Mechatronics Innovation Lab

ROS2 Based Quadruped Robot System for Inspection and Monitoring

BSc

UiA Faculty of Engineering and Science

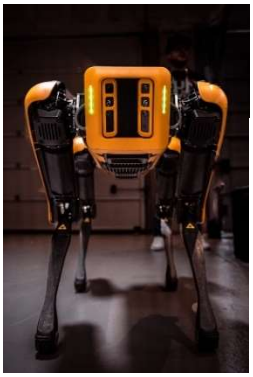
Short Introduction

The background for this project lies in the growing need for autonomous inspection and monitoring solutions in hazardous and industrial environments such as energy plants, construction sites, and manufacturing facilities. As industries strive to improve safety, reduce human error, and enhance operational efficiency, mobile robotic systems like quadrupeds are becoming essential for performing routine inspections, collecting sensor data, and monitoring equipment autonomously. Current systems often rely on fixed or limited mobility platforms, which can face challenges in navigating complex or dangerous environments. We are looking for bachelor's students with skills and interest in ROS2, AI, or control systems to develop a system for Boston Dynamics Spot robot capable of navigating and inspecting these environments using advanced vision-based techniques. The scope of the project is flexible and can be scaled according to the team's capabilities.

Keywords

The project will involve the following components:

- Programming: Python
- ROS2
- Robotics, Navigation, VSLAM for a Boston Dynamics Spot Robot
- Machine Vision Models (Integrate open source)
- CAD: To design and print parts
- Docker: Containerized development



Project Description

The aim of this project is to develop a mobile quadruped robotic system (Boston Dynamics Spot) that can autonomously perform inspection and monitoring tasks in hazardous and industrial environments. Using ROS2, AI, and advanced vision-based techniques, the system will be equipped to detect, localize, and classify objects, equipment, and anomalies in real-time. Students will explore object recognition and SLAM (Simultaneous Localization and Mapping) for navigation. The system will be implemented on an Nvidia Jetson. The project will focus on how quadruped robots can enhance safety and efficiency in industrial settings, with flexibility to explore additional capabilities based on the team's progress.

Additional Information

Boston Dynamics Spot	https://github.com/boston-dynamics/spot-sdk
Vision Models	https://github.com/ultralytics/ultralytics
Robot Operating System 2 (ROS2)	https://docs.ros.org/en/humble/index.html

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