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% Actuator Sizing
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% Constants
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Rw      = 0.0325; % Wheel Radius
Miu_r   = 0.04;   % Coefficient of rolling resistance
M        = 1.0335; % Total Mass per wheel
g        = 9.81;   % Acceleration due to gravity
Cd       = 0.27;   % Coefficient of drag (Assumed)
Ro_air   = 1.2;    % Density of air
Af       = 0.031;  % Frontal area
V        = 0.2;    % Robot Velocity
Jwheel   = 3.87e-5; % Wheel Inertia
Jshaft   = 2.59e-7; % Shaft Inertia
t        = 0.25;   % step time
eta      = 0.9;    % Efficiency
Miu_f    = 0.3;    % Coefficient of friction
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% Formulas
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Teffort_max = Miu_f * M * g;
Rr           = Miu_r * M * g;
Ra           = (1/2) * Cd * Af * Ro_air * (V^2);
Tr           = (Rr + Ra) * Rw;
Jload_eff    = (Jwheel / eta) + ( Jshaft / eta);
Jlinear_eff  = M * (Rw^2);
Jmotor       = Jload_eff;
Jtotal       = Jmotor + Jload_eff + Jlinear_eff;
alpha_1      = ((V/Rw) / t);
Tm           = Tr + (Jtotal * alpha_1);
Teffort      = Tm / Rw;

Tm_pos_acc   = Tr + (Jtotal * alpha_1);
Tm_zero_acc  = Tr;
Tm_neg_acc   = Tr + (Jtotal * -alpha_1);
Tm_rms       = sqrt(((Tm_pos_acc^2)*t) + ((Tm_zero_acc^2)*2*t) + ((Tm_neg_acc^2) * t));
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Name ▲	Value
 Af	0.0310
 alpha_1	24.6154
 Cd	0.2700
 eta	0.9000
 g	9.8100
 Jlinear_eff	0.0011
 Jload_eff	4.3288e-05
 Jmotor	4.3288e-05
 Jshaft	2.5900e-07
 Jtotal	0.0012
 Jwheel	3.8700e-05
 M	1.0335
 Miu_f	0.3000
 Miu_r	0.0400
 Ra	2.0088e-04
 Ro_air	1.2000
 Rr	0.4055
 Rw	0.0325
 t	0.2500
 Teffort	1.2981
 Teffort_max	3.0416
 Tm	0.0422
 Tm_neg_acc	-0.0158
 Tm_pos_acc	0.0422
 Tm_rms	0.0244
 Tm_zero_acc	0.0132
 Tr	0.0132
 V	0.2000