

Design of climbing mechanism for a tree climbing robot

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The evolution in nature has led to the introduction of highly efficient biological mechanisms. Imitating these mechanisms offers enormous potentials for the Improvement of our life and the tools we use. We have devised this mechanism Inspired from the locomotion of a worm called Stomata which uses Its whole body as distributed foot facilitating It to move on any terrain and have high agility on a regular tree environment. The gripper assembly designed uses a flexible casing which grasps the tree trunk of almost all diameter wealth the predefined range, classical It uses passive compliance.

This mechanism can be used for climbing trees which are almost straight Like coconut trees and poles. Hence this paper presents a new climbing mechanism for coconut tree climbing robot. Researchers all around the world work on climbing robots most of these climbing robots are capable of climbing regular structures like poles, walls, domes etc. But a very few are capable of climbing trees, main reason being irregular surface and variation of diameter with length -It also requires greater agility and high invulnerability to be used as a product.

Also the bark of some trees may not be strong enough to bear the weight of the climbing device, hence conventional climbing robots cannot be used for tree climbing applications. Many trees like coconut tree, recants tree, and palm trees are so tall that climbing them becomes risky. Hence harvesting fruits and nuts and maintaining them becomes difficult. So development of a unique tree climbing mechanism is necessary which may be used for maintaining and harvesting applications. Most commonly used design for tree limning is inch worm design ([4], [5]).

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These models are very slow. The main body of this type of robot is divided into two parts and each part has a gripper. These models using inch worm mechanism are continuous in their motion and can maneuver in complex tree environments involving multiple branches (16]). Next common type of design is wheeled robot wherein instead of grippers wheels are used for climbing up. The robot engulfs the tree and locks against it and as the motor rotates, it moves up. The sizes of these robots are comparable to the diameter of tree.

These models are suitable for trees with straight and plain trunks . The main drawback is it being slow and there is a possibility of them damaging the tree trunk. ([7]). Hence most of the models are slow, less agile, have less load carrying capacity. As a result we propose a tree climbing mechanism that can be used to climb trees that are almost straight, like coconut trees and poles with greater agility. The main locomotion of the robot is caused due to the two motors which facilitates simultaneous motion of two instinctive links (figurer).

This robot grasps the tree with the help of grippers which is acted by a spring. When the motor is ON it unclaps and clamps while the motor is OFF by spring action while harnessing the spring energy for gripping. When one gripper grasps the tree, the whole body makes a revolution such that the next gripper comes up and grips while the other unclaps and the whole process mechanism can be mounted on the Robot. With these attachments this robot can act as harvesting or maintenance equipment by the farmers.