

e-YSIP 2021

2 LEGGED-WHEELED ROBOT

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28 - Model-based designing of a two-legged-wheeled robot with ROS and Gazebo

Abstract

To formulate an accurate mathematical model of a 2-Legged-Wheeled Robot, and to simulate it in Gazebo.

Completion status

- Understand the basics of state space modelling and apply it to control simple systems (Simple Pendulum, Mass Spring System, Inverted Cart Pendulum, etc.)
- Explore different types of optimisation/control strategies and understand their applications and limitations.
- Simulate a balance bot in Gazebo.
- Analyse similar works in the field and delineate the pros and cons of such systems.
- Studied the dynamics of Spring Loaded Inverted Pendulum and designing a Hopping Wheeled Robot.
- Developed a model (both CAD and mathematical) of a Legged Wheeled Robot.
- Modelled of legged wheeled robot.
- Simulation of legged wheeled robot in Gazebo.
- Implemented jumping of legged wheeled robot.



1.1. SOFTWARE USED

1.1 Software used

- ROS melodic
- Gazebo
- Python2.7
- Matlab

1.2 Future Work

- Improving the controller for the robot.
- Improving jumping using proper SLIP model.
- Filter designing and noise adding.
- Hardware implementation.

1.3 Bug report and Challenges

- We faced many challenges in doing proper research and find proper material to read and work with.
- We faced challenges in designing the controller for the joint motors.
- Making the robot air-borne.

Bibliography

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