

Team Project Autonomy Technologies

3D SLAM and Motion Planning using Boston Dynamics Spot

Motivation

Spot is an autonomous four-legged robot designed by Boston Dynamics. It is equipped with several 3D cameras to offer a complete 360° view of its environment. With its freely programmable software interface, different processes can be automated like mapping and navigating unknown terrain. Autonomous robots require these skills to be useful tools.



Task description

In this team project, your group should use the onboard depth cameras to generate a 3D map of its environment and localize itself in it. This process is called SLAM (Simultaneous Localization and Mapping). The amount of data generated by the depth cameras is difficult to handle. A promising approach was proposed by [1] but you are welcome to investigate further methods. The resulting map should then be used to define start and endpoints and create a feasible path, which Spot should be able to autonomously navigate. Investigate suitable methods [2] and implement one for Spot.

Requirements

You are a group of four to five, enrolled in the master's degree Autonomy Technologies. You have programming knowledge in Python and a basic understanding of robotics.

References

[1] J. Biswas and M. Veloso, "Depth camera based indoor mobile robot localization and navigation," 2012 ICRA, Saint Paul, MN, USA, 2012, pp. 1697-1702.

[2] Patle, B. K., et al. "A review: On path planning strategies for navigation of mobile robot." Defence Technology 15.4 (2019): 582-606.

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