SNAKE ROBOT

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Abstract— Snake Robots have many degrees of freedom, which makes them extremely versatile and complex to control. This report presents modular snake robot, its electronic architecture and control. Inspired by biological snake, snake robot moves using cyclic motions called gaits. These cyclic motions directly control the snake robot's internal degrees of freedom which causes a net motion. Each mode of the robot is controlled by a sinusoidal oscillator with four parameters: amplitude, frequency, phase, and offset.

Keywords—Degrees of freedom,sinusoidal oscillator,gaits

I. INTRODUCTION (*HEADING 1*)

Snake like robots have structural characteristics such as multi-degrees of freedom, multi-joints and modular structure, which allows them to move using various methods and good adaptabilities.Compared to wheeled and legged mobile mechanisms, the snake robot offers high stability.It can travel through almost all types of terrains. So it can be used for many applications such as rescue missions, fire-fighting and maintenance where it may either be too narrow or too dangerous for personnel to operate. We have made a prototype which can basically perform various types of snake movements.Our robot is made up of 10 modules which are connected one after the other. Among them half of the modules move in vertical direction and remaining in horizontal
direction

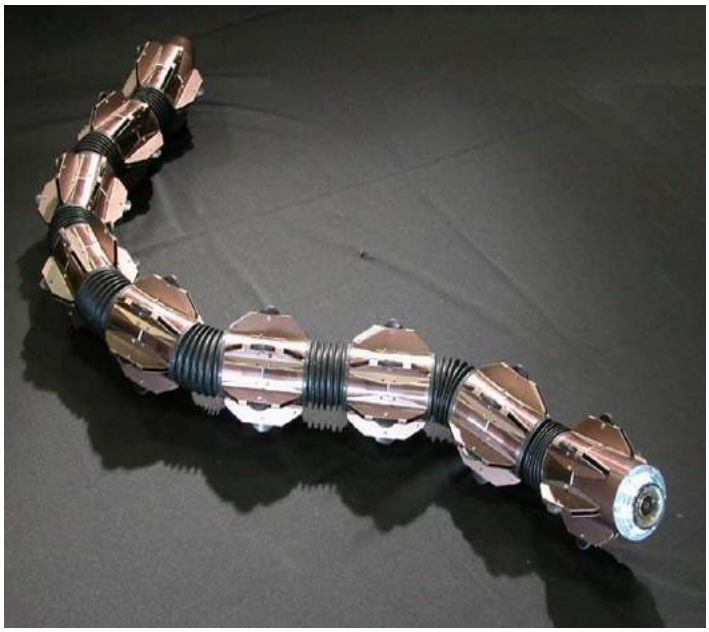


Figure 1

II. EASE OF USE

A. *Aims and objectives*

The objective of this project is to design a snake-like robot,which can either move by making decision itself in an unknown terrain (inspection) or move remotely with the assist of camera. Besides that, we are also required to program the snake-like robot so that it can move similar as the biological snakethe decisions itself when facing problems
(obstacles).
-The distance can be detect with the assist of sensors.
-The snake-like robot can lift at a certain height so that it can climb stair or
climb over the obstacles.
-The snake-like robot can remotely control by the

user.

Mechanical part

For mechanical part, the body or other mechanical parts can suit to the
locomotion of the snake-like robot have to be ensure, so that it can move in 2- axis (the xy-plane), able to overcome the obstacle and move on uneven surface, and the weight of the chosen material is important for the locomotion as well.

Electronics part

For electronics part, the effective voltage regulator for supplying efficient
power to the motor and microprocessor have to be ensure, and solving the
battery life issue being considered inefficient when supplying different power ratings by using linear voltage regulator.

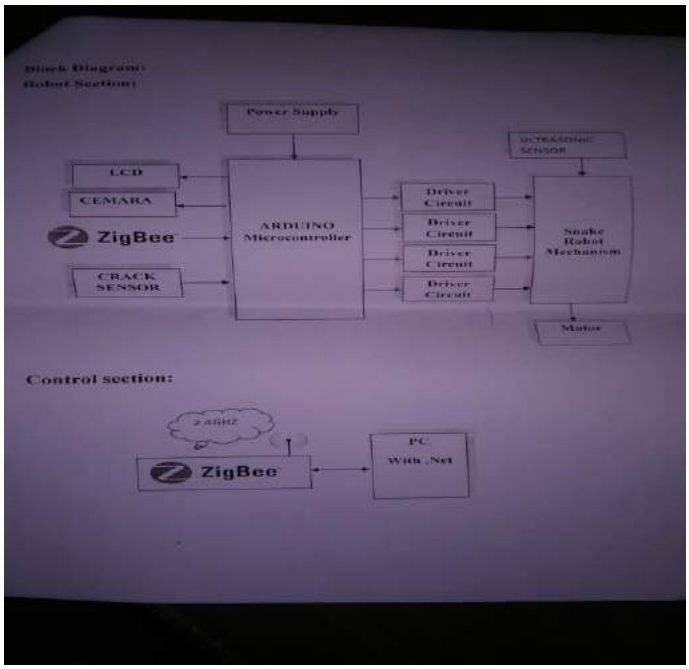
Programming part

For programming part, programming on the snake-like movement for the
snake-like robot need to be done, and with the vision assist of the camera, the snake-like robot will able to decide the possible solutions to overcome the obstacle that it face, and also able to respond to the feedback of the
controlling sensors like angle sensor.

In Programming part, the scopes are set as below

-The snake-like robot able to provide snake-like locomotion.

-The snake-like robot can make



III. LITERATURE REVIEW

Snake-like robots are multi-segmented devices. Based on their physical structure and design, these robots could have great mobility in their movements. This mobility can enable the robot to move around in more complex environments. The application of these kind of robots could be very useful in hard to reach places or hazardous environments, this is one of the reason that make the snake-like robots playing important role in our life and had been utilized in many fields like research and rescue, military, inspection and others.

IV. DESIGN AND RESEARCH OF A NEW STRUCTURE RESCUE SNAKE ROBOT WITH ALL BODY DRIVE (ROPE DRIVE SYSTEM)

After earthquake, many people are buried under ruins. Rescue is very
important in the first 48 hours, most survive are dead after 48hours. Snake robot has slime body and can reach the narrow crevices that people can't do, so is a very useful tool in climbing into ruins to detect people.(GAO etc, 2008)

This kind of snake robot is using the rope drive system to move like a snake.

The snake robot have 11 bodies and 10 joints, with the head and tail body have camera and communicator but without the drive system, where the drive systems are on the middle parts of the snake robot, which contain 9 segments. (GAO etc, 2008) Each segment contain a CPU, where the main CPU is located at the tail, so that the data such as velocity, forces, and angle value can send to the main CPU to process since the head and middle parts are move first. The main material for the body part is using the engineering plastic, which diminish the total weight, and increase the mobility of the snake robot.

References

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