EECS 476: PS2

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2016-02-03

Let R be the radius of the robot (which is circular). Since STDR appears to be entirely deterministic and devoid of measurement error (by default, anyways), there is no need for any error terms. Now, for each LIDAR ping i, let r_i and θ_i be, respectively, the radius and angle of that ping.

We wish to ensure a clear tunnel ahead of the robot that is at least as wide as the robot is, for at least $d =$ `MIN_SAFE_DISTANCE` in front. This corresponds to the region $\{(x, y) \mid x \in [0, d], y \in [-R, R]\}$ in the robot's rectilinear coordinate system (where $+x$ is forwards). If any laser endpoint is in this region, we sound the alarm. The x and y values of each laser endpoint are computed from their given polar form, thus:

$$\begin{aligned} x_i &= r_i \times \cos(\theta_i) \\ y_i &= r_i \times \sin(\theta_i) \end{aligned}$$

Note that, since the walls of the STDR map/arena/maze/thing appear to be rather fuzzy, and since numerical integration (which is effectively what reactive_commander does) has errors, an error term has been added to R to avoid close calls.