}\dot{P}RR$	27	27	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_4, d_5$	$\alpha_2=\alpha_3=\alpha_4=\alpha_5=90^\circ, \theta_3=0$
29	$RR\dot{P}\dot{R}\dot{R}$	28	28	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_4, d_5, \theta_3$	$\alpha_2=\alpha_3=90^\circ, \alpha_4=\alpha_5=0$
30	$RR\dot{P}\dot{R}\dot{R}$	–	–	–	$a_2, a_3, a_4, a_5, \alpha_2, d_1, d_2, d_4, d_5, \theta_3$	$\alpha_3=90^\circ, \alpha_4=0, \alpha_5=90^\circ$
31	$RRP\dot{R}\dot{R}$	–	–	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_4, d_5$	$\alpha_2=\alpha_3=\alpha_4=90^\circ, \alpha_5=0, \theta_3=90^\circ$
32	$RRPRR$	–	–	–	$a_2, a_3, a_4, a_5, \alpha_2, d_1, d_2, d_4, d_5$	$\alpha_3=\alpha_4=\alpha_5=90^\circ, \theta_3=90^\circ$
33	$R\dot{R}\dot{R}\dot{P}\dot{R}$	29	29	15	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_5, \theta_4$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=\alpha_5=0$
34	$\dot{R}\dot{R}\dot{R}\dot{P}R$	30	30	16	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_5, \theta_4$	$\alpha_2=\alpha_3=\alpha_4=0, \alpha_5=90^\circ$
35	$\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	31	–	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_5, \theta_4$	$\alpha_2=0, \alpha_3=90^\circ, \alpha_4=\alpha_5=0$
36	$\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	32	31	17	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_5$	$\alpha_2=0, \alpha_3=\alpha_4=\alpha_5=90^\circ, \theta_4=0$
37	$R\dot{R}\dot{R}\dot{P}R$	33	32	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_5, \theta_4$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=0, \alpha_5=90^\circ$
38	$R\dot{R}\dot{R}\dot{P}\dot{R}$	34	33	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_5, \theta_4$	$\alpha_2=90^\circ, \alpha_3=0, \alpha_4=90^\circ, \alpha_5=0$
39	$R\dot{R}\dot{R}PR$	35	34	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_5$	$\alpha_2=90^\circ, \alpha_3=0, \alpha_4=\alpha_5=90^\circ, \theta_4=90^\circ$
40	$RR\dot{R}\dot{P}\dot{R}$	36	–	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_5, \theta_4$	$\alpha_2=\alpha_3=90^\circ, \alpha_4=\alpha_5=0$
41	$RR\dot{R}\dot{P}R$	–	–	–	$a_2, a_3, a_4, a_5, \alpha_2, d_1, d_2, d_3, d_5, \theta_4$	$\alpha_3=90^\circ, \alpha_4=0, \alpha_5=90^\circ$
42	$RR\dot{R}\dot{P}\dot{R}$	–	–	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_5$	$\alpha_2=\alpha_3=\alpha_4=\alpha_5=90^\circ, \theta_4=0$
43	$RRR\dot{P}\dot{R}$	37	–	–	$a_2, a_3, a_4, a_5, \alpha_2, d_1, d_2, d_3, d_5, \theta_4$	$\alpha_3=\alpha_4=90^\circ, \alpha_5=0$
44	$RRRPR$	–	–	–	$a_2, a_3, a_4, a_5, \alpha_2, d_1, d_2, d_3, d_5$	$\alpha_3=\alpha_4=\alpha_5=90^\circ, \theta_4=90^\circ$
45	$\dot{R}\dot{R}\dot{R}\dot{R}\dot{R}$	38	35	18	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_4, d_5$	$\alpha_2=\alpha_3=0, \alpha_4=90^\circ, \alpha_5=0$
46	$\dot{R}\dot{R}\dot{R}\dot{R}\dot{R}$	39	36	19	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_4, d_5$	$\alpha_2=0, \alpha_3=90^\circ, \alpha_4=\alpha_5=0$
47	$R\dot{R}\dot{R}\dot{R}R$	40	37	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_4, d_5$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=0, \alpha_5=90^\circ$
48	$R\dot{R}\dot{R}\dot{R}\dot{R}$	41	38	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_4, d_5$	$\alpha_2=90^\circ, \alpha_3=0, \alpha_4=90^\circ, \alpha_5=0$
49	$RR\dot{R}\dot{R}\dot{R}$	–	–	–	$a_2, a_3, a_4, a_5, d_1, d_2, d_3, d_4, d_5$	$\alpha_2=\alpha_3=90^\circ, \alpha_4=\alpha_5=0$
50	$RR\dot{R}\dot{R}R$	42	39	–	$a_2, a_3, a_4, a_5, \alpha_2, d_1, d_2, d_3, d_4, d_5$	$\alpha_3=90^\circ, \alpha_4=0, \alpha_5=90^\circ$
51	$RRR\dot{R}\dot{R}$	–	–	–	$a_2, a_3, a_4, a_5, \alpha_2, d_1, d_2, d_3, d_4, d_5$	$\alpha_3=\alpha_4=90^\circ, \alpha_5=0$
52	$RRRRR$	–	–	–	$a_2, a_3, a_4, a_5, \alpha_2, \alpha_3, d_1, d_2, d_3, d_4, d_5$	$\alpha_4=\alpha_5=90^\circ$

For leg chains with six DoF, only prismatic joints up to the fourth joint are considered due to the design rules for proximal actuation and avoiding passive joints. Therefore, chains with prismatic fifth or sixth joint are excluded from the results list for six-DoF chains in Table S3.

Table S3. Structural-synthesis results for leg chains with six joints (part 1 of 2)

#	Structure	PR# 3T3R	Free parameters	Fixed parameters
1	PRR������	1	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_2, d_3, d_4, d_5, d_6, \theta_1$	$\alpha_3=90^\circ, \alpha_4=\alpha_5=0, \alpha_6=90^\circ$
2	PRR������	2	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_2, d_3, d_4, d_5, d_6, \theta_1$	$\alpha_3=90^\circ, \alpha_4=0, \alpha_5=90^\circ, \alpha_6=0$
3	PRR������	3	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_2, d_3, d_4, d_5, d_6, \theta_1$	$\alpha_3=\alpha_4=90^\circ, \alpha_5=\alpha_6=0$
4	PRR������	4	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, d_2, d_3, d_4, d_5, d_6, \theta_1$	$\alpha_4=90^\circ, \alpha_5=0, \alpha_6=90^\circ$
5	PRRR������	5	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, d_2, d_3, d_4, d_5, d_6, \theta_1$	$\alpha_4=\alpha_5=90^\circ, \alpha_6=0$
6	PRRR������	6	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, \alpha_4, d_2, d_3, d_4, d_5, d_6, \theta_1$	$\alpha_5=\alpha_6=90^\circ$
7	����������	7	$a_2, a_3, a_4, a_5, a_6, d_1, d_3, d_4, d_5, d_6, \theta_2$	$\alpha_2=0, \alpha_3=90^\circ, \alpha_4=0, \alpha_5=90^\circ, \alpha_6=0$
8	����������	8	$a_2, a_3, a_4, a_5, a_6, d_1, d_3, d_4, d_5, d_6, \theta_2$	$\alpha_2=0, \alpha_3=\alpha_4=90^\circ, \alpha_5=\alpha_6=0$
9	����������	9	$a_2, a_3, a_4, a_5, a_6, d_1, d_3, d_4, d_5, d_6, \theta_2$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=\alpha_5=0, \alpha_6=90^\circ$
10	����������	10	$a_2, a_3, a_4, a_5, a_6, d_1, d_3, d_4, d_5, d_6, \theta_2$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=0, \alpha_5=90^\circ, \alpha_6=0$
11	����������	11	$a_2, a_3, a_4, a_5, a_6, d_1, d_3, d_4, d_5, d_6$	$\alpha_2=\alpha_3=90^\circ, \alpha_4=0, \alpha_5=90^\circ, \alpha_6=0, \theta_2=90^\circ$
12	����������	12	$a_2, a_3, a_4, a_5, a_6, d_1, d_3, d_4, d_5, d_6$	$\alpha_2=\alpha_3=\alpha_4=90^\circ, \alpha_5=\alpha_6=0, \theta_2=90^\circ$
13	����������	13	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, d_1, d_3, d_4, d_5, d_6, \theta_2$	$\alpha_4=90^\circ, \alpha_5=0, \alpha_6=90^\circ$
14	����������	14	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, d_1, d_3, d_4, d_5, d_6, \theta_2$	$\alpha_4=\alpha_5=90^\circ, \alpha_6=0$
15	����������	15	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, \alpha_4, d_1, d_3, d_4, d_5, d_6, \theta_2$	$\alpha_5=\alpha_6=90^\circ$
16	����������	16	$a_2, a_3, a_4, a_5, a_6, d_1, d_2, d_4, d_5, d_6, \theta_3$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=\alpha_5=0, \alpha_6=90^\circ$
17	����������	17	$a_2, a_3, a_4, a_5, a_6, d_1, d_2, d_4, d_5, d_6, \theta_3$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=0, \alpha_5=90^\circ, \alpha_6=0$
18	����������	18	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_4, d_5, d_6, \theta_3$	$\alpha_3=0, \alpha_4=90^\circ, \alpha_5=0, \alpha_6=90^\circ$
19	����������	19	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_4, d_5, d_6, \theta_3$	$\alpha_3=0, \alpha_4=\alpha_5=90^\circ, \alpha_6=0$
20	����������	20	$a_2, a_3, a_4, a_5, a_6, d_1, d_2, d_4, d_5, d_6$	$\alpha_2=\alpha_3=\alpha_4=\alpha_5=90^\circ, \alpha_6=0, \theta_3=0$
21	����������	21	$a_2, a_3, a_4, a_5, a_6, d_1, d_2, d_4, d_5, d_6, \theta_3$	$\alpha_2=\alpha_3=90^\circ, \alpha_4=\alpha_5=\alpha_6=0$
22	����������	22	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_4, d_5, d_6, \theta_3$	$\alpha_3=90^\circ, \alpha_4=\alpha_5=0, \alpha_6=90^\circ$

Table S3: Structural-synthesis results for leg chains with six joints (part 2 of 2)

#	Structure	PR# 3T3R	Free parameters	Fixed parameters
23	RRP̂RR̂R̂	23	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_4, d_5, d_6, \theta_3$	$\alpha_3=90^\circ, \alpha_4=0, \alpha_5=90^\circ, \alpha_6=0$
24	RRP̂R̂RR	24	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_4, d_5, d_6$	$\alpha_3=\alpha_4=90^\circ, \alpha_5=0, \alpha_6=90^\circ, \theta_3=90^\circ$
25	RRPR̂R̂R̂	25	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_4, d_5, d_6$	$\alpha_3=\alpha_4=\alpha_5=90^\circ, \alpha_6=0, \theta_3=90^\circ$
26	RRPRRR	26	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, \alpha_4, d_1, d_2, d_4, d_5, d_6, \theta_3$	$\alpha_5=\alpha_6=90^\circ$
27	R̂R̂R̂P̂RR	27	$a_2, a_3, a_4, a_5, a_6, d_1, d_2, d_3, d_5, d_6, \theta_4$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=\alpha_5=0, \alpha_6=90^\circ$
28	R̂R̂R̂P̂R̂R̂	28	$a_2, a_3, a_4, a_5, a_6, d_1, d_2, d_3, d_5, d_6, \theta_4$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=0, \alpha_5=90^\circ, \alpha_6=0$
29	R̂R̂R̂P̂R̂R̂	29	$a_2, a_3, a_4, a_5, a_6, d_1, d_2, d_3, d_5, d_6, \theta_4$	$\alpha_2=90^\circ, \alpha_3=0, \alpha_4=90^\circ, \alpha_5=\alpha_6=0$
30	R̂R̂R̂P̂R̂R̂	30	$a_2, a_3, a_4, a_5, a_6, d_1, d_2, d_3, d_5, d_6$	$\alpha_2=90^\circ, \alpha_3=0, \alpha_4=\alpha_5=90^\circ, \alpha_6=0, \theta_4=90^\circ$
31	RRR̂P̂R̂R̂	31	$a_2, a_3, a_4, a_5, a_6, d_1, d_2, d_3, d_5, d_6, \theta_4$	$\alpha_2=\alpha_3=90^\circ, \alpha_4=\alpha_5=\alpha_6=0$
32	RRR̂P̂RR	32	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_3, d_5, d_6, \theta_4$	$\alpha_3=90^\circ, \alpha_4=\alpha_5=0, \alpha_6=90^\circ$
33	RRR̂P̂R̂R̂	33	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_3, d_5, d_6, \theta_4$	$\alpha_3=90^\circ, \alpha_4=0, \alpha_5=90^\circ, \alpha_6=0$
34	RRR̂P̂RR	34	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, d_1, d_2, d_3, d_5, d_6, \theta_4$	$\alpha_4=0, \alpha_5=\alpha_6=90^\circ$
35	RRR̂P̂RR	35	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_3, d_5, d_6$	$\alpha_3=\alpha_4=\alpha_5=\alpha_6=90^\circ, \theta_4=0$
36	RRR̂P̂R̂R̂	36	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_3, d_5, d_6, \theta_4$	$\alpha_3=\alpha_4=90^\circ, \alpha_5=\alpha_6=0$
37	RRR̂P̂RR	37	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, d_1, d_2, d_3, d_5, d_6, \theta_4$	$\alpha_4=90^\circ, \alpha_5=0, \alpha_6=90^\circ$
38	RRRP̂R̂R̂	38	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_3, d_5, d_6$	$\alpha_3=\alpha_4=\alpha_5=90^\circ, \alpha_6=0, \theta_4=90^\circ$
39	RRRPRR	39	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, d_1, d_2, d_3, d_5, d_6$	$\alpha_4=\alpha_5=\alpha_6=90^\circ, \theta_4=90^\circ$
40	R̂R̂R̂R̂R̂R̂	40	$a_2, a_3, a_4, a_5, a_6, d_1, d_2, d_3, d_4, d_5, d_6$	$\alpha_2=90^\circ, \alpha_3=\alpha_4=0, \alpha_5=90^\circ, \alpha_6=0$
41	R̂R̂R̂R̂R̂R̂	41	$a_2, a_3, a_4, a_5, a_6, d_1, d_2, d_3, d_4, d_5, d_6$	$\alpha_2=90^\circ, \alpha_3=0, \alpha_4=90^\circ, \alpha_5=\alpha_6=0$
42	RRR̂R̂R̂R̂	42	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_3, d_4, d_5, d_6$	$\alpha_3=90^\circ, \alpha_4=\alpha_5=0, \alpha_6=90^\circ$
43	RRR̂R̂R̂R̂	43	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_3, d_4, d_5, d_6$	$\alpha_3=90^\circ, \alpha_4=0, \alpha_5=90^\circ, \alpha_6=0$
44	RRR̂R̂R̂R̂	44	$a_2, a_3, a_4, a_5, a_6, \alpha_2, d_1, d_2, d_3, d_4, d_5, d_6$	$\alpha_3=\alpha_4=90^\circ, \alpha_5=\alpha_6=0$
45	RRR̂R̂R̂R̂	45	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, d_1, d_2, d_3, d_4, d_5, d_6$	$\alpha_4=90^\circ, \alpha_5=0, \alpha_6=90^\circ$
46	RRRR̂R̂R̂	46	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, d_1, d_2, d_3, d_4, d_5, d_6$	$\alpha_4=\alpha_5=90^\circ, \alpha_6=0$
47	RRRRRR	47	$a_2, a_3, a_4, a_5, a_6, \alpha_2, \alpha_3, \alpha_4, d_1, d_2, d_3, d_4, d_5, d_6$	$\alpha_5=\alpha_6=90^\circ$

2. 3T Parallel Robots

The following Table S4 shows results for parallel robots with 3T platform mobility. Chains without a lever on prismatic joints are marked by “nlp” in the joints column.

Table S4. Structural-synthesis results for 3T parallel robots (part 1 of 5)

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
1.1	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	1	c-m; R.D.: v-v, t-t, r-r, p-m
2.1	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	1	c-(t,r); R.D.: (v,r)-t, (v,t)-r, (v,p)-p, (t,r,p)-v, t-c, r-i
...2	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	PRRU		c-(t,r); R.D.: (v,t,r)-(t,r), (t,r)-c, (v,p)-p, (t,r,p)-v, r-i
3.1	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	2	(v,t,r,c)-t, (v,t)-r, (t,r)-c, (v,p)-p, (t,r,p)-v, r-i
...2	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	PRUR		(v,p)-p, (v,r,c)-t, (v,t,c)-r, (t,r,p)-v, t-c, r-i
4.1	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	3	(v,t,r,c,p)-(t,r), (v,t,r,c)-c, (t,r,p,v)-p, (v,t)-i, (v,t,r,c,p,v)-v
...2	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	PRUR		(v,t,r,c,p)-(t,r), (v,t,r,c)-c, (t,r,p,v)-p, (v,t)-i, (v,t,r,c,p,v)-v
5.1	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	4	(v,t)-i, (v,r,c)-c; R.D.: (t,r)-(t,p), (t,r,c)-r, (v,c,v)-v
...2	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	PURR		(v,t)-i, (v,r,c)-c; R.D.: (t,r)-(t,p), (t,r,c)-r, (v,c,v)-v
6.1	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	5	(v,t,r,c)-t, (v,t,r,p,v)-v, (v,c)-c, (p,v)-p, (v,t,r)-r
...2	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	PUU		(v,t,r,c)-t, (v,t,r,p,v)-v, (v,c)-c, (p,v)-p, (v,t,r)-r
...3	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	PRRU		(v,t,r,c)-t, (v,t,r,p,v)-v, (v,c)-c, (p,v)-p, (v,t,r)-r
7.1	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	6	v-c; R.D.: (v,v)-v, t-t, r-r
8.1	3- $\underline{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	7	v-c; R.D.: (v,v)-v, t-t, r-r
9.1	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	2	c-m; R.D.: (t,r)-r, v-v, t-t
10.1	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	8	t-c, c-m, r-i; R.D.: (v,p)-p, (v,t,r)-r, (v,r,c)-t, (t,r,p)-v
...2	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	(nlp)	t-c, c-m, r-i; R.D.: (v,p)-p, (v,t,r)-r, (v,r,c)-t, (t,r,p)-v
11.1	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	9	c-t; R.D.: (t,r)-v, (v,r)-t, (v,t)-r, v-p, t-c, r-i
...2	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	RPRU		c-t; R.D.: (t,r)-(v,c), (v,r)-t, (v,t)-r, v-p, r-i
12.1	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	10	(t,r)-v, (v,t)-r, (v,r,c)-t, v-p, t-c, r-i
...2	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	RPUR		(t,r)-v, (v,t)-r, (v,r,c)-t, v-p, t-c, r-i
13.1	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	11	v-v, t-t, r-r
...2	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	RPRU		v-v, t-t, r-r
...3	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	RPRU	(nlp)	v-v, t-t, r-r
...4	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	(nlp)	v-v, t-t, r-r
14.1	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	12	R.D.: v-v, t-t, r-r
...2	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	RPUR		R.D.: (t,r)-t, v-v, r-r
...3	3- $\ddot{\text{R}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}$	—	(nlp)	R.D.: v-v, t-t, r-r

Table S4: Structural-synthesis results for 3T parallel robots, part 2 of 4

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
15.1	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	13	(t,r)-v, (v,t)-r, (v,r,c)-t, t-c, r-i; R.D.: v-p
...2	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	RPUR		(v,t)-r, (v,r,c)-t, (t,r,p)-v, t-c, r-i, p-p; R.D.: v-p
...3	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	RPUR	(nlP)	(v,t)-r, (v,r,c)-t, (t,r,p)-v, t-c, r-i, p-p; R.D.: v-p
...4	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	(nlP)	(v,t)-r, (v,r,c)-t, (t,r,p)-v, t-c, r-i, p-p; R.D.: v-p
16.1	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	14	(t,r)-(t,r), v-v
...2	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	RPRU		v-v, t-t, r-r
...3	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	RPRU	(nlP)	v-v, t-t, r-r
...4	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	(nlP)	v-v, t-t, r-r
17.1	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	16	v-v, t-t, r-r
...2	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	RPRU		v-v, t-t, r-r
...3	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	RPRU	(nlP)	(t,r)-r, v-v, t-t
...4	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	(nlP)	(t,r)-r, v-v, t-t
18.1	3- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	18	R.D.: v-v, t-t, r-r
19.1	3- $\dot{R}\dot{R}\dot{P}\dot{R}$	—	3	c-m; R.D.: v-v, t-t, r-r
20.1	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	19	t-c, c-m, r-i; R.D.: (v,t)-r, (v,p)-p, (v,r,c)-t, (t,r,p)-v
...2	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	UPRR		t-c, c-m, r-i; R.D.: (t,r)-v, (v,t)-r, (v,p)-p, (v,r,c)-t
21.1	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	20	c-t; R.D.: (t,r)-v, (v,r)-t, (v,t)-r, v-p, t-c, r-i
...2	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RRPU		c-t; R.D.: (t,r)-v, (v,r)-t, (v,t)-r, v-p, t-c, r-i
22.1	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	21	(v,t)-r, (v,r,c)-t, (t,r,p)-v, v-p, t-c, r-i; R.D.: p-p
...2	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	(v,r,c)-t, (v,t,c)-r, (t,r,p)-v, v-p, t-c, r-i; R.D.: p-p
23.1	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	22	(v,t)-r, (v,p)-p, (v,r,c)-t, (t,r,p)-v, t-c, r-i
...2	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	(v,t,r,c)-t, (v,t)-r, (v,p)-p, (t,r,p)-v, t-c, r-i
24.1	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	24	(t,r)-v, (v,t)-r, (v,r,c)-t, t-c, r-i; R.D.: v-p
25.1	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	25	v-v, t-t, r-r
...2	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	UPU		(t,r)-r, v-v, t-t
...3	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RRPU		v-v, t-t, r-r
26.1	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	27	R.D.: v-v, t-t, r-r
...2	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RRPU		R.D.: v-v, t-t, r-r
...3	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	R.D.: v-v, t-t, r-r
27.1	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	28	v-v, t-t, r-r
...2	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	UPU		(t,r)-r, v-v, t-t
...3	3- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RRPU		v-v, t-t, r-r

Table S4: Structural-synthesis results for 3T parallel robots, part 3 of 4

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
27.4	3- $\dot{R}\dot{R}\dot{P}\dot{P}\dot{R}\dot{R}$	UPU	28	(t,r)-t, v-v, r-r
...5	3- $\dot{R}\dot{R}\dot{P}\dot{P}\dot{R}\dot{R}$	RRPU	(nlP)	(t,r)-t, v-v, r-r
...6	3- $\dot{R}\dot{R}\dot{P}\dot{P}\dot{R}\dot{R}$	—	(nlP)	(t,r)-r, v-v, t-t
28.1	3- $\dot{R}\dot{R}\dot{P}\dot{P}\dot{R}\dot{R}$	—	29	R.D.: v-v, t-t, r-r
...2	3- $\dot{R}\dot{R}\dot{P}\dot{P}\dot{R}\dot{R}$	UPRR		R.D.: v-v, t-t, r-r
...3	3- $\dot{R}\dot{R}\dot{P}\dot{P}\dot{R}\dot{R}$	—	(nlP)	R.D.: (t,r)-t, v-v, r-r
29.1	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	33	c-m; R.D.: (v,t)-r, (v,p)-p, (v,r,c)-t, (t,r,p)-v
...2	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	URPR		c-m; R.D.: (v,r)-t, (v,t)-r, (v,p)-p
30.1	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	34	c-t; R.D.: (v,r)-t, (v,t)-r, (v,p)-p, (t,r,p)-v, t-c
...2	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	c-t; R.D.: (v,r)-t, (v,t)-r, (v,p)-p, (t,r,p)-v, t-c
31.1	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	35	v-(t,r)
...2	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RUPR		v-(t,r)
32.1	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	36	(v,t)-r, v-t, t-c
...2	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RUPR		(v,r)-t, (v,t)-r, (v,p)-p, p-v, t-c
...3	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RUPR	(nlP)	(t,r)-v, (v,t)-r, (v,p)-p, (v,r,c)-t, t-c; R.D.: p-v
...4	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	(t,r)-v, (v,t)-r, (v,p)-p, (v,r,c)-t, t-c; R.D.: p-v
33.1	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	37	v-v, t-t, r-r
...2	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	URPR		v-v, t-t, r-r
...3	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	URPR	(nlP)	v-v, t-t, r-r
...4	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	v-v, t-t, r-r
34.1	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	38	v-v, t-t, r-r
...2	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	URPR		v-v, t-t, r-r
...3	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	URPR	(nlP)	v-v, t-t, r-r
...4	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	v-v, t-t, r-r
35.1	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	39	v-v, t-t, r-r
...2	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	URPR		v-v, t-t, r-r
...3	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	URPR	(nlP)	v-v, t-t, r-r
...4	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	(t,r)-r, v-v, t-t
36.1	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	40	R.D.: v-v, t-t, r-r
37.1	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	43	R.D.: v-v, t-t, r-r
...2	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RUPR		R.D.: v-v, t-t, r-r
...3	3- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	R.D.: v-v, t-t, r-r

Table S4: Structural-synthesis results for 3T parallel robots, part 4 of 4

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
38.1	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—	45	(v,t)-r, (v,r,c)-t, (t,r,p)-v, t-c, r-i, p-p; R.D.: v-p
...2	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		(v,t)-r, (v,r,c)-t, (t,r,p)-v, t-c, r-i, p-p; R.D.: v-p
...3	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		(v,t)-r, (v,r,c)-t, (t,r,p)-v, t-c, r-i, p-p; R.D.: v-p
...4	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		c-t; R.D.: (v,r)-t, (v,t)-r, (v,p)-p, (t,r,p)-v, t-c
...5	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRUR		(v,t)-r, (v,p)-p, (v,r,c)-t, (t,r,p)-v, t-c, r-i
...6	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRUR		(v,t)-r, (v,p)-p, (v,r,c)-t, (t,r,p)-v, t-c, r-i
39.1	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—	46	t-c, r-i; R.D.: (v,t)-r, (v,p)-p, (v,r,c)-t, (t,r,p)-v
...2	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		t-c, r-i; R.D.: (v,t)-r, (v,p)-p, (v,r,c)-t, (t,r,p)-v
...3	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		(v,t)-r, (v,p)-p, (v,r,c)-t, (t,r,p)-v, t-c, r-i
...4	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		(v,t)-r, (v,p)-p, (v,r,c)-t, (t,r,p)-v, t-c
...5	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RURR		t-c, r-i; R.D.: (v,t)-r, (v,p)-p, (v,r,c)-t, (t,r,p)-v
...6	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RURR		(v,t)-r, (v,p)-p, (v,r,c)-t, (t,r,p)-v, t-c
40.1	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—	47	t-t, r-r; R.D.: v-v
...2	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		v-v, t-t, r-r
...3	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		v-v, t-t, r-r
...4	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		v-v, t-t, r-r
...5	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	URU		v-v, t-t, r-r, c-c
...6	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRRU		t-t, r-r; R.D.: v-v
...7	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRRU		v-v, t-t, r-r
...8	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRRU		v-v, t-t, r-r
41.1	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—	48	v-v, t-t, r-r
...2	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		R.D.: v-v, t-t, r-r
...3	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		R.D.: v-v, t-t, r-r
...4	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		v-v, t-t, r-r
...5	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRUR		v-v, t-t, r-r
...6	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRUR		R.D.: v-v, t-t, r-r
42.1	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—	50	v-v, t-t, r-r
...2	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		v-v, t-t, r-r
...3	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		R.D.: v-v, t-t, r-r
...4	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		R.D.: v-v, t-t, r-r
...5	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RUU		v-v, t-t, r-r
...6	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRRU		v-v, t-t, r-r
...7	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRRU		v-v, t-t, r-r
...8	3- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRRU		R.D.: v-v, t-t, r-r

3. 3T1R Parallel Robots

Table S5. Structural-synthesis results for 3T1R parallel robots (part 1 of 4)

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
1.1	4- $\underline{P}\ddot{R}\ddot{R}\ddot{R}$	—	1	R.D.: $\mathbf{v-v}$
2.1	4- $\underline{P}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—	1	R.D.: $\mathbf{v-(t,p)}$, $\mathbf{(t,r,p)-v}$
...2	4- $\underline{P}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	PRRU		R.D.: $\mathbf{v-(t,p)}$, $\mathbf{(t,r,p)-v}$
3.1	4- $\underline{P}\ddot{R}\ddot{R}\ddot{R}\dot{R}$	—	2	$\mathbf{(t,r,p)-v}$, $\mathbf{v-(t,r,p)}$
...2	4- $\underline{P}\ddot{R}\ddot{R}\ddot{R}\dot{R}$	PRUR		$\mathbf{(t,r,p)-v}$, $\mathbf{v-(t,r,p)}$
4.1	4- $\underline{P}\ddot{R}\ddot{R}\ddot{R}\dot{R}$	—	3	$\mathbf{(v,t,r,c)-v}$, $\mathbf{(t,r,p)-(t,r,p)}$; R.D.: $\mathbf{p-v}$
...2	4- $\underline{P}\ddot{R}\ddot{R}\ddot{R}\dot{R}$	PRUR		$\mathbf{(v,t,r,c)-v}$, $\mathbf{(t,r,p)-(t,r,p)}$; R.D.: $\mathbf{p-v}$
5.1	4- $\underline{P}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—	4	R.D.: $\mathbf{(v,c)-v}$, $\mathbf{(t,r,p)-(t,r,p)}$
...2	4- $\underline{P}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	PURR		R.D.: $\mathbf{(v,c)-v}$, $\mathbf{(t,r,p)-(t,r,p)}$
6.1	4- $\underline{P}\ddot{R}\ddot{R}\dot{R}\ddot{R}$	—	5	$\mathbf{(v,t,r,p)-v}$
...2	4- $\underline{P}\ddot{R}\ddot{R}\dot{R}\ddot{R}$	PUU		$\mathbf{(v,t,r,p)-v}$
...3	4- $\underline{P}\ddot{R}\ddot{R}\dot{R}\ddot{R}$	PRRU		$\mathbf{(v,t,r,p)-v}$
7.1	4- $\underline{P}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—	6	R.D.: $\mathbf{v-v}$
8.1	4- $\underline{P}\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—	7	R.D.: $\mathbf{v-v}$
9.1	4- $\ddot{R}\ddot{P}\ddot{R}\ddot{R}$	—	2	R.D.: $\mathbf{v-v}$
10.1	4- $\ddot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	—	8	R.D.: $\mathbf{(t,r)-v}$, $\mathbf{v-(t,r,p)}$
...2	4- $\ddot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	—	(nlP)	R.D.: $\mathbf{(t,r)-v}$, $\mathbf{v-(t,r,p)}$
11.1	4- $\ddot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	—	9	R.D.: $\mathbf{(t,r)-v}$, $\mathbf{v-(t,p)}$
...2	4- $\ddot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	RPRU		R.D.: $\mathbf{(t,r)-v}$, $\mathbf{v-(t,p)}$
12.1	4- $\ddot{R}\ddot{P}\ddot{R}\dot{R}\dot{R}$	—	10	$\mathbf{(t,r)-v}$, $\mathbf{v-(t,p)}$
...2	4- $\ddot{R}\ddot{P}\ddot{R}\dot{R}\dot{R}$	RPUR		$\mathbf{(t,r)-v}$, $\mathbf{v-(t,p)}$
13.1	4- $\ddot{R}\ddot{P}\dot{R}\dot{R}\ddot{R}$	—	11	$\mathbf{v-v}$
...2	4- $\ddot{R}\ddot{P}\dot{R}\dot{R}\ddot{R}$	RPRU		$\mathbf{v-v}$
...3	4- $\ddot{R}\ddot{P}\dot{R}\dot{R}\ddot{R}$	RPRU	(nlP)	$\mathbf{v-v}$
...4	4- $\ddot{R}\ddot{P}\dot{R}\dot{R}\ddot{R}$	—	(nlP)	$\mathbf{v-v}$
14.1	4- $\ddot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	—	12	R.D.: $\mathbf{v-v}$
...2	4- $\ddot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	RPUR		R.D.: $\mathbf{v-v}$
...3	4- $\ddot{R}\ddot{P}\ddot{R}\ddot{R}\ddot{R}$	—	(nlP)	R.D.: $\mathbf{v-v}$
15.1	4- $\ddot{R}\ddot{P}\ddot{R}\dot{R}\dot{R}$	—	13	$\mathbf{(t,r,p)-v}$, $\mathbf{v-p}$; R.D.: $\mathbf{v-(t,r)}$
...2	4- $\ddot{R}\ddot{P}\ddot{R}\dot{R}\dot{R}$	RPUR		$\mathbf{(t,r,p)-v}$, $\mathbf{v-p}$; R.D.: $\mathbf{v-(t,r)}$

Table S5: Structural-synthesis results for 3T1R parallel robots, part 2 of 4

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
15.3	4- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	RPUR	13	(t,r,p)-v, v-p; R.D.: v-(t,r)
...4	4- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	(nlP)	(t,r,p)-v; R.D.: v-(t,r,p)
16.1	4- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	14	R.D.: v-v
...2	4- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	RPRU		R.D.: v-v
...3	4- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	RPRU	(nlP)	R.D.: v-v
...4	4- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	(nlP)	R.D.: v-v
17.1	4- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	16	v-v
...2	4- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	RPRU		v-v
...3	4- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	RPRU	(nlP)	v-v
...4	4- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	(nlP)	v-v
18.1	4- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}$	—	18	R.D.: v-v
19.1	4- $\dot{R}\dot{R}\dot{P}\dot{R}$	—	3	R.D.: v-v
20.1	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	19	R.D.: (t,r)-v, v-(t,r,p)
...2	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	UPRR		R.D.: (t,r)-v, v-(t,r,p)
21.1	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	20	R.D.: (t,r)-v, v-(t,p)
...2	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RRPU		R.D.: (t,r)-v, v-(t,p)
22.1	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	21	(t,r,p)-v, v-(t,r,p)
...2	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	(t,r,p)-v, v-(t,r,p)
23.1	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	22	(t,r,p)-v, v-(t,r,p)
...2	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	(t,r,p)-v, v-(t,r,p)
24.1	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	24	(t,r)-v, v-(t,r); R.D.: v-p, p-v
25.1	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	25	R.D.: v-v
...2	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	UPU		R.D.: v-v
...3	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RRPU		R.D.: v-v
26.1	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	27	R.D.: v-v
...2	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RRPU		R.D.: v-v
...3	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	R.D.: v-v
27.1	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	28	v-v
...2	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	UPU		R.D.: v-v
...3	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RRPU		v-v
...4	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	UPU	(nlP)	R.D.: v-v
...5	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	RRPU	(nlP)	v-v

Table S5: Structural-synthesis results for 3T1R parallel robots, part 3 of 4

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
27.6	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	28	v-v
28.1	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	29	R.D.: v-v
...2	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	UPRR		R.D.: v-v
...3	4- $\dot{R}\dot{R}\dot{P}\dot{R}\dot{R}$	—	(nlP)	R.D.: v-v
29.1	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	—	33	R.D.: v-(t,r,p)
...2	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	URPR		R.D.: v-(t,r,p)
30.1	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	—	34	R.D.: (t,r,p)-v
...2	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	—	(nlP)	R.D.: (t,r,p)-v
31.1	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	—	36	v-(t,r,p), p-v; R.D.: (t,r)-v
...2	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	RUPR		v-(t,r,p); R.D.: (t,r,p)-v
...3	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	RUPR	(nlP)	v-(t,r,p), t-v; R.D.: (r,p)-v
...4	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	—	(nlP)	v-(t,r,p); R.D.: (t,r,p)-v
32.1	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	—	37	R.D.: v-v
...2	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	URPR		R.D.: v-v
...3	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	URPR	(nlP)	R.D.: v-v
...4	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	—	(nlP)	R.D.: v-v
33.1	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	—	38	v-v
...2	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	URPR		v-v
...3	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	URPR	(nlP)	v-v
...4	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	—	(nlP)	v-v
34.1	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	—	39	v-v
...2	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	URPR		v-v
...3	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	URPR	(nlP)	v-v
...4	4- $\dot{R}\dot{R}\dot{R}\dot{P}\dot{R}$	—	(nlP)	v-v
35.1	4- $\dot{R}\dot{R}\dot{R}\dot{R}\dot{R}$	—	45	(t,r,p)-v, v-(t,r,p)
...2	4- $\dot{R}\dot{R}\dot{R}\dot{R}\dot{R}$	—		(t,r,p)-v, v-(t,r,p)
...3	4- $\dot{R}\dot{R}\dot{R}\dot{R}\dot{R}$	—		(t,r,p)-v, v-(t,r,p)
...4	4- $\dot{R}\dot{R}\dot{R}\dot{R}\dot{R}$	—		R.D.: (t,r,p)-v, v-(t,r,p)
...5	4- $\dot{R}\dot{R}\dot{R}\dot{R}\dot{R}$	RRUR		(t,r,p)-v, v-(t,r,p)
...6	4- $\dot{R}\dot{R}\dot{R}\dot{R}\dot{R}$	RRUR		(t,r,p)-v, v-(t,r,p)
36.1	4- $\dot{R}\dot{R}\dot{R}\dot{R}\dot{R}$	—	46	R.D.: (t,r,p)-v, v-(t,r,p)
...2	4- $\dot{R}\dot{R}\dot{R}\dot{R}\dot{R}$	—		R.D.: (t,r,p)-v, v-(t,r,p)
...3	4- $\dot{R}\dot{R}\dot{R}\dot{R}\dot{R}$	—		(t,r,p)-v, v-(t,r,p)
...4	4- $\dot{R}\dot{R}\dot{R}\dot{R}\dot{R}$	—		(t,r,p)-v, v-(t,r,p)

Table S5: Structural-synthesis results for 3T1R parallel robots, part 4 of 4

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
36.5	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RURR	46	R.D.: (t,r,p)-v, v-(t,r,p)
...6	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RURR		(t,r,p)-v, v-(t,r,p)
37.1	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—	47	R.D.: v-v
...2	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		v-v
...3	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		v-v
...4	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		v-v
...5	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	URU		R.D.: v-v
...6	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRRU		R.D.: v-v
...7	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRRU		v-v
...8	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRRU		v-v
38.1	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—	48	v-v
...2	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		R.D.: v-v
...3	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		R.D.: v-v
...4	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		v-v
...5	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRUR		v-v
...6	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRUR		R.D.: v-v
39.1	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—	50	v-v
...2	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		v-v
...3	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		R.D.: v-v
...4	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	—		R.D.: v-v
...5	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RUU		v-v
...6	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRRU		v-v
...7	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRRU		v-v
...8	4- $\ddot{R}\ddot{R}\ddot{R}\ddot{R}$	RRRU		R.D.: v-v

4. 3T2R Parallel Robots

Table S6. Structural-synthesis results for 3T2R parallel robots, part 1 of 2

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
1.1 ...2	5- $\underline{P}$ RRRR 5- $\underline{P}$ RRRR	— PRRU	1	R.D.: (v,p)-p R.D.: (v,p)-p
2.1 ...2	5- $\underline{P}$ RRRR 5- $\underline{P}$ RRRR	— PRUR	2	(v,p)-p (v,p)-p
3.1 ...2	5- $\underline{P}$ RRRR 5- $\underline{P}$ RRRR	— PRUR	3	(t,p,v)-p; R.D.: r-p (t,p,v)-p; R.D.: r-p
4.1 ...2	5- $\underline{P}$ RRRR 5- $\underline{P}$ RRRR	— PURR	4	R.D.: (p,v)-p R.D.: (p,v)-p
5.1 ...2	5- $\underline{R}$ RRRR 5- $\underline{R}$ RRRR	— —	8 (nlP)	R.D.: (v,p)-p R.D.: v-p
6.1 ...2	5- $\underline{R}$ RRRR 5- $\underline{R}$ RRRR	— RPRU	9	R.D.: v-p R.D.: v-p
7.1 ...2	5- $\underline{R}$ RRRR 5- $\underline{R}$ RRRR	— RPUR	10	v-p v-p
8.1 ...2 ...3 ...4	5- $\underline{R}$ RRRR 5- $\underline{R}$ RRRR 5- $\underline{R}$ RRRR 5- $\underline{R}$ RRRR	— RPUR RPUR —	13 (nlP) (nlP)	(v,p)-p (v,p)-p (v,p)-p v-p
9.1 ...2	5-RRRR 5-RRRR	— UPRR	19	R.D.: (v,p)-p R.D.: (v,p)-p
10.1 ...2	5-RRRR 5-RRRR	— RRPU	20	R.D.: v-p R.D.: v-p
11.1 ...2	5-RRRR 5-RRRR	— —	21 (nlP)	(v,p)-p v-p
12.1 ...2	5-RRRR 5-RRRR	— —	22 (nlP)	(v,p)-p v-p
13.1 ...2	5-RRRR 5-RRRR	— —	23 (nlP)	(v,p)-p v-p
14.1	5-RRRR	—	24	(v,p)-p
15.1 ...2	5-RRRR 5-RRRR	— URPR	33	R.D.: (v,p)-p R.D.: (v,p)-p
16.1	5-RRRR	—	34	R.D.: (v,p)-p
17.1 ...2	5-RRRR 5-RRRR	— RUPR	36	p-p p-p

Table S6: Structural-synthesis results for 3T2R parallel robots, part 2 of 2

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
18.1	5- $\underline{R}RRR\underline{R}$	—	45	(v,p)-p
...2	5- $\underline{R}RRR\underline{R}$	—		(v,p)-p
...3	5- $\underline{R}RRR\underline{R}$	—		(v,p)-p
...4	5- $\underline{R}RR\underline{R}R$	—		R.D.: (v,p)-p
...5	5- $\underline{R}RRR\underline{R}$	RRUR		(v,p)-p
...6	5- $\underline{R}RRR\underline{R}$	RRUR		(v,p)-p
19.1	5- $\underline{R}RRR\underline{R}$	—	46	R.D.: (v,p)-p
...2	5- $\underline{R}RRR\underline{R}$	—		R.D.: (v,p)-p
...3	5- $\underline{R}RRR\underline{R}$	—		(v,p)-p
...4	5- $\underline{R}RR\underline{R}R$	—		(v,p)-p
...5	5- $\underline{R}RRR\underline{R}$	RURR		R.D.: (v,p)-p
...6	5- $\underline{R}RRR\underline{R}$	RURR		(v,p)-p

5. 3T3R Parallel Robots

Table S7. Structural-synthesis results for 3T3R parallel robots (part 1 of 11)

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
1.1	6- $\underline{\text{PR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	—	1	(v,t,r,c,V,T,C)-(r,R), (t,r,c,V,R,C)-t, (v,r,V,T,R,C)-c, (v,t,r,c,V,R,C)-T; R.D.: (t,c,p,v)-c, (t,r,c,T,R,C)-(v,V), (v,t,r,c,v)-p, (v,v)-t, v-(r,T,R)
...2	6- $\underline{\text{PR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	PURU		(v,t,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,C)-(r,R), (v,t,V,T,R,C)-c; R.D.: (r,c,p,v)-c, (p,v)-(r,R), (v,t,r,c,V,T,C,p,v)-p, v-(t,T), (t,r,c,T,R,C,p)-(v,V)
...3	6- $\underline{\text{PR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	PRRRU		(r,V,T,R,C)-c, (v,t,r,c,V,T,C)-(r,R), (t,r,c,V,R,C)-t, (v,t,r,c,V,R,C)-T; R.D.: (p,v)-(r,R), (v,t,c,p,v)-c, (v,t,r,c,V,T,C,p,v)-p, (v,v)-t, (t,r,c,T,R,C,p)-(v,V), v-T
2.1	6- $\underline{\text{PR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\dot{\text{R}}$	—	2	(v,t,r,c,v)-p, (v,t,r,c,V,T,R,C,v)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p,v)-c
...2	6- $\underline{\text{PR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\dot{\text{R}}$	PUUR		(v,t,r,c,V,T,R,C,p,v)-(v,t,r,V,T,R,p,c)
...3	6- $\underline{\text{PR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\dot{\text{R}}$	PRRUR		(v,t,r,c,V,T,R,C,p,v)-(v,t,r,V,T,R,p,c)
3.1	6- $\underline{\text{PRR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	—	3	(t,V,T,R,C,p,v)-c; R.D.: (v,c,V,C,v)-(v,V), (t,r,c,R,C)-(r,R), (t,r,c,T)-(t,T), (t,r,c)-p, (v,r,c)-c
4.1	6- $\underline{\text{PRR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	—	4	(v,t,r,c,v)-p, (v,t,r,c,V,T,R,C,v)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p,v)-c
...2	6- $\underline{\text{PRR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	PRUU		(v,t,r,c,V,T,R,C,p,v)-(v,t,r,V,T,R,p,c)
...3	6- $\underline{\text{PRR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	PRRRU		(v,t,r,c,V,T,R,C,p,v)-(v,t,r,V,T,R,p,c)
5.1	6- $\underline{\text{PRRR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	—	5	(v,t,r,c,v)-p, (v,t,r,c,V,T,R,C,v)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p,v)-c
6.1	6- $\underline{\text{PRRRRR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	—	6	(v,t,r,c,v)-p, (v,t,r,c,V,T,R,C,v)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p,v)-c
...2	6- $\underline{\text{PRRRRR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	PRRS		(v,t,r,c,V,T,R,C,p,v)-(v,V)
...3	6- $\underline{\text{PRRRRR}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	PUS		(v,t,r,c,V,T,R,C,p,v)-(v,V)
7.1	6- $\underline{\dot{\text{R}}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	—	7	(v,t,r,c)-p, (t,r,c,T,R,C)-(v,V), (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,C)-(r,R)
...2	6- $\underline{\dot{\text{R}}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	RPRUR		(v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C)-V, (t,r,c,T,R,C,p)-v; R.D.: p-V
...3	6- $\underline{\dot{\text{R}}}\ddot{\text{P}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\ddot{\text{R}}\text{R}$	—	(nlp)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)

Table S7: Structural-synthesis results for 3T3R parallel robots, part 2 of 11

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
7.4	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	RPRUR	7	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
8.1	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	—	8	(r,c,V,T,R,C,p)-c; R.D.: (c,C)-(v,V), (v,t)-c, (t,r,c,C)-(r,R), (t,r,c)-(t,T,p)
...2	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	RPURR		(V,T,R,C,p)-c; R.D.: (t,r,c,C)-(r,R,p), (v,t,r,c)-c, (c,C)-(v,V), (t,r,c)-(t,T)
...3	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	—	(nlP)	(V,T,R,C,p)-c; R.D.: (v,t,r,c)-c, (c,C)-(v,V), (t,r,c,T,R,C,p)-(t,r,T,R,p)
...4	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	RPURR	(nlP)	(r,V,T,R,C,p)-c; R.D.: (c,C)-(v,V), (t,r,c,T,R,C,p)-(t,r,T,R,p), (v,t,c)-c
9.1	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	—	9	(t,r,c,T,R,C)-c, (t,r,c,C)-(T,R), (t,R,C)-t, (c,T,C)-r; R.D.: (v,t,r,V)-r, (v,r,c,V)-t, (v,t,r,c)-p, (t,r,c,T,R,C)-(v,V), (v,V,R)-T, (v,V,T)-R, (v,V,p)-c
...2	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	RPRRU		(t,c,T,C)-r, (c,T,R,C)-c, (t,r,c,C)-(T,R), (t,R,C)-t; R.D.: (v,r,c,V)-t, (v,r,V,p)-r, (v,V,T,p)-R, (v,t,r,c,V,T,C,p)-p, (v,t,r,V,p)-c, (t,r,c,T,R,C,p)-(v,V), (v,V,R)-T
...3	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	—	(nlP)	(t,r,c,C)-T, (c,T,R,C)-r, (t,r,c,R,C)-R, (r,c,T,R,C)-c, (t,r,c,T,R,C)-t; R.D.: (v,t,V,p)-c, (v,V,T,p)-R, (v,t,r,V,p)-r, (v,V,T,R,p)-T, (v,t,r,c,V,T,R,C,p)-p, (t,r,c,T,R,C,p)-(v,V), (v,V,p)-t
...4	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	RPRRU	(nlP)	(t,c,T,R,C)-(t,r), (t,r,c,R,C)-T, (t,r,T,R,C)-c, (t,r,c,T,R,C)-R; R.D.: (v,V,T,p)-T, (v,c,V,p)-c, (v,t,r,c,V,T,R,C,p)-p, (t,r,c,T,R,C,p)-(v,V), (v,r,V,p)-(t,r), (v,V,p)-R
10.1	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	—	10	(v,t,r,c)-p, (t,r,c,T,R,C)-(v,V), (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,C)-(r,R)
...2	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	RPRUR		(v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V)
...3	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
...4	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	RPRUR	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
11.1	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	—	11	(v,t,r,c)-p, (t,r,c,T,R,C)-(v,V), (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,C)-(r,R)
...2	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	RPRUR		(v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V)
...3	6- $\dot{R}\dot{P}\dot{R}\dot{R}\dot{R}\dot{R}$	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)

Table S7: Structural-synthesis results for 3T3R parallel robots, part 3 of 11

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
11.4	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	RPRUR	11	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
12.1	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	—	12	(r,V,T,R,C,p)-c; R.D.: (v,t,r,c)-p, (t,r,c,T,R,C)-(v,V), (v,t,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,C)-(r,R), (v,t,c)-c
...2	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	RPURR		(c,V,T,R,C,p)-c; R.D.: (v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V), (v,t,r)-c
...3	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	—	(nlP)	(v,V,T,R,C,p)-c; R.D.: (v,t,r,c,V,T,R,C,p)-(t,r,T,R,p), (t,r,c,T,R,C,p)-(v,V), (t,r,c)-c
...4	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	RPURR	(nlP)	(r,c,V,T,R,C,p)-c; R.D.: (v,t,r,c,V,T,R,C,p)-(t,r,T,R,p), (v,t)-c, (t,r,c,T,R,C,p)-(v,V)
13.1	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	—	13	(v,t,r,c)-p, (v,t,r,c,V,T,R,C)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p)-c
...2	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	RPUU		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...3	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	RPRRU		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...4	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...5	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	RPUU	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...6	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	RPRRU	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
14.1	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	—	14	(v,t,r,c)-p, (v,t,r,c,V,T,R,C)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p)-c
...2	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
15.1	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	—	15	(v,t,r,c)-p, (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,T,R,C)-(t,r,T,R), (v,t,r,c,T,R,C)-(v,V)
...2	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	RPRS		(v,t,r,c,T,R,C,p)-(v,V)
...3	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...4	6-R $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	RPRS	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,V)
16.1	6-R $\ddot{R}$ $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	—	16	(t,r,R,C)-t, (t,C)-T, (r,C)-R, (T,R,C)-c, C-r; R.D.: (v,t,r,c)-p, (v,r)-r, (v,R)-T, (R,C)-V, v-(t,R), (v,t,r,c,V,p)-c, (r,R,C)-v
...2	6-R $\ddot{R}$ $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	UPRU		(t,C)-T, (r,C)-R, (t,r,c,T,R,C)-c, (t,R,C)-t, C-r; R.D.: (r,R,C,p)-v, (v,r,T,C,p)-p, (v,r)-t, (v,R)-T, (v,p)-R, (v,r,p)-r, (v,V,p)-c, (R,C,p)-V
...3	6-R $\ddot{R}$ $\underline{P}$ R $\ddot{R}$ R $\ddot{R}$	RRPRU		(t,r,R,C)-t, (t,r,T,R,C)-c, (r,C)-R, (t,R,C)-T, C-r; R.D.: (r,R,C,p)-v, (v,c,V,p)-c, (v,r,T,C,p)-p, (v,p)-R, v-(t,T), (v,r,p)-r, (R,C,p)-V

Table S7: Structural-synthesis results for 3T3R parallel robots, part 4 of 11

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
17.1	6-RR̄P̄RR̄R̄	—	17	(v,t,r,c)-p, (v,t,R,C)-T, (v,t,r,R,C)-t, (v,t,r,c,V,T,R,C,p)-c, (v,r,C)-(r,R), (R,C)-V, (r,R,C)-v
...2	6-RR̄P̄RR̄R̄	UPUR		(v,t,R,C)-T, (r,R,C,p)-v, (v,t,r,R,C)-t, (v,r,T,C,p)-p, (v,t,r,c,V,T,R,C,p)-c, (v,r,C,p)-(r,R), (R,C,p)-V
...3	6-RR̄P̄RR̄R̄	RRPUR		(v,t,R,C)-T, (r,R,C,p)-v, (v,t,r,R,C)-t, (v,r,T,C,p)-p, (v,t,r,c,V,T,R,C,p)-c, (v,r,C,p)-(r,R), (R,C,p)-V
18.1	6-RR̄P̄RR̄R̄	—	18	(v,t,r,c)-p, (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,T,R,C)-(t,r,T,R), (t,r,c,V,T,R,C)-(v,V)
...2	6-RR̄P̄RR̄R̄	RRPRU		(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,V,T,R,C,p)-(v,V)
...3	6-RR̄P̄RR̄R̄	UPRU		(v,t,r,c,V,T,R,C,p)-(t,r,T,p,c), (v,t,r,c,V,R,C,p)-R, (t,r,c,V,T,R,C,p)-(v,V)
...4	6-RR̄P̄RR̄R̄	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...5	6-RR̄P̄RR̄R̄	RRPRU	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...6	6-RR̄P̄RR̄R̄	UPRU	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
19.1	6-RR̄P̄RR̄R̄	—	19	(v,t,r,c)-p, (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,T,R,C)-(t,r,T,R), (t,r,c,V,T,R,C)-(v,V)
...2	6-RR̄P̄RR̄R̄	RRPUR		(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,V,T,R,C,p)-(v,V)
...3	6-RR̄P̄RR̄R̄	UPUR		(v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V)
...4	6-RR̄P̄RR̄R̄	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...5	6-RR̄P̄RR̄R̄	RRPUR	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...6	6-RR̄P̄RR̄R̄	UPUR	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
20.1	6-RR̄P̄RR̄R̄	—	20	(v,t,r,c)-p, (t,r,c,T,R,C)-(v,V), (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,C)-(r,R)
...2	6-RR̄P̄RR̄R̄	UPUR		(v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V)
...3	6-RR̄P̄RR̄R̄	RRPUR		(v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V)
...4	6-RR̄P̄RR̄R̄	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
...5	6-RR̄P̄RR̄R̄	UPUR	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
...6	6-RR̄P̄RR̄R̄	RRPUR	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
21.1	6-RR̄P̄RR̄R̄	—	21	(V,T,R,C,p)-c; R.D.: (t,r,c,T,R,C)-(v,V), (v,t,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,C)-(r,R), (v,t,r,c)-(p,c)

Table S7: Structural-synthesis results for 3T3R parallel robots, part 5 of 11

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
21.2	6-RRP ₁ RR ₂ RR ₃	UPRRR	21	(V,T,R,C)-c; R.D.: (v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,p)-c, (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V)
...3	6-RRP ₁ RR ₂ RR ₃	—	(nlP)	(V,T,R,C,p)-c; R.D.: (v,t,r,c)-c, (v,t,r,c,V,T,R,C,p)-(t,r,T,R,p), (t,r,c,T,R,C,p)-(v,V)
...4	6-RRP ₁ RR ₂ RR ₃	UPRRR	(nlP)	(V,T,R,C)-c; R.D.: (v,t,r,c,V,T,R,C,p)-(t,r,T,R,p), (v,t,r,c,p)-c, (t,r,c,T,R,C,p)-(v,V)
22.1	6-RRP ₁ RR ₂ RR ₃	—	22	(v,t,r,c)-p, (v,t,r,c,V,T,R,C)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p)-c
...2	6-RRP ₁ RR ₂ RR ₃	RRPRU		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...3	6-RRP ₁ RR ₂ RR ₃	UPRU		(V,T,R,C)-(v,t,r,p), (v,t,r,c,V,T,R,C,p)-(V,T,R,c); R.D.: (v,t,r,c,p)-(v,t,r,p)
...4	6-RRP ₁ RR ₂ RR ₃	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...5	6-RRP ₁ RR ₂ RR ₃	RRPRU	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...6	6-RRP ₁ RR ₂ RR ₃	UPRU	(nlP)	(v,t,r,c,V,T,R,C,p)-(V,T,R), (V,T,R,C)-(v,t,r,p,c); R.D.: (v,t,r,c,p)-(v,t,r,p,c)
23.1	6-RRP ₁ RR ₂ RR ₃	—	23	(v,t,r,c)-p, (t,r,c,T,R,C)-(v,V), (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,C)-(r,R)
...2	6-RRP ₁ RR ₂ RR ₃	RRPUR		(v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V)
...3	6-RRP ₁ RR ₂ RR ₃	UPUR		(r,R,C,p)-v, (v,r,T,C,p)-p, (v,t,r,c,V,T,R,C,p)-c, (v,t,R,C)-(t,T), (v,r,C,p)-(r,R), (R,C,p)-V
...4	6-RRP ₁ RR ₂ RR ₃	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
...5	6-RRP ₁ RR ₂ RR ₃	RRPUR	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
24.1	6-RRP ₁ RR ₂ RR ₃	—	24	(v,t,r,c)-p, (v,t,r,c,V,T,R,C)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p)-c
...2	6-RRP ₁ RR ₂ RR ₃	RRPRU		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...3	6-RRP ₁ RR ₂ RR ₃	UPRU		(v,t,r,c,V,R,C,p)-R, (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,p,c)
...4	6-RRP ₁ RR ₂ RR ₃	RRPRU	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...5	6-RRP ₁ RR ₂ RR ₃	UPRU	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...6	6-RRP ₁ RR ₂ RR ₃	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
25.1	6-RRP ₁ RR ₂ RR ₃	—	25	(v,t,r,c)-p, (v,t,r,c,V,T,R,C)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p)-c

Table S7: Structural-synthesis results for 3T3R parallel robots, part 6 of 11

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
25.2	6-RRP $\overline{R}$ R $\overline{R}$	RRPUR	25	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...3	6-RRP $\overline{R}$ R $\overline{R}$	UPUR		(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
...4	6-RRP $\overline{R}$ R $\overline{R}$	RRPUR	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...5	6-RRP $\overline{R}$ R $\overline{R}$	UPUR	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
...6	6-RRP $\overline{R}$ R $\overline{R}$	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
26.1	6-RRP $\overline{R}$ RR	—	26	(v,t,r,c)-p, (v,t,r,c,V,T,R,C)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p)-c
...2	6-RRP $\overline{R}$ RR	RRPS		(v,t,r,c,V,T,R,C,p)-(v,V)
...3	6-RRP $\overline{R}$ RR	UPS		(V,T,R,C)-v, (v,t,r,c,V,T,R,C,p)-V; R.D.: (v,t,r,c,p)-v
...4	6-RRP $\overline{R}$ RR	RRPS	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,V)
...5	6-RRP $\overline{R}$ RR	UPS	(nlP)	(V,T,R,C)-v, (v,t,r,c,V,T,R,C,p)-V; R.D.: (v,t,r,c,p)-v
...6	6-RRP $\overline{R}$ RR	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
27.1	6-R $\overline{R}$ $\overline{R}$ $\overline{P}$ $\overline{R}$ R	—	27	(t,r,c,T,R,C)-c, (r,R,C)-t, C-(r,T,R); R.D.: (v,R)-T, (R,C)-V, (r,R,C)-v, (v,V,p)-c, v-(t,r,R)
...2	6-R $\overline{R}$ $\overline{R}$ $\overline{P}$ $\overline{R}$ R	URPU		(R,C)-t, (t,r,c,T,R,C)-c, C-(r,T,R); R.D.: (r,R,C,p)-v, (v,T,C,p)-p, (v,p)-(r,R), (v,r)-t, (v,R)-T, (v,V,p)-c, (R,C,p)-V
...3	6-R $\overline{R}$ $\overline{R}$ $\overline{P}$ $\overline{R}$ R	RRRPU		(r,c,T,R,C)-c, (r,R,C)-t, C-(r,T,R); R.D.: (v,t,V,p)-c, (r,R,C,p)-v, (v,T,C,p)-p, (v,p)-(r,R), (v,R)-T, (R,C,p)-V, v-t
28.1	6-R $\overline{R}$ $\overline{R}$ $\overline{P}$ $\overline{R}$ $\overline{R}$	—	28	(t,r,c,T,R,C)-(v,V), (v,r,c,V,R,C)-(t,T), (v,t,c,V,T,C)-(r,R), (v,t,r,c,V,T,R,C,p)-c
...2	6-R $\overline{R}$ $\overline{R}$ $\overline{P}$ $\overline{R}$ $\overline{R}$	URPRR		(v,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,R,C,p)-c, (t,r,c,T,R,C,p)-(v,V), (v,t,c,V,T,C,p)-(r,R,p)
...3	6-R $\overline{R}$ $\overline{R}$ $\overline{P}$ $\overline{R}$ $\overline{R}$	URPRR	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
...4	6-R $\overline{R}$ $\overline{R}$ $\overline{P}$ $\overline{R}$ $\overline{R}$	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
29.1	6-R $\overline{R}$ $\overline{R}$ $\overline{P}$ $\overline{R}$ $\overline{R}$	—	29	(t,r,c,T,R,C)-(v,V), (v,r,c,V,R,C)-(t,T), (v,t,c,V,T,C)-(r,R), (v,t,r,c,V,T,R,C,p)-c
...2	6-R $\overline{R}$ $\overline{R}$ $\overline{P}$ $\overline{R}$ $\overline{R}$	URPRR		(v,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,R,C,p)-c, (t,r,c,T,R,C,p)-(v,V), (v,t,c,V,T,C,p)-(r,R,p)
...3	6-R $\overline{R}$ $\overline{R}$ $\overline{P}$ $\overline{R}$ $\overline{R}$	URPRR	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
...4	6-R $\overline{R}$ $\overline{R}$ $\overline{P}$ $\overline{R}$ $\overline{R}$	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
30.1	6-R $\overline{R}$ $\overline{R}$ $\overline{P}$ $\overline{R}$ $\overline{R}$	—	30	(t,r,c,T,R,C)-(v,V), (v,r,c,V,R,C)-(t,T), (v,t,c,V,T,C)-(r,R), (v,t,r,c,V,T,R,C,p)-c

Table S7: Structural-synthesis results for 3T3R parallel robots, part 7 of 11

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
30.2	6-RR $\dot{R}$ $\dot{P}$ RR	URPRR	30	(v,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,R,C,p)-c, (t,r,c,T,R,C,p)-(v,V), (v,t,c,V,T,C,p)-(r,R,p)
...3	6-RR $\dot{R}$ $\dot{P}$ RR	URPRR	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
...4	6-RR $\dot{R}$ $\dot{P}$ RR	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,c), (v,t,r,c,V,T,R,C)-p, (t,r,c,T,R,C)-V, (t,r,c,T,R,C,p)-v; R.D.: p-(V,p)
31.1	6-RR $\dot{R}$ $\dot{P}$ RR	—	31	(c,V,T,R,C,p)-c; R.D.: (v,r,R,C)-t, (v,C)-(r,R), (R,C)-V, (v,t,r)-c, (r,R,C)-v, (v,R,C)-T
...2	6-RR $\dot{R}$ $\dot{P}$ RR	SPRR		V-c; R.D.: v-(t,r,T,R,p,c)
32.1	6-RR $\dot{R}$ $\dot{P}$ RR	—	32	(v,r,R,C)-t, (v,t,r,c,V,T,R,C,p)-c, (R,C)-V, (v,R,C)-(r,T,R), (r,R,C)-v
...2	6-RR $\dot{R}$ $\dot{P}$ RR	RUPU		(v,R,C,p)-(r,T,R), (r,R,C,p)-v, (v,r,R,C,p)-t, (v,T,R,C,p)-p, (v,t,r,c,V,T,R,C,p)-c, (R,C,p)-V
...3	6-RR $\dot{R}$ $\dot{P}$ RR	RRRPU		(v,R,C,p)-(r,T,R), (r,R,C,p)-v, (v,r,R,C,p)-t, (v,T,R,C,p)-p, (v,t,r,c,V,T,R,C,p)-c, (R,C,p)-V
...4	6-RR $\dot{R}$ $\dot{P}$ RR	SPU		V-(v,t,r,p,c), (v,V)-(V,T,R); R.D.: v-(v,t,r,p,c)
33.1	6-RR $\dot{R}$ $\dot{P}$ RR	—	33	(t,r,c,T,R,C)-(v,V), (v,r,c,V,R,C)-(t,T), (v,t,c,V,T,C)-(r,R), (v,t,r,c,V,T,R,C,p)-c
...2	6-RR $\dot{R}$ $\dot{P}$ RR	RUPRR		(v,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,R,C,p)-c, (t,r,c,T,R,C,p)-(v,V), (v,t,c,V,T,C,p)-(r,R,p)
...3	6-RR $\dot{R}$ $\dot{P}$ RR	RUPRR	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
...4	6-RR $\dot{R}$ $\dot{P}$ RR	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
34.1	6-RR $\dot{R}$ $\dot{P}$ RR	—	34	(v,t,r,c,V,T,R,C)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p)-c
...2	6-RR $\dot{R}$ $\dot{P}$ RR	RRRPU		(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (v,t,r,c,T,R,C,p)-(v,V)
...3	6-RR $\dot{R}$ $\dot{P}$ RR	RUPU		(v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (v,t,r,c,T,R,C,p)-(v,V)
...4	6-RR $\dot{R}$ $\dot{P}$ RR	URPU		(V,T,R,C)-(t,r,p), (v,t,r,c,V,T,R,C,p)-(V,T,R,c), (T,R,C)-v; R.D.: (v,t,r,c,p)-(v,t,r,p)
...5	6-RR $\dot{R}$ $\dot{P}$ RR	SPU		V-(v,t,r,p,c), (v,V)-(V,T,R); R.D.: v-(v,t,r,p,c)
...6	6-RR $\dot{R}$ $\dot{P}$ RR	RRRPU	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...7	6-RR $\dot{R}$ $\dot{P}$ RR	RUPU	(nlP)	(t,r,c,V,T,R,C,p)-c, (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p); R.D.: v-c
...8	6-RR $\dot{R}$ $\dot{P}$ RR	URPU	(nlP)	(v,t,r,c,V,T,R,C,p)-(V,T,R), (V,T,R,C)-(v,t,r,p,c); R.D.: (v,t,r,c,p)-(v,t,r,p,c)

Table S7: Structural-synthesis results for 3T3R parallel robots, part 8 of 11

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
34.9 ...10	6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR	SPU —	34 (nlP)	V-(v,t,r,p,c), (v,V)-(V,T,R); R.D.: v-(v,t,r,p,c) (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
35.1 ...2 ...3 ...4 ...5 ...6	6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR	— RUPU RRRPU RUPU RRRPU —	35 (nlP) (nlP) (nlP)	(v,t,r,c,V,T,R,C)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p)-c (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c) (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c) (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c) (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c) (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
36.1 ...2 ...3 ...4 ...5	6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR	— RUPRR SPRR RUPRR —	36 (nlP) (nlP)	(v,t,r,c,V,T,R,C)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p)-c (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c) V-c; R.D.: v-(t,r,T,R,p,c) (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c) (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
37.1 ...2 ...3 ...4 ...5 ...6 ...7 ...8	6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR	— RRRPU RUPU URPU RRRPU RUPU URPU —	37 (nlP) (nlP) (nlP) (nlP)	(v,t,r,c,V,T,R,C)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p)-c (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c) (v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V) (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c) (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c) (v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V) (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c) (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
38.1 ...2 ...3 ...4	6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR	— RUPRR RUPRR —	38 (nlP) (nlP)	(t,r,c,T,R,C)-(v,V), (v,r,c,V,R,C)-(t,T), (v,t,c,V,T,C)-(r,R), (v,t,r,c,V,T,R,C,p)-c (v,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,R,C,p)-c, (t,r,c,T,R,C,p)-(v,V), (v,t,c,V,T,C,p)-(r,R,p) (v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V) (v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V)
39.1 ...2 ...3 ...4 ...5	6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR 6-RRR $\dot{P}$ RR	— RRRPU RUPU URPU RRRPU	39 (nlP)	(v,t,r,c,V,T,R,C)-(v,t,r,V,T,R), (v,t,r,c,V,T,R,C,p)-c (v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,V,T,R,C,p)-(v,V) (v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,V,T,R,C,p)-(v,V) (v,t,r,c,V,T,R,C,p)-(t,r,T,R,p,c), (t,r,c,T,R,C,p)-(v,V) (v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)

Table S7: Structural-synthesis results for 3T3R parallel robots, part 9 of 11

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
39.6	6-RRRPRR	RUPU	39	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...7	6-RRRPRR	URPU	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
...8	6-RRRPRR	—	(nlP)	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p,c)
40.1	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	—	40	R.D.: (v,t,r,c)-p, (t,r,c,T,R,C)-(v,V), (v,t,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,C)-(r,R), (t,r,c)-c
...2	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	—		(v,t,r,c)-(r,T,R,p), (t,r,c)-(t,c), (t,r,c,C)-(v,V)
...3	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	—		(v,t,r,c)-(r,T,R,p), (t,r,c)-(t,c), (t,r,c,C)-(v,V)
...4	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	—		C-(v,V)
...5	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	URUR		(v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V), (t,r,c)-c
...6	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	RRRUR		R.D.: (v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V), (t,r,c)-c
...7	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	RRRUR		(v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V), (t,r,c)-c
...8	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	RRRUR		(v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V), (t,r,c)-c
41.1	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	—	41	R.D.: (v,t,r,c)-p, (t,r,c,T,R,C)-(v,V), (v,t,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,C)-(r,R), (t,r,c)-c
...2	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	—		(t,r,c)-c; R.D.: (v,t,r,c)-(r,T,R,p), (t,r,c,C)-(v,V), (t,r,c)-t
...3	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	—		(t,r,c)-c; R.D.: (v,t,r,c)-(r,T,R,p), (t,r,c,C)-(v,V), (t,r,c)-t
...4	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	—		C-(v,V)
...5	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	RRURR		R.D.: (v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V), (t,r,c)-c
...6	6-R $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	RRURR		(t,r,c)-c; R.D.: (v,t,r,c,V,T,C,p)-(r,R,p), (v,t,r,c,V,R,C)-(t,T), (t,r,c,T,R,C,p)-(v,V)
42.1	6-RR $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	—	42	(v,t,r,c,V,T,R,C)-t, (v,t,r,c,V,T,R,C,p)-(r,T,R), (t,r,c)-c; R.D.: (v,t,r,c,V,T,R,C)-V, (v,t,r,c,T,R,C,p)-v, (v,t,r,c,p)-p
...2	6-RR $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	—		(v,t,r,c)-(r,T,R), (t,r,c)-(t,c); R.D.: (v,t,r,c,C)-(v,V), (v,t,r,c)-p
...3	6-RR $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	—		(v,t,r,c,C)-(v,V), (v,t,r,c)-(r,T,R,p), (t,r,c)-(t,c)
...4	6-RR $\overline{R}\overline{R}\overline{R}\overline{R}\overline{R}$	—		(v,C)-(v,V)

Table S7: Structural-synthesis results for 3T3R parallel robots, part 10 of 11

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
42.5	6- <u>RRR</u> <u>RR</u> RR	RURU	42	(v,t,r,c,V,T,R,C,p)-(t,r,T,R), (t,r,c)-c; R.D.: (v,t,r,c,V,T,R,C,p)-(V,p), (v,t,r,c,T,R,C,p)-v
...6	6-RR <u>RR</u> <u>RR</u> RR	RURU		(v,t,r,c,T,R,C,p)-v, (v,t,r,c,V,T,R,C,p)-(t,r,V,T,R,p)
...7	6- <u>RRR</u> <u>RR</u> RR	RRRRU		(v,t,r,c,V,T,R,C,p)-(t,r,T,R), (t,r,c)-c; R.D.: (v,t,r,c,V,T,R,C,p)-(v,V,p)
...8	6-RR <u>RR</u> <u>RR</u> RR	RRRRU		(v,t,r,c,V,T,R,C,p)-(t,r,T,R), (t,r,c)-c; R.D.: (v,t,r,c,V,T,R,C,p)-(v,V,p)
...9	6-RR <u>RR</u> <u>RR</u> RR	RRRRU		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p), (t,r,c)-c
...10	6-RR <u>RR</u> <u>RR</u> RR	RRRRU		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p)
...11	6- <u>RRR</u> <u>RR</u> <u>RR</u> RR	SRU		V-(v,t,r,p), (v,V)-(V,T,R); R.D.: v-(v,t,r,p)
43.1	6- <u>RRR</u> <u>RR</u> <u>RR</u> RR	—	43	(v,t,r,c,V,T,R,C)-(r,V,T), (v,t,r,c,V,T,R,C,p)-(v,t,R), (v,t,r,c,C,p)-p, (t,r,c)-c
...2	6-RR <u>RR</u> <u>RR</u> RR	—		(v,t,r,c,C)-(v,V), (v,t,r,c)-(r,T,R,p), (t,r,c)-(t,c)
...3	6-RR <u>RR</u> <u>RR</u> RR	—		(v,t,r,c,C)-(v,V), (v,t,r,c)-(r,T,R,p), (t,r,c)-(t,c)
...4	6-RR <u>RR</u> <u>RR</u> RR	—		(v,C)-(v,V)
...5	6- <u>RRR</u> <u>RR</u> <u>RR</u> RR	RUUR		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p), (t,r,c)-c
...6	6- <u>RRR</u> <u>RR</u> <u>RR</u> RR	RRRUR		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p), (t,r,c)-c
...7	6- <u>RRR</u> <u>RR</u> <u>RR</u> RR	RRRUR		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p), (t,r,c)-c
...8	6- <u>RRR</u> <u>RR</u> <u>RR</u> RR	RRRUR		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p), (t,r,c)-c
44.1	6- <u>RRR</u> <u>RR</u> <u>RR</u> RR	—	44	(t,r,c)-c; R.D.: (v,t,r,c)-p, (t,r,c,T,R,C)-(v,V), (v,t,r,c,V,R,C)-(t,T), (v,t,r,c,V,T,C)-(r,R)
...2	6-RR <u>RR</u> <u>RR</u> RR	—		(t,r,c)-c; R.D.: (v,t,r,c)-(r,T,R,p), (t,r,c,C)-(v,V), (t,r,c)-t
...3	6-RR <u>RR</u> <u>RR</u> RR	—		(t,r,c)-c; R.D.: (v,t,r,c)-(r,T,R,p), (t,r,c,C)-(v,V), (t,r,c)-t
...4	6-RR <u>RR</u> <u>RR</u> RR	—		C-(v,V)
45.1	6- <u>RRR</u> <u>RR</u> <u>RR</u> RR	—	45	(v,t,r,c,C,p)-p, (v,t,r,c,V,T,R,C,p)-(v,t,r,T), (t,r,c)-c, (v,t,r,c,V,T,R,C)-(V,R)
...2	6-RR <u>RR</u> <u>RR</u> RR	—		(v,t,r,c,C)-(v,V), (v,t,r,c)-(r,T,R,p), (t,r,c)-(t,c)
...3	6-RR <u>RR</u> <u>RR</u> RR	—		(v,t,r,c,C)-(v,V), (v,t,r,c)-(r,T,R,p), (t,r,c)-(t,c)
...4	6-RR <u>RR</u> <u>RR</u> RR	—		(v,C)-(v,V)
...5	6- <u>RRR</u> <u>RR</u> <u>RR</u> RR	RRUU		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p), (t,r,c)-c
...6	6- <u>RRR</u> <u>RR</u> <u>RR</u> RR	RRUU		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p), (t,r,c)-c

Table S7: Structural-synthesis results for 3T3R parallel robots, part 11 of 11

PR#	Structure	Joints	Leg#	Alignment and Rank Deficiency
45.7	6- <u>RRR</u> $\ddot{R}\ddot{R}$	RRRRU	45	(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p), (t,r,c)-c
...8	6- <u>RRR</u> $\ddot{R}\ddot{R}$	RRRRU		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p), (t,r,c)-c
...9	6- <u>RRR</u> $\ddot{R}\ddot{R}$	RRRRU		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p), (t,r,c)-c
...10	6- <u>RRR</u> $\ddot{R}\ddot{R}$	RRRRU		(v,t,r,c,V,T,R,C,p)-(v,t,r,V,T,R,p)
...11	6- <u>RRR</u> $\ddot{R}\ddot{R}$	SRU		V-(v,t,r,p), (v,V)-(V,T,R); R.D.: v-(v,t,r,p)
46.1	6- <u>RRRR</u> $\ddot{R}\ddot{R}$	—	46	(v,t,r,c,C,p)-p, (v,t,r,c,V,T,R,C,p)-(v,r,T,R), (t,r,c)-c, (v,t,r,c,V,T,R,C)-(t,V)
...2	6- <u>RRRR</u> $\ddot{R}\ddot{R}$	—		(v,t,r,c,C)-(v,V), (v,t,r,c)-(r,T,R,p), (t,r,c)-(t,c)
...3	6- <u>RRRR</u> $\ddot{R}\ddot{R}$	—		(v,t,r,c,C)-(v,V), (v,t,r,c)-(r,T,R,p), (t,r,c)-(t,c)
...4	6- <u>RRRR</u> $\ddot{R}\ddot{R}$	—		(v,C)-(v,V)
47.1	6- <u>RRRRRR</u>	—	47	(v,t,r,c,V,T,R,C,p)-(v,t,r,T,R), (v,t,r,c,V,T,R,C)-V, (v,t,r,c,C,p)-p, (t,r,c)-c
...2	6- <u>RRRRRR</u>	—		(t,r,c,C)-v, (v,t,r,c,C)-V, (v,t,r,c)-(r,T,R,p), (t,r,c)-(t,c); R.D.: v-v
...3	6- <u>RRRRRR</u>	—		(t,r,c,C)-v, (v,t,r,c,C)-V, (v,t,r,c)-(r,T,R,p), (t,r,c)-(t,c); R.D.: v-v
...4	6- <u>RRRRRR</u>	—		(v,C)-V, C-v; R.D.: v-v
...5	6- <u>RRRRRR</u>	RRRS		(v,t,r,c,V,T,R,C,p)-(v,V)
...6	6- <u>RRRRRR</u>	RRRS		(v,t,r,c,V,T,R,C,p)-(v,V)
...7	6- <u>RRRRRR</u>	RRRS		(v,t,r,c,V,T,R,C,p)-(v,V)
...8	6- <u>RRRRRR</u>	RUS		(v,t,r,c,V,T,R,C,p)-(v,V)
...9	6- <u>RRRRRR</u>	URS		(V,T,R,C)-v, (t,r,c,V,T,R,C,p)-V; R.D.: (t,r,c,p)-v

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