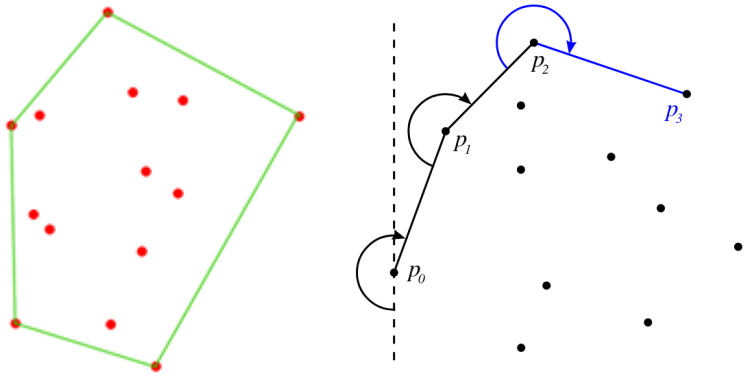
stability_check

Overview

stability_check is a class created to evaluate the robot's stability based on chosen margin of stability, foot contact points and predefined center of mass.

Mathematics

To make this class work convex hull problem had to be solved. Algorithm implemented in the solution is Jarvis' Algorithm. Algorithm makes a convex hull for foot contact points and center of mass and checks if center of mass is part of the hull. If it is not, distance to each side of hull is calculated and the lowest distance is chosen. The lowest distance is then compared to *stability_margin*.



Usage

Class as takes *stability_margin* as an initialization argument - if none is given it is initialized as 0. *stability_margin* has its setter and getter.

- *check_stability* method takes 3-dimensional legs coordinates and returns boolean value. (True if center of mass is within margin of stability) Only legs with lowest third dimension value are counted as ones touching the ground.

- *check_stability_with_minimal_distance* - returns the same boolean value as *check_stability* and additionally returns distance of center of mass to closest side of convex hull as float value.