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KINEMATIC SIX LEG MOVING ROBOT ON A CHAIN DRIVE MECHANISM BY USING ELECTRIC MOTOR

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ABSTRACT:

Mechanical engineering is not more involved in robotics since Mechatronics and robotics found a vast application in implementing the concept of running a robot model using servo motors and drives, since large amount of energy is required to run the robot model. The other thing is, it requires more power and initial cost is much higher and implementation of the concept is more difficult as compared to that of the other concepts in mechanical. In order to overcome this, here we are designing the six legged walking robot based on kinematic mechanisms without any controllers. Kinematic robot is the application of Kinematics & Robotics with Chain drive system. The walking system of kinematic robot can be controlled using the chain drive system. With simple mechanisms and a small electric motor, the Kinematic robot can be executed.

INTRODUCTION

Kinematic robot is the application of Kinematics & Robotics with Chain drive system. The walking system of kinematic robot can be controlled using the chain drive system. With simple mechanisms and a small electric motor, the Kinematic robot can be executed. Mechanical engineering is not more involved in robotics since Mechatronics and robotics found a vast application in implementing the concept to run a robot model using servo motors and drives, since much of the energy is required to run the robot model. The other factor is that, it requires more power and initial cost is much higher and implementation of the concept is more difficult as compared to that of the mechanical concepts. To evade this problem, here we are designing the six legged walking robot based on kinematic mechanisms without any controllers.

WORKING PRINCIPLE

The motor is connected to the center shaft of the walker, which is coupled directly to a sprocket. There is a chain drive which drives the other two sprockets which is placed at the adjacent sides of the center shaft. The two sprockets are made riveted eccentrically to the legs that are placed vertically parallel to the center shaft. At the center of the two pillars which are placed vertically, a shaft is placed accordingly to run the other two legs that are placed at an angle of 45° and it is made riveted in the same way as the first two walkers. These are also riveted eccentrically in such a way that it will be on air while the first two legs on land. The fifth and sixth legs are riveted in the same way that of the arrangement of the first four legs. First, second, fifth, sixth legs will be on air while the third and fourth legs are in ground position. The arrangement is made in such a way that to increase the stability while in motion.

PICTURES OF KINEMATIC ROBOT MODEL:

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Fig.1

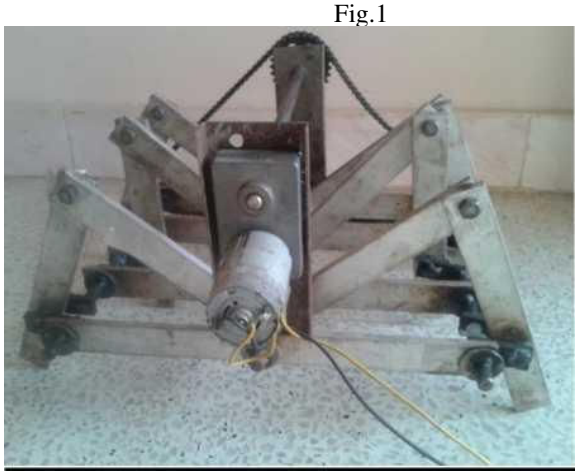
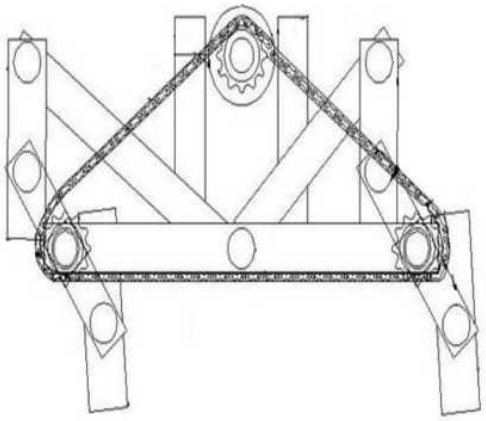


Fig 2

Fig 3

DRAWING FOR KINEMATIC ROBOT:



COMPONENTS

Kinematic robot consists of following components are given below

- Walking Legs (Six lymph)
- Nut & bolt linkage
- DC electric motor
- Chain drive and sprocket
- Connecting rod
- Switch kit

WALKING LEGS:

Walking legs or lymph made of aluminum plates for more reliability and life with less weight & load carrying capacity. It's six edges are the base of the robot which is in contact with ground for movement.

LINKS:

Links are made with nut & bolt, and they are welded for permanent fixing without any loose contact.

DC ELECTRIC MOTOR:

DC motor having 30 rpm of speed and 4kg of load withstanding capacity is used. DC supply is given sing a battery.

CHAIN DRIVE & SPROCKET:

Cycle chain and sprocket are arranged on one side of the robot in a series manner. The weight that the robot can withstand is balanced using this chain and sprocket.

CONNECTING ROD:

The connecting rod is made of cast iron and it gives maximum strength for the entire mechanism and keeps it uniform while motion.

SWITCH KIT:

Switch that makes the robot movement forward and backward in two directional switches.

ADVANTAGES

- Fully Mechanical project, since only kinematic mechanisms involved.
- Increase in Stability while in motion since it is having six legs
- Mechanisms without any controllers using Kinematics

APPLICATIONS

- Search and rescue purposes can be efficiently carried out.
- Used for locomotive purposes
- It can be used as a locomotive for tunnel sensing purposes.
- Slow motion cameras can be fixed in it due to its slow operation to improve security monitoring.
- Sensors can be fixed for more sensing purposes.
- In future slow motion robots will be more apt for detailed sensing

PROBLEM IDENTIFICATION:

- Since Mechanical Engineering needs more amount of energy to run the robot model.
- Robotics has a vast application in implementing the concept of running a robot model using servo motors and drives.
- The other thing is that, it requires more power.
- Cost of initialization is much higher and concept implementation is a bit more difficult as compared to that of the mechanical concepts.
- In order to overcome this, here we are designing the six legged walking robot based on kinematic mechanisms without any computer assistance

CONCLUSION

The first made kinematic robot is using Nichrome plates, due to its heavy weight and reduced thickness the movement was difficult. So the Aluminium plates are used instead of Nichrome plates its light weight and moving flexibility the model made a perfect result. As the Aluminium plates reduce the whole weight of the robot its carrying and use will be more easy. The installation of Aluminium plates, its availability and the coast are affordable for the making of robot base on its application. The kinematic robot using chain drive and motor will enhance the role of kinematics in robotics and can be applicable in vast areas of medical and military sectors. The kinematic robot has been fabricated and the movement has been analyzed.

As for the conclusion of this project, we have achieved the best results.

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