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1 // p_l15.h - include file that contains parameters of the robot LOLA15
2
3 #include "errs.h"
4 #include "all_funcs.h"
5 #define t_inter 0.005 // interpolation cycle
6 #include <math.h>
7 #define M_PI 3.14159265358979323846
8 #define M_PI_2 (M_PI/2.)
9 #define krad (M_PI/180.) /* 0.0174532925199433 */
10
11 /* Coefficients needed for conversions increments into radians and vice versa */
12 #define r_kaisa4 (24./14.)
13 #define r_kaisa5 (24./14.)
14 #define r_konz5 1.6
15 #define r_konz6 1.6
16 #define r_hd4 78.
17 #define r_hd5 120.
18 #define r_hd6 50.
19 #define r_cilz5 (100./150.)
20 #define r_cilz6 (100./150.)
21 #define r_konz6e 1.
22
23 #define r1 120.
24 #define r2 119.
25 #define r3 119.
26 #define r4 (r_kaisa4*r_hd4) /* 133.7142857 */
27 #define r5 (r_kaisa5*r_konz5*r_hd5*r_cilz5) /* 219.4285714 */
28 #define r6 (r_konz6*r_hd6*r_cilz6*r_konz6e) /* 53.33333333 */
29 #define r54 (r_kaisa4)
30 #define r64 (-1.0)
31 #define r65 (r6)
32
33 #define k1_15 (M_PI/(r1*2000.))
34 #define k2_15 (M_PI/(r2*2000.))
35 #define k3_15 (M_PI/(r3*2000.))
36 #define k4_15 (M_PI/(r4*1000.))
37 #define k5_15 (M_PI/(r5*1000.))
38 #define k6_15 (M_PI/(r6*1000.))
39
40 #define is1_15 (1.0/k1_15)
41 #define is2_15 (1.0/k2_15)
42 #define is3_15 (1.0/k3_15)
43 #define is4_15 (1.0/k4_15)
44 #define is5_15 (1.0/k5_15)
45 #define is6_15 (1.0/k6_15)
46
47 #define is54_15 (r54*1000./M_PI)
48 #define is65_15 (r65*1000./M_PI)
49 #define is64_15 (r64*1000./M_PI)
50 #define k54_15 (-is54_15/(is4_15*is5_15))
51 #define k645_15 (is54_15*is65_15/(is4_15*is5_15*is6_15))
52 #define k646_15 (-is64_15/(is4_15*is6_15))
53 #define k64_15 (k645_15+k646_15)
54 #define k65_15 (-is65_15/(is5_15*is6_15))
55
56 #define sp54_15 (is54_15*k4_15)
57 #define sp65_15 (is65_15*k5_15)
58 #define sp64_15 ((is64_15-is65_15*is54_15*k5_15)*k4_15)
59 #define sp_15 (sp65_15*sp54_15+sp64_15)
60
61 /* Lengths of the robot links */
62 #define a1_15 200.
63 #define aa2_15 600.
64 #define a3_15 115.
65 #define d4_15 825.
66 #define a1_15_d 0.2
67 #define aa2_15_d 0.6
68 #define a3_15_d 0.115
69 #define d4_15_d 0.825
70
71 /* End effector parameters */

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72 #define dist_6_m_15 105.0
73 #define TOOL_X_15 0.0
74 #define TOOL_Y_15 0.0
75 #define TOOL_Z_15 205.0 /* 70.0 mm */
76 #define TOOL_A_15 0.0 /* degrees */
77 #define TOOL_B_15 0.0
78 #define TOOL_C_15 0.0
79 #define TOOL_L_15 (sqrt(TOOL_X_15*TOOL_X_15+TOOL_Y_15*TOOL_Y_15
+ (TOOL_Z_15+dist_6_m_15)*(TOOL_Z_15+dist_6_m_15)))
80
81 /* Coordinate system USER-a with regard to coordinate system BASE */
82 #define USER_X_15 1000.0
83 #define USER_Y_15 0.0
84 #define USER_Z_15 500.0 /* mm */
85 #define USER_A_15 0.0 /* degrees */
86 #define USER_B_15 0.0
87 #define USER_C_15 0.0
88
89 /* Lengths needed to check if the end effector is in the working space */
90 #define dis1_15 3.0 /* 313600.0 */
91 #define dis2_15 3802500.0
92
93 #define e1_15 1053850. /* a2^2 + a3^2 + d4^2 */
94 #define e2_15 0.00000100042827497215380234372049 /* 1/(2*a2*sqrt(a3^2+d4^2) */
95 #define beta_15 0.13850148191590443650 /* atan(a3/d4) */
96
97 /* Maximal angular velocities and
98 * maximal angular accelerations of the robot links, nm*2*pi/(60*r), [radians/s] */
99 #define omm1_15 3.054326323 /* nmax=3150 */
100 #define omm2_15 2.463994238 /* nmax=2800 */
101 #define omm3_15 3.079992798 /* nmax=3150 */
102 #define omm4_15 2.66274591 /* nmax motora=3400 */
103 #define omm5_15 1.6222610789 /* nmax motora=3400 */
104 #define omm6_15 6.675884393 /* nmax motora=3400 */
105
106 #define epsm1_15 3.75 // [radjani/s**2]
107 #define epsm2_15 2.1
108 #define epsm3_15 3.75
109 #define epsm4_15 3.75
110 #define epsm5_15 1.5
111 #define epsm6_15 6.
112
113 // Software limits
114 #define max1_15 (150.*krad)
115 #define max2_15 (80.*krad)
116 #define max3_15 (73.*krad)
117 #define max4_15 (200.*krad)
118 #define max5_15 (110.*krad)
119 #define max6_15 (200.*krad)
120
121 #define min1_15 (-150.*krad)
122 #define min2_15 (-120.*krad)
123 #define min3_15 (-73.*krad)
124 #define min4_15 (-200.*krad)
125 #define min5_15 (-110.*krad)
126 #define min6_15 (-200.*krad)
127
128 // nm*enk*t_inter/60
129 #define nmc1_15 (3500*4000*t_inter/60) /* 1166.66 za 5 ms */
130 #define nmc2_15 (2800*4000*t_inter/60) /* 933.33 za 5 ms */
131 #define nmc3_15 (3500*4000*t_inter/60) /* 1166.66 za 5 ms */
132 #define nmc4_15 (3400*2000*t_inter/60) /* 566.66 za 5 ms */
133 #define nmc5_15 (3400*2000*t_inter/60) /* 566.66 za 5 ms */
134 #define nmc6_15 (3400*2000*t_inter/60) /* 566.66 za 5 ms */
135
136 #define t4_pi_15 (r4*500.) /* 66857.14 */
137 #define t6_pi_15 (r6*500.) /* 26666.67 */

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