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%NEXTSTATETEST Test script for NEXTSTATE.
%
% NEXTSTATETEST simulates the KUKA youBot for T seconds with
% initial configuration theta_list, constant joint velocities
% theta_dot_list, time step duration dt, and maximum joint/wheel velocity
% theta_dot_max.
%
% NEXTSTATETEST saves theta_list of each time step as a
% column in theta_array and writes the data to a csv file to be
% visualized in CoppeliaSim Scene 6 associated with the book "Modern
% Robotics: Mechanics, Planning, and Control," Kevin Lynch and Frank
% Park, Cambridge University Press, 2017.
%
% See also NEXTSTATE.

% Written by David Lim for the MAE 204 Final Project in WI25.
% Last modified on 03/08/25.

clear

T = 1; % total duration
theta_list = [0 0 0 0 0 0 0 0 0 0 0 0 0]'; % initial configuration
theta_dot_list = [pi/6 pi/6 pi/6 pi/6 pi/6 2*pi -2*pi 2*pi -2*pi]'; % joint/wheel velocities
dt = 0.01; % time step
theta_dot_max = 2*pi; % maximum velocity magnitude

N = T/dt+1; % total steps
theta_array = zeros(13,N); % array of all configurations
theta_array(1:12,1) = theta_list;

% main simulation loop
for i = 1:N-1
    theta_array(1:12,i+1) = (NextState(theta_array(1:12,i),theta_dot_list,dt,theta_dot_max))';
end

writematrix(theta_array','nextstate.csv') % write matrix to csv file

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