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Spider Robot - An Eight Leg Waking Robot

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Abstract: This paper gives the methodology used & working details of an eight leg waking robot named as "SPY SPIDER". It was named so because it walks like a spider and it used safely for spying purpose. It could be easily used where humans are unable to and gather information through camera mounted on it and send live recording too. It was a useful gadget for gathering information of enemies. The robot was wirelessly connected and controlled by remote control so that one can access the location of the robot at any time. The live updates of the location can also be checked on mobile phone and can be record the live streaming also. The robot was connected to IOT, which send the updates to robot also. The unique thing of this was that it can rotate 360 degree on its location. It can go on different terrains where the normal wheels can't move which make it useful to it to any planet for gathering its environmental conditions.
Keywords: Klann mechanism. IOT, Hexapod robot,

I. INTRODUCTION

The main advantage of Klann mechanism robots is their ability to access places impossible for wheeled robots. By copying to the physical structure of legged animals, it may be possible to improve the performance of mobile robots. To provide more stable and faster walking, scientists and engineers can implement the relevant biological concepts in their design. Our project, "Spy Spider" This project is useful in hazardous material handling, clearing minefields, or secures an area without putting anyone at risk .The military, Explosive Ordinance Disposal units, and security system could also benefit from applications of mechanical spider. It would perform very well as a platform with the ability to handle stairs and other obstacles. Spy Spider", is to demonstrate the working of Klann Mechanism through a simple walking robot.

A normal robot (or vehicle) can move only forward and backward direction. By using Klann Mechanism the vehicle can able to move in one plane along different direction. The movement of the kinematic linkage is done by the use of electric motors.

II. METHODOLOGY

We can use the robot with the wireless remote control made by us with the batteries with the range can be set according to the use. This robot walks with the stability. This robot can walk on the different fields / terrains. We have used the embedded technology in this robot which makes the communication part of the robot very compact in size and also reduce the cost of the robot.

First we are trying to make a robot which can walk on the legs and can walk in different terrains. So for this we first need to study the process of klann mechanism. It is the mechanism that convert the rotational motion of the motor into linear motion. The linkage was originally designed by the famous Russian mathematician Chebyshev some years earlier. During the 80 or 90 years that followed, workers viewed the task of building walking machines as the task of designing linkages that would generate suitable stepping motions when driven by a source of power. The leg was a three dimensional pantograph that translated the motion of each actuator into a pure Cartesian translation of the foot. Now we need to track our device and want to get the latest updates of the field. To we installed the wireless camera over it so we can now able to view the live updates on our phone and on the laptop wirelessly.

A. *Components Used*

1) Electric Motor
2) Gears
3) Wireless Remote Control
4) Aluminum Legs
5) Screws and Nuts
6) GSM Module
7) Raw Material
8) PCB
9) Motion Sensors

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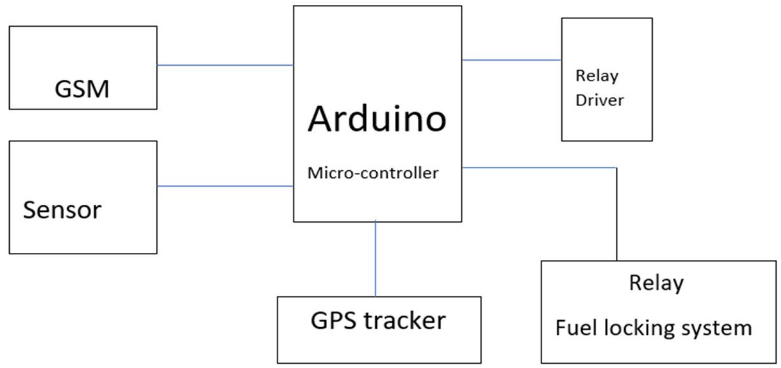
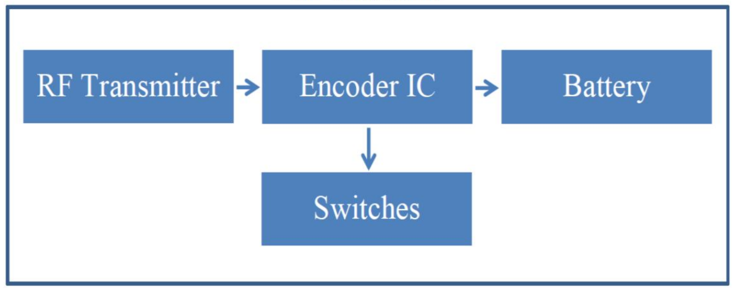
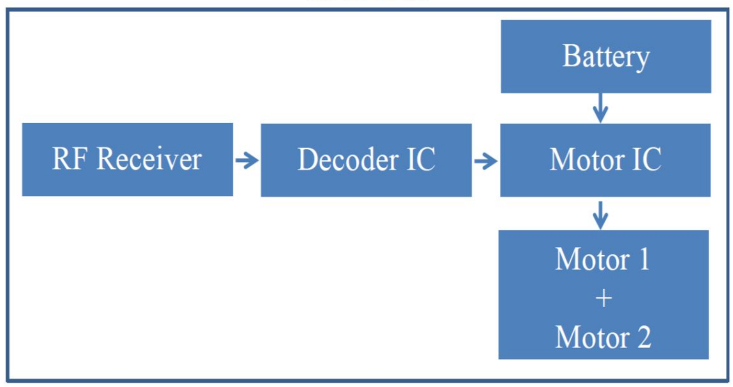
Block Diagram



RF Transmitter



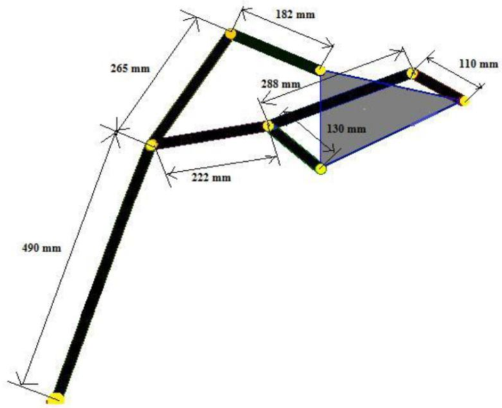
RF Receiver



III. RESULT

It is a quadruped, electrically actuated, walking and wall climbing robot. The trunk consists of one part only, and the legs are mounted, symmetrically, on the corners of the trunk. Each leg has three links and three actuated joints connecting these links. Hip horizontal joint is used to swing the three links of the leg in a plane parallel to the ground while walking, hip vertical joint, to attach-detach the foot on and from the terrain for swing and support stages, respectively. Adopting legged locomotion for traversing the seabed has a number of operational advantages; firstly, the platform can maintain its position without expending energy; secondly, the typically unstructured terrain of the sea bed can be scaled efficiently, and thirdly, movement generates a low acoustic signature which, for application ns such as mine clearance or littoral Warfare would be beneficial. Literature review reveals that Klann Mechanism robots have ability to access places which are impossible for wheeled robots. By copying to the physical structure of legged animals, it may be possible to improve the performance of the mobile robots. By implementing relevant biological concepts in the design, more stable and faster walking robots could be developed. Based on the results of literature review, an attempt is made in this project to develop an eight legged Klann mechanism spider robot.

A. *Figures and Tables*



Direction of movement of spider	Direction of rotation of motor 1	Direction of rotation of motor 2
Forward	Clockwise	Counter-clockwise
Backward	Counter-clockwise	Clockwise
Right	Clockwise	Clockwise
Left	Counter-clockwise	Counter-clockwise

IV. CALCULATION

Gears are very important for the movement of our model. Gears transmit power and while doing so, they reduce the undesirably high rpm delivered by the motors to useable levels.

A. *Gear Nomenclature of Motors*

Number of teeth in larger gear, Z1 = 36
Number of gear in smaller gear, Z2 = 36
Gear Ratio, i = 1
Module, m = 1.5 mm
Speed on smaller gear N1=200rpm
Speed on larger Gear N2=200rpm
Circular pitch Pc=3.4mm
Diametral pitch Pd=0.92mm
Module pitch m=1mm
Peripheral velocity v=0.72m/s

B. *Calculation of Dimensions of Gears*

Pitch Diameter, d1 = m*Z1
= 1.5*36 = 54 mm
Diameteral Pitch, DP = Z1/d1
= 36/65 = 0.553 mm-1.
Outside Diameter, Do = (Z1+2)/DP
= (36+2)/0.55 = 69.09 mm.
Addendum, a = 1/DP
= 1/0.55 = 1.81 mm.

Dedendum d=1.157/DP
= 1.157/0.92 = 1.9 mm.
Working depth =2.25m 18
=2.25*1.0 =2.43mm
Tooth thickness t =1.5708m
=1.5708*1.08 =1.696mm
Minimum bottom clearance=0.25m
=0.25*1.08 =0.27mm

C. Calculation of DOF

In the design or analysis of a mechanism, one of the most important concerns is the number of degrees of freedom (also called movability) of the mechanism. It is defined as the number of input parameters (usually pair variables) which must be independently controlled in order to bring the mechanism into a useful engineering purpose. It is possible to determine the number of degrees of freedom of a mechanism directly from the number of links and the number and types of joints which it includes. In general, number of degrees of freedom of a mechanism is given by, $n = 3 (l – 1) – 2 j$
Where, n – Degree of freedom, l – Number of link. j – Number of binary joints

V. CONCLUSION

This project can step over curbs, climb stairs, or travel into an area that are currently not accessible with wheels but does not require microprocessor control or multitudes of actuator mechanisms. It would be difficult to compete with the efficiency of a wheel on smooth hard surfaces but as conditions increase rolling friction, this linkage becomes more viable and wheels of
similar size cannot handle obstacles that this linkage is capable of. Pivoting suspension arms could be used to optimize, The height of the legs for the waterline.

Increase the platform height. Reduce the vehicle width. Also it allows the legs to fold up compactly for storage and delivery. Thus, all the principles and mechanisms involved in a walking robot using are studied and the practical difficulties in fabrication of a working model are understood. If implemented properly, automobiles moving on legs using Klann Mechanism have the
potential to change mobility as we know it.

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[3] Movement Abd Alsalam Sh. I. Alsalameh Shamsudin H.M. Amin Rosbi Mamat Center for Artificial Intelligence and Robotics (CAIRO) Faculty of Electrical Engineering
[4] University Technology Malaysia. A study of availability and extensibility of Theo Jansen mechanism toward climbing over bumps Kazuma Komoda (PY), and Hiroaki Wagatsuma 1 Department of Brain Science and Engineering, Kyushu Institute of Technology RIKEN Brain Science Institute.
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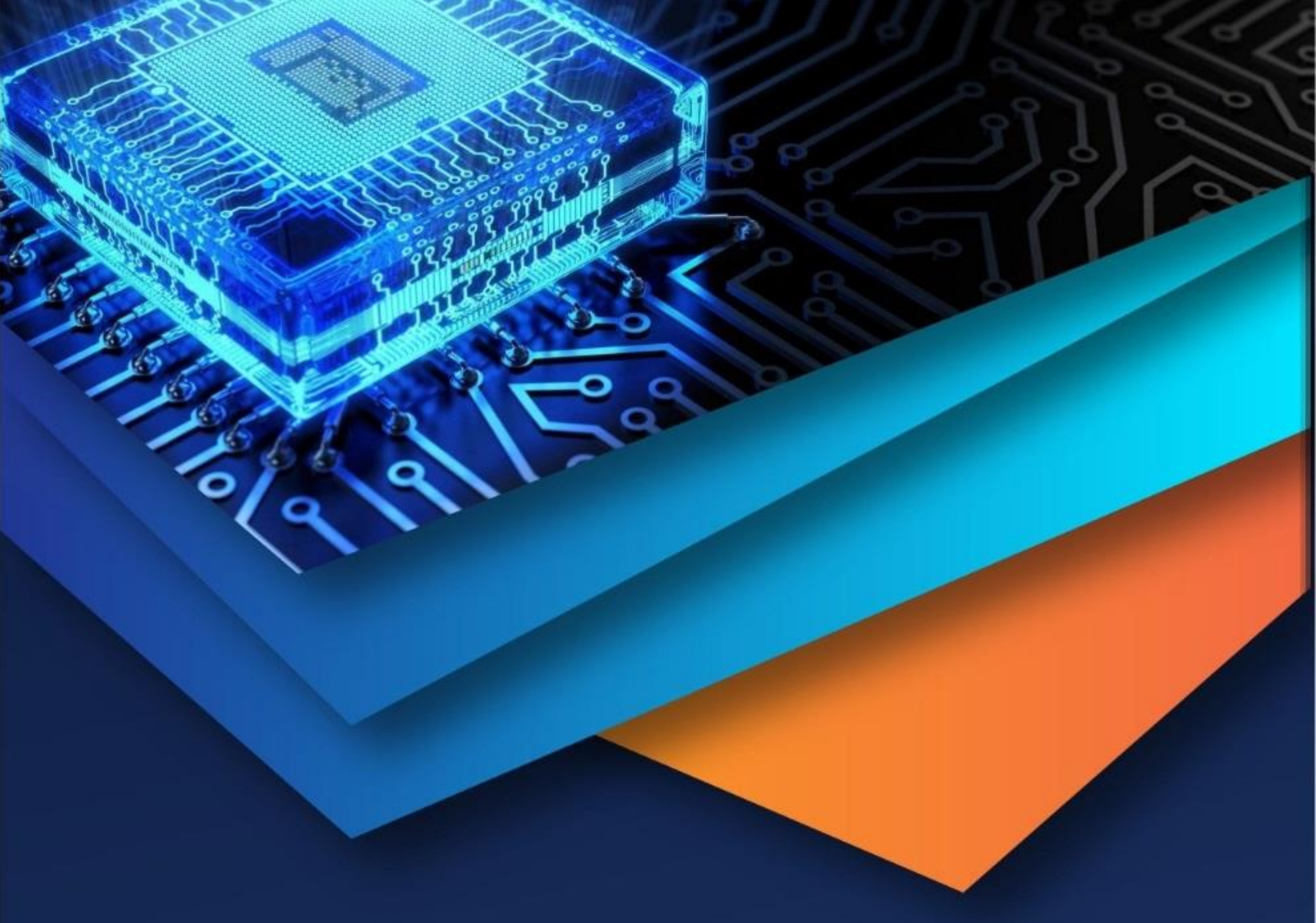

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