East African Scholars Journal of Engineering and Computer Sciences
Abbreviated Key Title: East African Scholars J Eng Comput Sci
ISSN: 2617-4480 (Print) & ISSN: 2663-0346 (Online)
Published By East African Scholars Publisher, Kenya
OPEN ACCESS
Volume-8 | Issue-5 | Nov-Dec-2025 | DOI: https://doi.org/10.36349/easjecs.2025.v08i05.003

Original Research Article

Design and Development of a Quadruped Spider Robot

Lima Akter[1]*, Pronoy Chandra Sarker[2], Md Gazi Salahuddin[3], Md Arafat Hossan[4], Sojib Foysal[5], Md Jakaria Islam[6], Md Nafiur Rahman Jamin[7], Sakibul Hasan[8], Abir Hasan[9], Morium Nissa Banna[10], Nurn Nahar[11], Abid Hasan[12]

[1]Department of Computer Science and Engineering, Atish Dipankar University of Science and Technology, Bangladesh
[2]Department of Electrical and Electronics Engineering, American International University, Bangladesh
[3]Department of Electronic Science and Technology, Northwest Polytechnical University, China
[4]Department of Computer Science and Technology, Chang'an University, China
[5]Department of Computer Science and Technology, Chang'an University, China
[6]Department of Computer Science, Northwestern Polytechnical University, China
[7]Department of Computer Science and Technology, Chang'an University, China
[8]Department of Civil Engineering, Chang'an University, China
[9]Department of Vehicle Engineering, Chang'an University, China
[10]Department of Chemistry, Jahangirnagar University, Bangladesh
[11]Department of Law, Bangladesh Islami University, Bangladesh
[12]Department of Mechanical Engineering, Moscow Power Engineering Institute, Moscow, Russia

Article History
Received: 10.10.2025
Accepted: 02.12.2025
Published: 19.12.2025

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: The spiders, in comparison with the majority of others animals, it has the ability to access to that kind of environment where others animals or even the humans can't. Those attributes of the spiders are taken into this project in order to design and develop a quadruped spider robot in conditions to move in all kind of directions and perform such movement like ascend or descend. The paper is presented the dynamic and kinematics model with the purpose of understand how, mathematically, a quadruped animal and a spider walk. In this case we have studied the movement of a real spider, so we can define a suitable bio-mimetic model for our robot. Similarly, the motion simulation was implemented and the results are shown.

Keywords: Design and Development, Theoretical, Quadruped Spider Robot, Design and Implementation.

1. INTRODUCTION

In the recent history, the human want to replicate all kind of movement of the animal kind of having really nice results. This effort on doing that allowed humans to realize that they can use robots for certain task instead of risk human lives. This kind of biomimetic replication can be employed in for example land mines task and exploration task. The main purpose of the spider robots we are making is to provide the work that helps to human and make easy their work places where hard to access for example a building under an exploration area. Hence the main feature of our robot is its 4 different quadruped which help the robot to walk in any places. Most of the places where other robot face difficulties to go or walk but our spider robot can go there easily. Humans do have their limitations, and deployment in inaccessible places is not always possible. There are also added risks of losing personnel in the event by exploration or others. With advances in technology over the years, however, it is possibly to remotely monitor areas of importance by using robots in place of humans. Apart from the obvious advantage of not having to risk any personnel and terrestrial, robots can also pick up details that are not obvious to humans.

2. DESIGN AND DEVELOPMENT OF A QUADRUPED SPIDER ROBOT

2.1: Important Applications:

You will find quadrupeds abundant in nature, because four legs allow for passive stability, or the ability to stay standing without actively adjusting position. The same is true of robots. A four-legged robot is cheaper and simpler than a robot with more legs, yet it can still achieve stability.

***Corresponding Author:** Lima Akter
Department of Computer Science & Engineering, Atish Dipankar University of Science & Technology, Bangladesh

2.2: Most Popular Quadruped Robots:

The most popular quadruped robot of Boston Dynamic's its Big Dog. Fig 1. Big Dog it's employed entirely in exploration duties .as you can imagine all the robots produced by Boston Dynamics have a lot of and new technology, a totally different means like Big Dog wasn't a point of inspiration because this resembles more like a cow or a dog instead of a spider. The spider robot was built around 90's where researches started to innovate the whole world with their robots. In 2008, this business built a hexapod spider robot, which had the ability of climb all kind of surfaces.

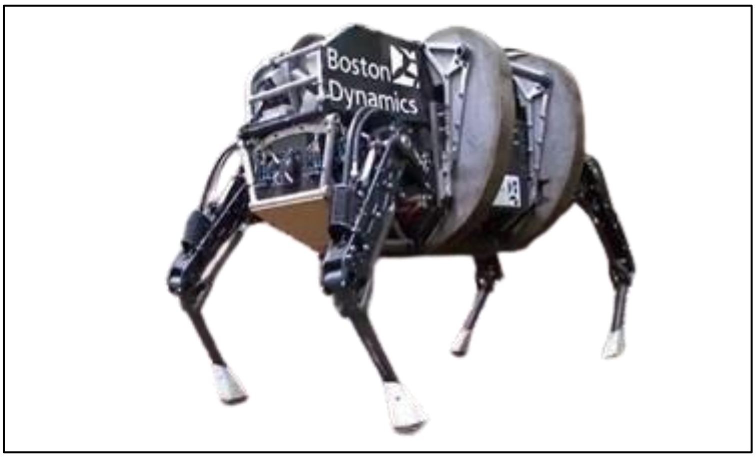

Fig-1.2: Big Dog

Nowadays, the majority of information found in the internet suggests that the quadruped spider robots are developed by amateurs or fans who want to have that kind of toy. Obviously, there is exceptional material and work. Proofs of these are presented in references. This robot is based on 4 different quadruped spider robots, all with different attributes and characteristics seen in Fig 2 in the same way as historical contributions. We must mention a particular quadruped spider robot; the machine that we are evaluating represents the biggest inspiration in our project. The particular robot was made by Claudio Semini University of Genoa, Italy, PhD. Student project.

2.3: Motivation for Project on Design and development of a quadruped spider robot:

Legged robots handle terrain better than their wheeled counterparts and move in varied and animalistic ways. However, this makes legged robots more complicated, and less accessible to many makers. and also the making cost and the high depenses that a maker should spend in order to create a full body quadruped since it is based on servo motors or stepper motors and both are more expensive than DC motors that could be used in wheeled robots.

2.4: Objective of the Project:

The aim of this project is to develop a quadruped spider robot that is able to walk on-site and be controlled by Bluetooth. This is carried out by the following objectives:

I. This robot can work instead of any human being or any other animal. So that we can easily do our work without risk of life.
II. In the rescue area. We can also use this robot to save many lives.
III. On the battlefield this robot can survey the battle area. Also, it can help detect and defuse the boom.
IV. In a hostage situation. Where man can't go there this robot can go inside and exchange information to victims and In between Rescuers.

2.5: Organization of the Report:

Design & Development Quadruped Spider Robot final thesis is arranged into following chapter:

I. Focused on familiarization of the elements and devices and their features used in this project.
II. Mainly focused on methodologies for the development of quadruped spider robots on the progress of the project are explained in this paper.
III. In this writer's paper the system's specification and estimated results are briefly described.
IV. Concludes overall about the project. Obstacle faces and future Recommendation are also discussed in this writer's paper.

3. THEORETICAL AND BACKGROUND

3.1: The Quadrupeds:

In order to accomplish this robot, we initially observed the behavior of the quadrupeds in the animal kind, this means, in their natural environment. We established how they move the algorithm behind this process. But we found a problem in this section. The majority of the quadrupeds move in a mammalian form, like a dog or a horse for example. This represented a problem because we wanted it to move in an arachnid way. Besides this the spider has 8 limbs, so we couldn't use them as a direct source of inspiration at least in the beginning. To solve this problem we used a mixture of sources of inspiration. We had the quadruped animals, their movement and behavior and on the other hand we had the anatomy of the spider. So in this order of ideas the anatomy or physic shape of the spider and movement of the quadruped animals in an arachnid way was used.

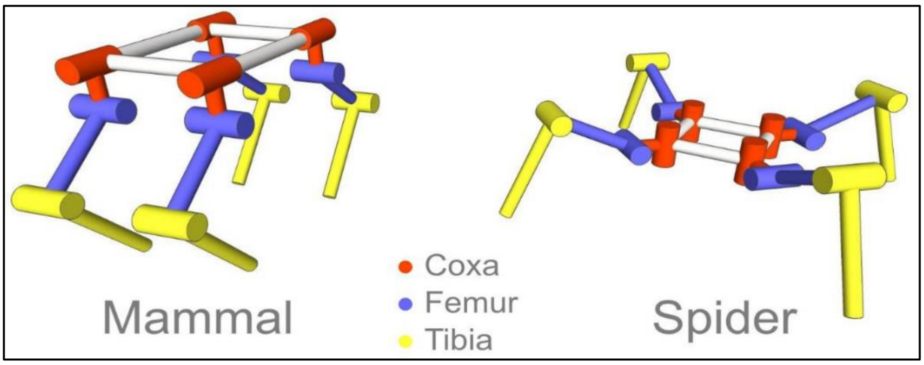

Fig-3.1: Simulator models

3.2: Motion Analysis:

Initially, it's important to know that the spider has 7 parts by leg (Fig-4). These parts are: coxa, trochanter, femur, patella, tibia, metatarsus and tarsus. This spatial arrangement is illustrated in Fig-4. From the original anatomy of the spider, we suppress some components which we didn't need. The reason for this it's because we wanted to simplify the whole system. Having said this, instead of using the Patella part, we linked the femur and the tibia by a direct joint. The metatarsus and the tibia were united as a single link or part. Similarly, we dismiss the tarsus. All of these dismissals were executed in the robot, but for the kinematics we took account of the entire system for a realistic approach and because we wanted to know what exactly we were suppressing.

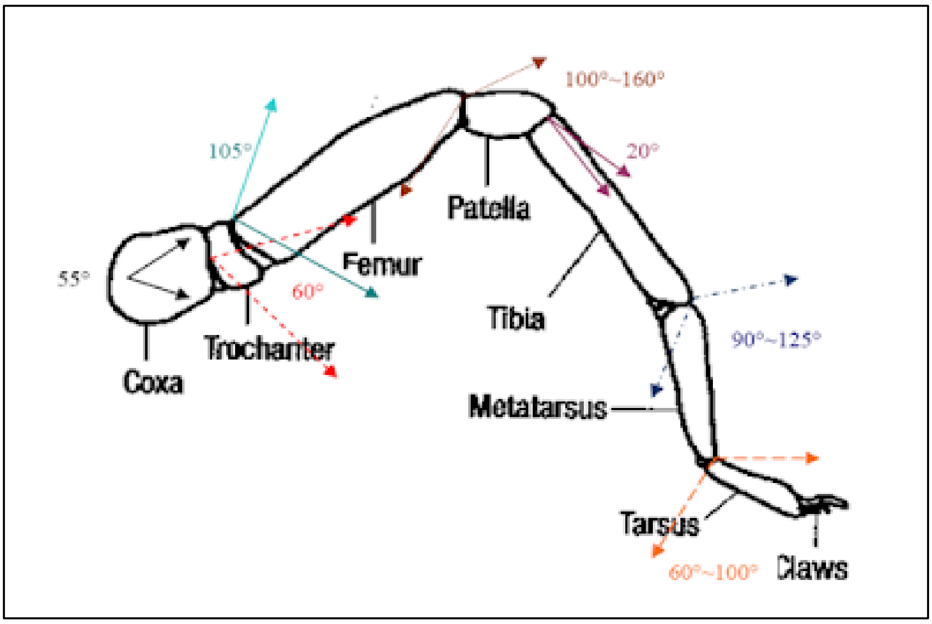

Fig-3.2: Spider's leg.

One important aspect is the amplitude that has every part of the spider leg. This means, for example, that the coxa has an amplitude of 35 degrees while tibia has a mobility of 70 degrees. Also, every of the seven components of the limb has a different axis of movement; for example, the trochanter has a movement in the X-Y axis, meanwhile the femur in the X-Z axis. This kind of association and motion, it's explained graphicall-3.3.

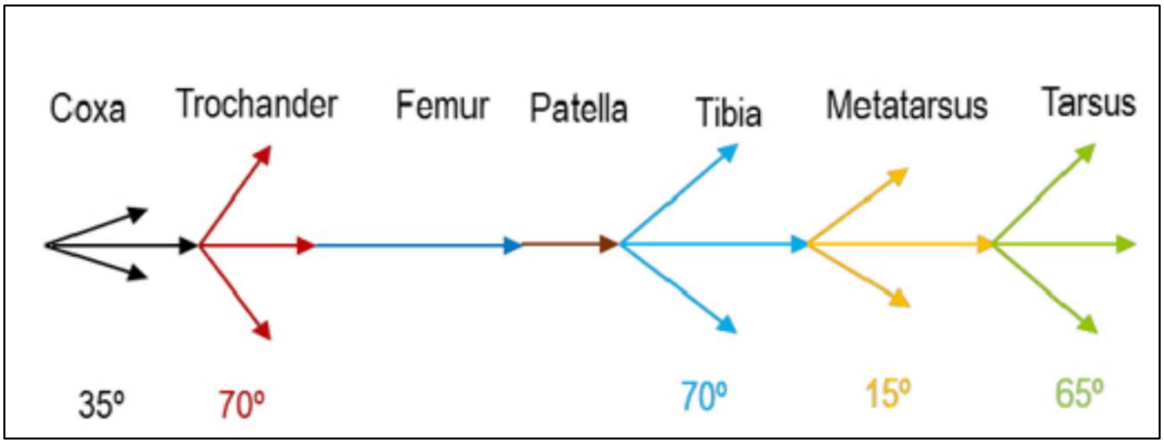

Fig-3.3: Range of movement of the spider

So, at this point it's convenient to establish the different joints and links which constitute the system limb of the spider:

i. Body-Coxa joint: Some authors view this joint as three degrees of freedom (DOFs) ball-and-socket joint.
ii. Coxa-Trochanter joint: Some individuals view this joint as, either a 3-DOFs ball-and- socket or a 2-DOFs saddle joint.
iii. Trochanter-Femur joint: this joint can be modeled as a universal joint with 2-DOFs.
iv. Femur-Patella joint: Commonly this joint can be modeled as a hinge joint.
v. Patella-Tibia joint: There are two options to model this joint; first as a hinge joint or a universal joint with a very limited joint on the Y-Z axis.
vi. Tibia-Metatarsus: it is also possible to assume this joint as a hinge joint, or a universal joint but with some constraints.
vii. Metatarsus-Tarsus joint: this joint can be modeled as a universal joint.
viii. In this case, the claws are the end-effector of the system. This means that this part of the limb is who interacts with the outside.

3.3: Mathematical Development

As we mentioned previously, there are some constraints that we applied in anatomic development. We applied these modifications in the mathematical development and we decided to involve all the possible variables, based on the following table to produce the most faithful model and prototype.

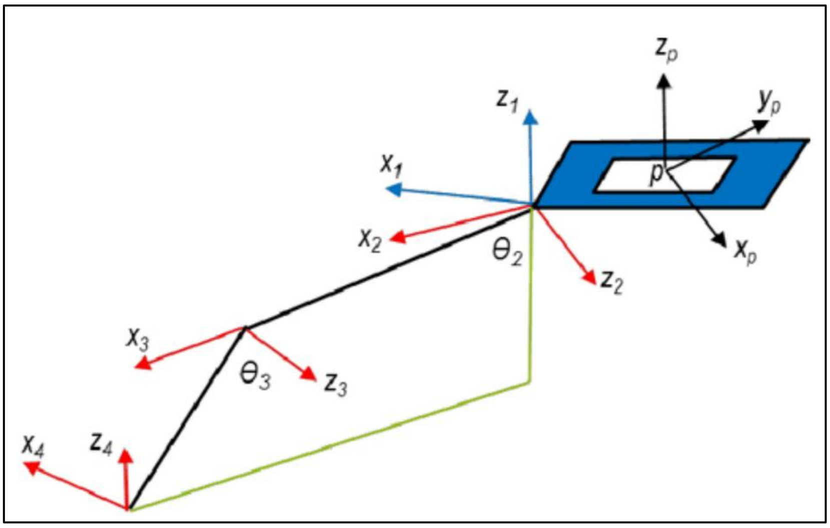

Fig-3.4: Coordinate frames of the robot

Table-1: Parts Movement

Parts	Movements	Plane
Coxa	75	Transversal
Femur	140	Sagittal
Tibia	40	Sagittal

3.3.1: Direct Kinematic:

In order to study the direct kinematics of the robot at first by using the joint variables of contact limbs, position and orientation of the platform based on a fixed frame are determined.

Taking into account the Fig-6 and knowing OAi vectors, which are the end points of contact legs, we can establish the next expression:

$rBi = rAi + rMi/Ai + rB/Mi$ (1)

In this expression, and represent the position vector of Bi. In the same way, we needed to determine all the parameters of the system in a graphically mean way. In the Fig-7 it can detail these parameters.

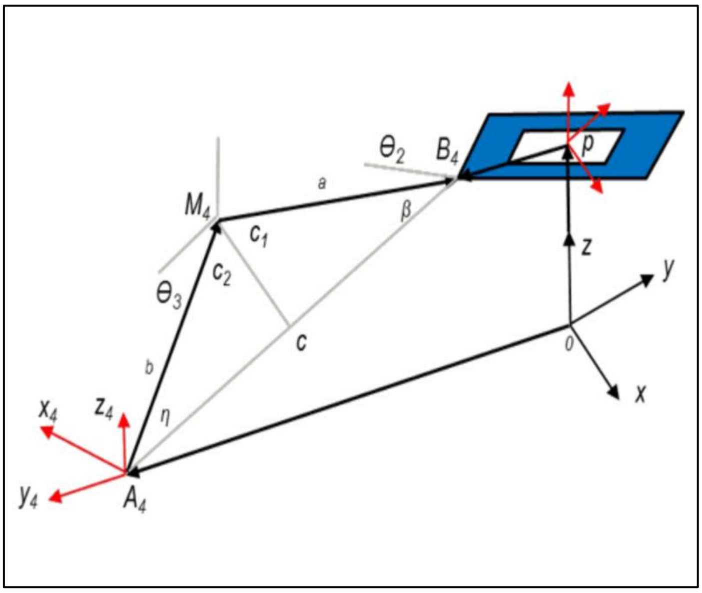

Fig-3.5: Parameters of the system

One highly important aspect in our robot was the motion and the sequence that a quadruped robot must follow in order to walk correctly. This item is the quadruped walk, which is illustrated in Fig-8.

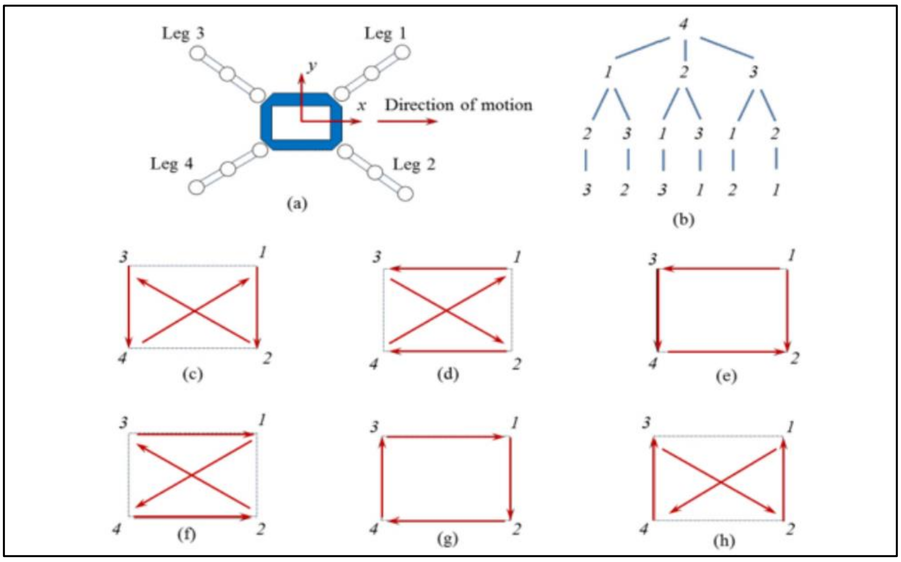

Fig-3.6: Quadruped walk

Suppose that the legs 1, 2 and 3 are standing on the ground. According to relation (1) the location of points Bi versus fixed coordinate are determined and as direction of x axis of P-coordinate system is direct to vector can determine the direction of x-axis unit vector:

$Ex = B3B1/B3B1$ (2)

In the same way, we can determine the vector B3B2.

$Ex = B3B2/B3B2$ (3)

By having this information, we can determine the direction of the unit vector, normal to the platform plane. To do this, we first needed to implement the cross product of the two previous vectors:

$Ex = EmxEx$ (4)

In the same way, having the vectors Ex and Ez, it's possible to determinate the Ey by the same method:

$Ex = Ex\ x\ Ez$ (5)

These three vectors are necessary because we can establish the matrix of the platform versus fixed coordinates with the next expression:

$^{P}R = [Ex\ Ey\ Ez]$ (6)

In order to specify the origin of coordinate system, we can use the equation of the circle in this way:

$(Xb1-Xp)^2+(Yb1-Yp)^2(Zb1-Zp)^2= r^2$ (7)

$(Xb2-Xp)^2+(Yb2-Yp)^2(Zb2-Zp)^2= r^2$ (8)

$(Xb3-Xp)^2+(Yb3-Yp)^2(Zb3-Zp)^2= r^2$ (9)

If we solve the equations system previously established, we can determine the position of the body in the coordinate system.

3.3.2: Platform Velocity:

In order to determine the velocity of the robot's platform it is necessary to determine the velocity and angular velocity of the robot platform by using the position and velocity of joint variables. In order to specify the direct kinematics of platform velocity can use (10):

$$\overrightarrow{OA_1} + \overrightarrow{A_1M_1} + \overrightarrow{M_1B_1} + \overrightarrow{B_1P} = \overrightarrow{OP} \quad (10)$$

In the previous expression, OAi represents a vector drawn from fixed coordinate origin to point "A" from leg No. i. It's possible to determine the relation between velocity of joint variables and platform velocity by differentiating from (10). The result is (11):

$$\overrightarrow{vp} = \overset{B\rightarrow Tib}{\omega_1} \times \overrightarrow{A_1M_1} + \overset{B\rightarrow Fem}{\omega_1} \times \overrightarrow{M_1B_1} + \overset{B\rightarrow P}{\omega} \times \overrightarrow{B_1P} \quad (11)$$

In (11), the first and third element of the equality represents the absolute angular velocity of femur and tibia of limb No. i respectively. If we take into account the symmetry of our robot,

(11) can be used for the other three contact legs. By using the fifth element of (11), it is possible to establish Vp. Based on Fig-7:

$$1\overset{\rightarrow Tib}{\omega_1} = \overrightarrow{\theta_1.K_1} + \overrightarrow{\zeta.K_2} \quad (12)$$

$$\overset{1\rightarrow Fem}{\omega_1} = \overrightarrow{\theta_1.K_1} + \overrightarrow{\zeta.K_2} \quad (13)$$

$$\zeta = \frac{\pi}{2} - \theta_2 - \theta_3 - \zeta = (\theta_2 + \theta_3) \quad (14)$$

$$y = \frac{\pi}{2} - \theta_2 \rightarrow y = \theta_2 \quad (15)$$

In expression (12) and (13), the first factor in both of them, indicates the unit vector directly to the z-axis of the first coordinate frame of limb No. i. The relation between the unit vectors of different coordinate frames of each leg is determined in function of the as follow:

$$\overrightarrow{I_{k_1}} = \overrightarrow{I_{k_2}} \quad (16)$$

$$\overrightarrow{I_{k_1}} = -\sin(\theta_1)\overrightarrow{1_{f_1}} + \cos(\theta_1)\overrightarrow{1_{f_1}} \quad (17)$$

$$\overrightarrow{I_{k_x}} = \overrightarrow{I_{k_y}} \quad (18)$$

Using the expressions from (12) to (18), we can determine the values of ωi as follows:

In and the S's and the C's, means cosines and sines. In this case, for mathematical simplicity, que can express all the previous equations as rotational matrices as follows:

As we mentioned previously, 'R' represents the rotational matrix of the platform relative to the fixed coordinate frame. In this order R1p is the rotation matrix of the first coordinate frame of limb No.i relative to the P-coordinate frame system. This last rotational matrix is defined as follow:

It is the number of limbs.

C. Direct kinematics of non-contact leg

Direct kinematics of position for a non-contact limb it's similar to the direct kinematics for a serial robot. As shown in Fig. 7 can write:

Based on the previous expressions PBi can be established as follows:

As we did with the contact legs, we wanted to determine the velocity of the non-contact limbs, so the procedure is similar. We first need to differentiate as follows. Using the information from with to, we can determine the velocity of the end point of noncontact legs; as a result, these values can be specified.

3.4: Theoretical Studies of Proposed Instrumentation

3.4.1: Arduino:

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward.

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board.

3.4.2: Use Arduino:

Thanks to its simple and accessible user experience, Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low-cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to build many of the projects exhibited at the Maker Faire, for example. Arduino is a key tool to learn new things. Anyone - children, hobbyists, artists, programmers - can start tinkering just following the step-by-step instructions of a kit, or sharing ideas online with other members of the Arduino community. There are many other microcontrollers and microcontroller platforms available for physical computing. Parallax Basic Stamp, Net media's BX-24, Phi gets, MIT's Handy board, and many others offer similar functionality. All of these tools take the messy details of microcontroller programming and wrap it up in an easy-to-use package. Arduino also simplifies the process of working with microcontrollers, but it offers some advantages for teachers, students, and interested amateurs over other systems.

3.4.3: Arduino Software (IDE):

The Arduino IDE or Integrated Development Environment is the software used to program the Arduinos. This software is written in JAVA. And the language it uses to program the MCU is like C/C++ and follows that syntax. The language is processing. And it is actually a language made for the electronic arts and visual design communities with the purpose of teaching the basics of computer programming in a visual context.

3.4.4: SG909 g Micro Servo:

Tiny and lightweight with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos. Good for beginners who want to make stuff move without building a motor controller with feedback & gear box, especially since it will fit in small places. It comes with 3 horns (arms) and hardware.

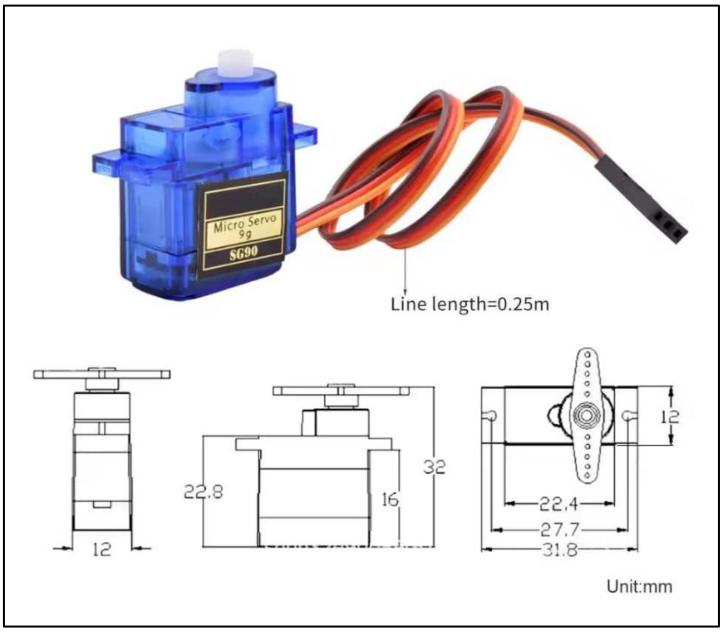

Fig-3.7: SG90 9 g Micro Servo Motor

3.4.5: Bluetooth Module:

This version of the popular Bluetooth uses the HC-05 module. These modems work as a serial (RX/TX) pipe. Any serial stream from 9600 to 115200bps can be passed seamlessly from your computer to your target. The remote unit can be powered from 3.3V up to 6V for easy battery attachment. All signal pins on the remote unit are 3V-6V tolerant. No level shifting is required. You can directly connect it to a 3.3V/5V microcontroller. You'll need a usb to serial converter to connect it to a computer. By default, this Bluetooth module is set to be on SLAVE mode. But you can recon Fig it with proper AT commands to use it as a MASTER device.

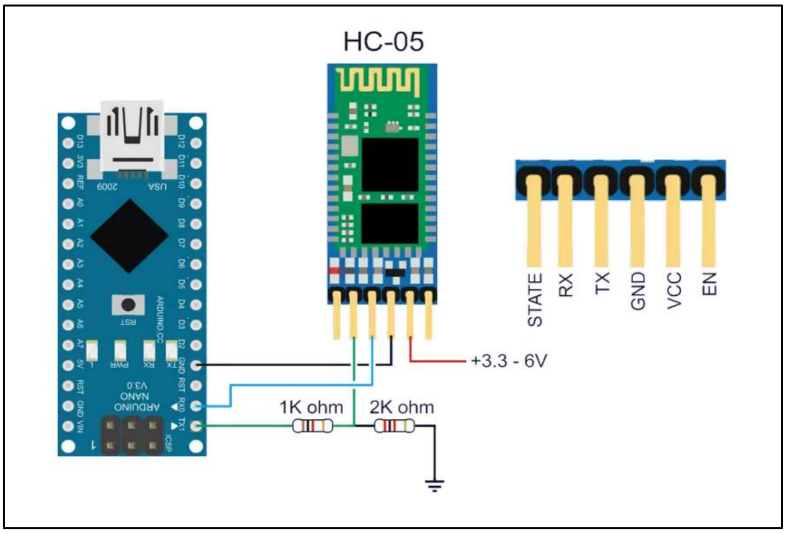

Fig-3.8: Bluetooth module HC-05

3.4.6: Power Supply Unit:

It needs both a microcontroller and motor DC 5V to work on. Since this device is plugged into the 220V main power supply that's why we use an adapter, which converts 220v ac to 5v dc.

4. DESIGN AND IMPLEMENTATION

4.1: Design of 3D Model for Quadruped Spider Robot:

We need first to prepare each leg a side and to make one led we need two servo motors for the joints and the Coxa, Femur and Tibia printed parts with this small attach part.

Starting with the first serve, place it in its socket and hold it with its screws, after that turn the servos axe to 180° without placing the screw for the attaches and move to the next part which is the Femur to connect it to the tibia using the first servo joint axe and the attach piece. The last step to complete the leg is placing the second joint. I mean the second servo to hold the third part of the leg which is the Coxa piece.

Now repeat the same thing for all legs to get four legs done ready. After that take the upper chassis and place the rest of servos in them sockets and then connect each leg to the appropriate servo. There is only one last printed part which is the bottom robot chassis in where we will place our circuit board.

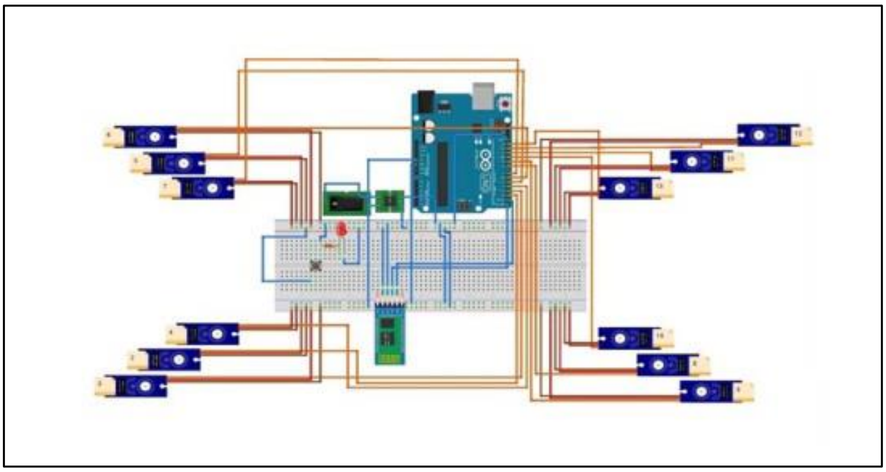

Fig-4.1: 3D printed Parts

5. RESULT

Figs 10 and 11 representing the forward movements of each axis of the robot using Mat lab ©. We use Arduino as a controller for full platform control and communication. For motion, 12 servo-actuators were set, 3 for each leg with torque of 2.2Kg-cm. These servo- motors are attached directly as a joint of each link-leg. The supply voltage and current for the robot was a battery package of 4.8 V and 3000 mA with around power of 7.5 W approx.

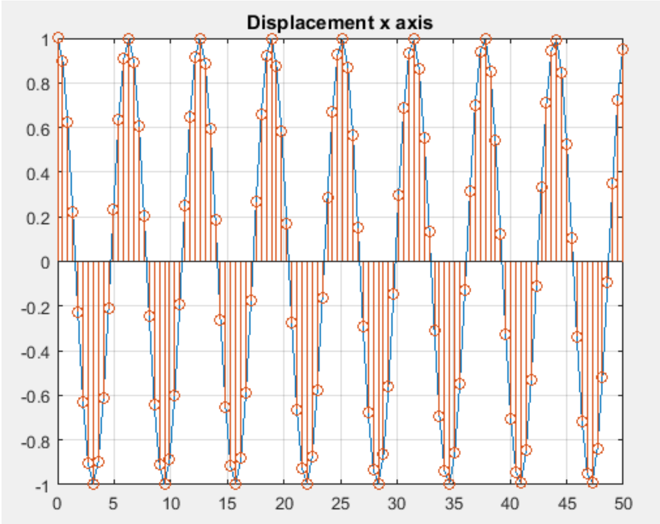

Fig-5.1: Displacement x axis

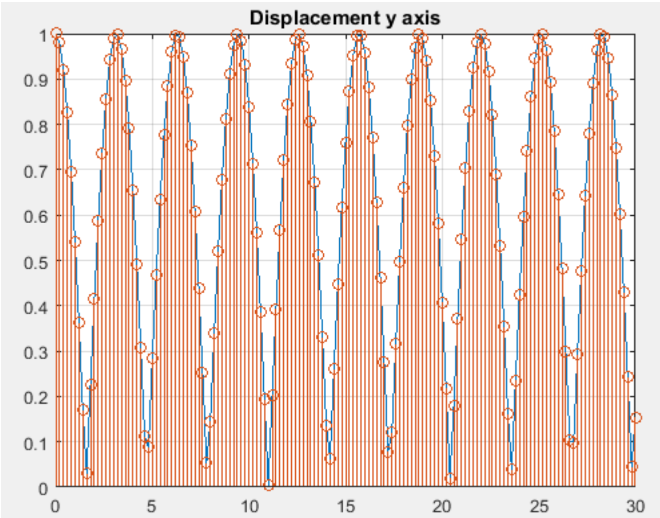

Fig-5.2: Displacement y axis

6. CONCLUSION

The project had achieved step by step the design, development and control of a quadruped walking robot. The mathematical model helped out the modeling of the motion´s behavior of the robot. The robot has 12 DOF in total, 3 DOF for each one, controlled by an Arduino Nano via remote mobile device. The movement has been analyzed with biomimetic inspirations taken from spiders. You will find quadrupeds abundant in nature, because four legs allow for passive stability, or the ability to stay standing without actively adjusting position. The same is true of robots. A four-legged robot is cheaper and simpler than a robot with more legs, yet it can still achieve spiders.

REFERENCES

1. Guo, K. Rogers, and R. Kirkham, "A Climbing Robot with Continuous Motion", in Proc. of the IEEE International Conference on Robotics and Automation (ICRA 94), 813 May 1994.
2. S. Hirose, and K. Kawabe, “Ceiling Walk of Quadruped Wall Climbing Robot NINJA-II”, in Proc. of the 1st International Conference on Walking and Climbing Robots (CLAWAR 98), Brussels, Belgium, 1998.
3. T. Yano, T. Suwa, M. Murakami, and T. Yamamoto, “Development of a Semi Self-Contained Wall Climbing Robot with Scanning Type Suction Cups”, in Proc. of the IEEE International Conference on Intelligent Robots and Systems (IROS 97), Grenoble, France, 711 September, 1997.
4. Rainer F. Foelix, Biology of Spiders, Oxford University Press. 2 edition, September 1996.
5. A.B. Kesel, A. Martin and T. Seidl, Adhesion measurements on the attachment devices of the jumping spider Evarcha arcuata, J. of Exp. Biol., 206, pp. 27332738, 2003.
6. B. Kesel et al., Getting a grip on spider attachment: an AFM approach to microstructure adhesion in

arthropods, Smart Mater. Struct., 13, 512-518, 2004.
7. K. Autumn, Y. A. Liang, S. T. Hsieh, W. Zesch, Wai Pang Chan, T. W. Kenny, R. Fearing and R. J. Full, Adhesive force of a single gecko foot-hair, Nature 405, 681-685, 8 June 2000.
8. S. Niederegger, S. Gorb, Friction and adhesion in the tarsal and metatarsal scopulae of spiders, J. of Comp. Physiology 192, 1223- 1232, 2006.
9. Huajian Gao, Xiang Wang, Haimin Yao, Stanislav Gorb, Eduard Arzt, Mechanics of hierarchical adhesion structures of geckos, Mechanics of Materials, 37, 2-3, 275-285, February-MaMechanism.
10. D. A. Parry, Spider Leg-muscles and the Autotomy Mechanism.
11. Quarterly J. of Microscopical Science, 98, 331-340, 1957.
12. A.T. Sensenig and J. W. Shultz, Mechanics of cuticular elastic energy storage in leg joints lacking extensor muscles in arachnids, J. of Exp. Biology, 206, 771-783, 2002.
13. A.T. Sensenig and J.W. Shultz, Elastic Energy Storage in the Pedi- palpal Joints of Scorpions and Sun-Spiders (Arachnida, Scorpiones, Solifugae), J. of Arachnology, 32, 1-10, 2004.
14. J.W. Shultz, Walking and Surface Film Locomotion in Terrestrial and Semi-Aquatic Spiders, J. of Exp. Biology, 128, 427-444, 1987.
15. E. F. Fichter and B.L. Fichter, “A Survey of Legs of Insects and Spiders From a Kinematics Perspective”, in Proc. of the 1988 IEEE International Conference on Robotics and Automation, vol.2, 984 - 986, 24-29 Apr 1988.
16. H. Ellis, The Mechanism of Extension in the Legs of Spiders, Thesis submitted to the Faculty of the Gradute School of California Institute of Technology, 1943.
17. Lorenzo Sciavicco and Bruno Siciliano, Modelling and Control of Robot Manipulators (Advanced Textbooks in Control and Signal Processing), Feb 17, 2001.
18. Zhao Tang, Peng Qi, Jian Dai, (2017) "Mechanism design of a biomimetic quadruped robot", Industrial Robot: An International Journal, Vol. 44 Issue: 4, doi: 10.1108/IR-11-2016-0310.
19. Marc Raibert, Kevin Blankespoor, Gabriel Nelson, Rob Playter and the BigDog Team, BigDog, the Rough-Terrain Quadruped Robot, Proceedings of the 17th World Congress The International Federation of Automatic Control Seoul, Korea, July 6-11, 2008.
20. S. Shoval, E. Rimon and A. Shapiro, "Design of a spider-like robot for motion with quasi-static force constraints," Proceedings 1999 IEEE International Conference on Robotics and Automation, Detroit, MI, 1999, pp. 1377-1383 vol.2. doi: 10.1109/ROBOT.1999.772553.
21. Yi Lu, Keke Zhou, Nijia Ye, Design and kinemics/dynamics analysis of a novel climbing robot with tri-planar limbs for remanufacturing, Journal of Mechanical, Science and Technology, March 2017, Volume 31, Issue 3, pp 1427–1436[5] Claudio Semini, HyQ - Design and Development of a Hydraulically Actuated Quadruped Robot, A thesis submitted for the degree of Doctor of Philosophy (Ph.D.) April 2010.
22. Hongbo Wang, Zhengyan Qi, Guiling Xu, Fengfeng Xi, Guoqing Hu and Zhen Huang, Kinematics Analysis and Motion Simulation of a Quadruped Walking Robot with Parallel Leg Mechanism, The Open Mechanical Engineering Journal, 2010, 4, 77-85.
23. Garabini M., Santina C.D., Bianchi M., Catalano M., Grioli G., Bicchi A. (2017) Soft Robots that Mimic the Neuromusculoskeletal System. In: Ibáñez J., González-Vargas J., Azorín J., Akay M., Pons J. (eds) Converging Clinical and Engineering Research on Neurorehabilitation II. Biosystems & Biorobotics, vol 15. Springer, Cham.

Cite This Article: Lima Akter, Pronoy Chandra Sarker, Md Gazi Salahuddin, Md Arafat Hossan, Sojib Foysal, Md Jakaria Islam, Md Nafiur Rahman Jamin, Sakibul Hasan, Abir Hasan, Morium Nissa Banna, Nurn Nahar, Abid Hasan (2025). Design and Development of a Quadruped Spider Robot. *East African Scholars J Eng Comput Sci, 8*(5), 114-123.