

SpiderBot 2.0 –Hexapod

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What is SpiderBot ?

We plan to design and build a ROS enabled autonomous hexapod capable of navigation and obstacle avoidance.

The hexapod would be using LIDAR sensor and visual odometry for detecting its surroundings.

This idea was inspired from Rhoebie hexapod which has the similar function.

<https://youtu.be/8TUtX0-EMYw>



Rhoebie Hexapod

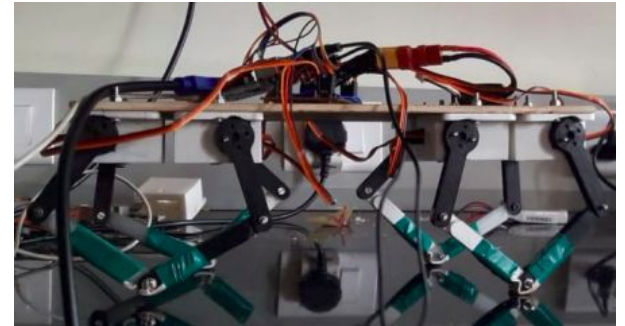
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Base stabilisation of the robot on different incline gradient would be added, to make the robot more stable while climbing up or down the inclines.

This would be achieved by servo motors and use of control systems as achieved in Quadruped.

Also the robot would be optimised to climb steps which are higher than its body as proposed in the robot ASTERISK.

Quadruped



Continued...

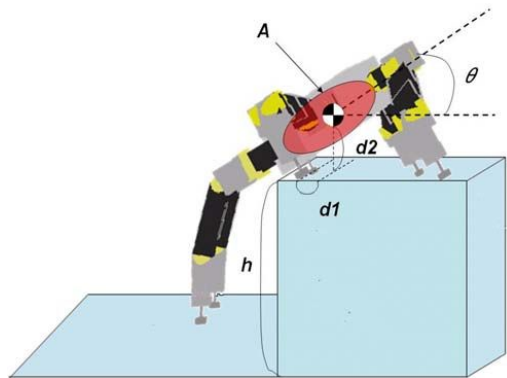
Last idea for exploring is motion planning for the robot to climb between 2 vertical walls.

The climbing gait would be horizontal as that is a better option as compared to vertical climbing gait.

The robot would not only climb between 2 vertical parallel walls but also be able to climb up on uneven wall, inclined walls and avoid an obstacle in between.

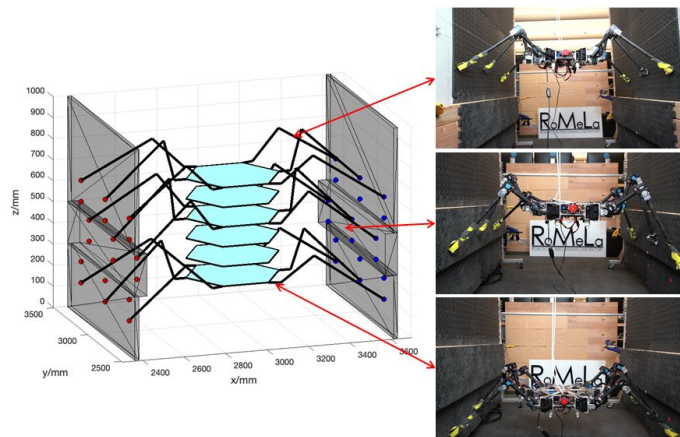
This idea was inspired from a research paper on “Optimization Based Motion Planning for Multi-Limbed VerticalClimbing Robots” presented at IROS,Macau on 4-8 November 2019.

Simulation images



ASTERISK robot

Step climbing



Wall climbing mechanism

Why SpiderBot ?

To achieve all terrain mobility legged robots are better alternative as compared to wheeled or flying robots. Also they outperform crawling robots when the terrain gets too rough.

Why Hexapod ?

Hexapods provide better stability, better fault tolerance, terrain adaptability and good walking ability. Hexapods can easily achieve motion in almost every direction without turning the robot completely. Hexapod in general is a design more biologically inspired.

What we would need to learn

ROS and Gazebo simulation

MATLAB

Control Systems

Raspberry pi

Solidworks

And more...

Basic Timeline

2-1

Basic designing,
prototyping & simulation

2nd Year

3-1

Stabilisation, step
climbing, wall climbing

3rd Year

2-2

Obstacle avoiding &
motion planning
algorithm

3-2

Final Prototype, designing
a controller

What we look to achieve

To make a legged robot that can truly walk on any terrain, can climb steps and even walls.

We want to integrate all the hexapods out there like Rhex, ASTERISK and the wall climbing robot into one hexapod that can truly walk on any terrain.

These kind of robots have a lot of applications in the real world like reaching difficult places where humans can't reach and varied use in the army.

Research Point

From Mechanical point this project would help us in researching more into legged robots and their different mechanisms, we will also explore different tasks that are possible with a legged robot.

From Electronics and Software point we will research more into control systems, how to manipulate the actuators and motors to get a desired output and learn how to simulate different problems faced by a legged robot. Lastly would also explore the odometry and motion planning.

Thank You