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Intelligent Autonomous Six Legged Robot Operate On Uneven Surfaces

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Abstract: *This paper presents design and development of an intelligent robot that easily operates on uneven surfaces with six-legged arms. The system design depicts the "Intelligent Robot" that supports voice activation system as well as operates through the keyboard. Legged robots are appropriate to stroll on troublesome landscapes to the detriment of requiring complex control frameworks to walk even on level surfaces. Be that as it may, essentially strolling on a level surface does not merit utilizing a legged robot. It ought to be expected that strolling on an unexpected landscape is the run of the mill circumstance for a legged robot. In view of this commence, we have built up a vigorous controller for a six-legged robot that enables it to stroll over troublesome landscapes in a self-sufficient route; with a constrained utilization of tactile data (no vision is included). This walk controller can be driven by an upper level which requires not be worried about the subtle elements of foot arrangement or leg movements, taking consideration just of abnormal state angles.*
***Keywords** -Keyboard, Adriano, Voice Control, Bluetooth, Robotic*

I. INTRODUCTION

Over the counter the research based on legged motility robots has developedgradually. Legged robots have an unarguable benefits concluded above the wheeled robots intern of mobilization, energy consumption. Legged robots travel on uneven ground and or to cross waterways or steps where wheeled robots could be useless. [1] The legged robots move in uneven landscapes by changing their leg alignment, in order to familiarizethemselves to the surface irregularities. The feet may begin interaction with the land in the selected points in accord with the landscape situations. In spite of the fact that legged robots have potential advantages, in the current state of development, there are numerousfeatures that need to be upgraded and enhanced.

This is an intelligent robot system that can easily move on uneven surfaces withthe help of six legs and can proceed by its own decision in case of any obstacle approaches. This robot is quite an intelligent system,whenever an obstacle is detected; the robot changes its direction and moves in other direction. It is assumed that walking on difficult terrain is the typical situation for a legged robot. The proposed system is a vigorousregulator for a six-legged robot that allows it to walk over difficult landscapes in a self-directed way; with a limited use of sensory information. By the proposed system, described in this paper, the low-cost, simple and friendly solution for the voice-controlled platform that can be operated through the keyboard and the wireless device like smartphone, and the model presented as user-friendly, fully-customizable according to the language spoken by the user and helps in enhancement of users independent mobility. The remainder of this paper is organized as follows. Section two presents someprevious work done and section three explained theproposed system for designing legged robots.Finally, section four presents the main conclusions of this study.

II. RELATED WORK

In 1878,an early walking EdwardMuybridge model was documented which use linkage to move the body along with the horizontal path. It is an open hardware and free software project for six-legged robot with an advanced module structure. It provides Bluetooth connection,all compatible with the most expensive modules available on the market.[2]

Ryushi Aoyagi, Yoshihiro Homma, Kazuyuki presented Six-legged robot capable of climbing various columnar objects with regard to the intelligence of the entity outline.[3] The innumerable amounts of independence of the legs are measured to be organized by developing the changing aspects of the elasticity of the legs, and this moderates the computational capacity of the mind.[4][5]

Zhizhong Tong, Zhengmao Ye designed six-legged robot walk on rough landscape for electro-hydraulic control system for a large scale organization. These robots capable of handling varying load and control high bandwidth.[6]

Kenji Inoue and Masashi Kaminogo developed Steep Slope Climbing Using Feet or Shins for Six-Legged Robots. There are two methods used for implementation. In the main method the robot parks its bases. The second method routines the robot's shins to rise ground contact area.[7]

GiangHoang proposed an Omni-directional walking control of a six-legged robot (6LR) based on kinematic modelling. The simulation results for walking motion of one leg of the 6LR are shown to prove the effectiveness and applicability of the proposed controller. [8]

IndraAdjiSulistijono, focuses on teaching path planning to the robot. Basically, the owner can explain the path planning by humblestatementgrounded on experimental and blunder. Human communicatesthe path planning by using his hand. It will give an input of fuzzy controller used for the input and output movement of legged robot.[9]

M. I. Petra, L. D focuses on the optimization of the truncated power series for the inverse kinematics solution that was obtained in the earlier work for a six-legged robot. In this research, a neural network was used to replace the highly complex power expansions. The neural networks provided good accuracy in the solutions they obtained. [10]

Here, we have designed an intelligent six legged robot project to operate on uneven surfaces and to provide an inexpensive platform for research purposes, such as human interface development and prototype tests. It has been engineered around the Adriano platform to drive autonomous the six-legged robot with robust, low cost control modules.

III. PROPOSED SYSTEM

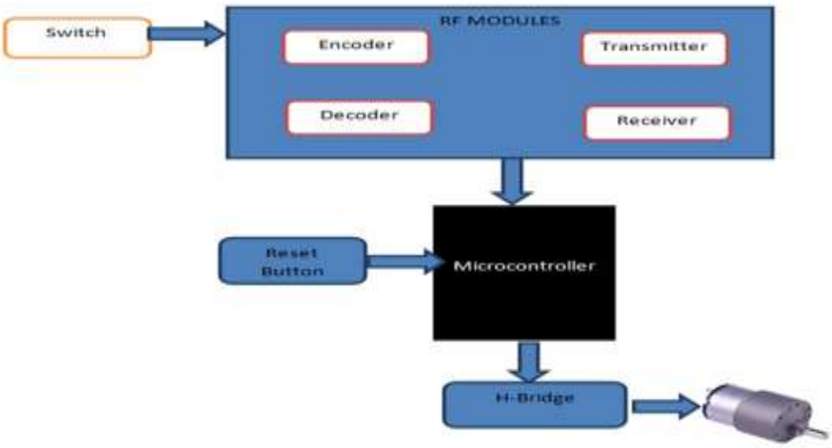

Figure1: system architecture

Fig. 1 shows the architecture of intelligent autonomous six-legged robot. The proposed system consistsof switch, RF Modules, reset button, Microcontroller,H-Bridge.The system has two parts, namely; hardware and software. The hardware architecture consists of an embedded system that is based on a keyboard, a Bluetooth Module, Motor Driver and an Android phone. The Bluetooth Module provides the communication media between the user through the android phone and the system by means of voice command given to the android phone.

3.1 Microcontroller:

Microcontroller is the heart of system.Transmitter sends all the commands to the microcontroller. Microcontroller decodes all the commands, based on the commands robot will move left, right, forward, reverse.

3.2 Encoder

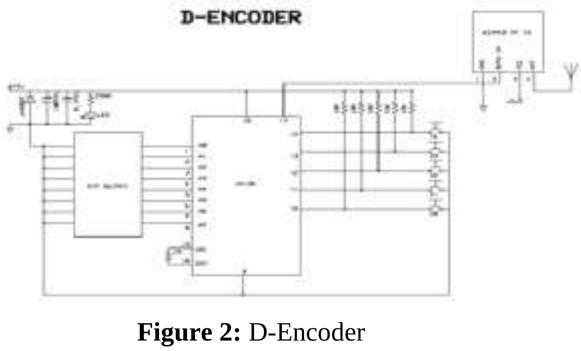

Figure 2: D-Encoder

The 12 E encoders are a series of CMOS LSIs which are mostly used for isolated control system applications. These ICs are capable of converting information, which contains N address bits and 12_N data bits. Each input address/data bus can be fixed to one of the binary logic states.

The 12 E series of encoders begin a 4-word transmission cycle upon receipt of a transmission enable (TE for the HT12E or D8~D11 for the HT12A, active low). As long as the transmission permit (TE or D8~D11) the cycle will repeat itself and the signal will low. As soon as the communicationallow returns high signal the encoder output ends its final cycle and then stops.[12]

3.3 Decoder:

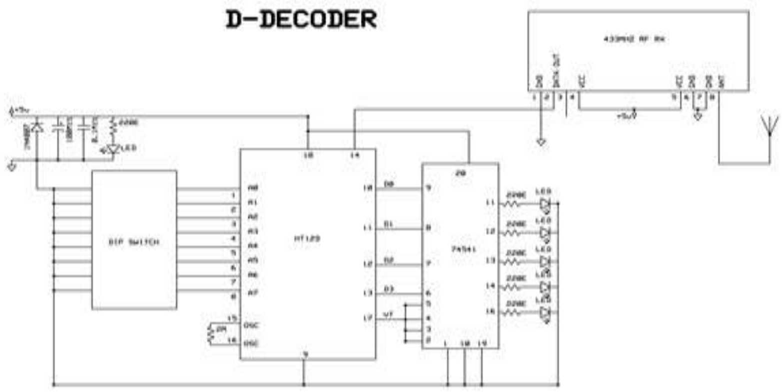

Figure 3: D-decoder

Fig 3.Shows the 12 E decoders ICs are a series of CMOS LSI s. They are paired with Holtek_s series of encoders.For proper operation, a pair of encoder/decoder with the same number of addresses and data format should be chosen. The decoders accept the address and data signal form encoders that are transmitted by a carrier signal spending an RF or an IR transmission medium. They associate the input serial informationwith the local addresses three times constantly. If incomparable codes are found or no error codes are found, the input information codes are decoded and then reassigned to the output pins. The VT pin similarlydrives high to specify a legalcommunication. [12]

IV. RESULTS

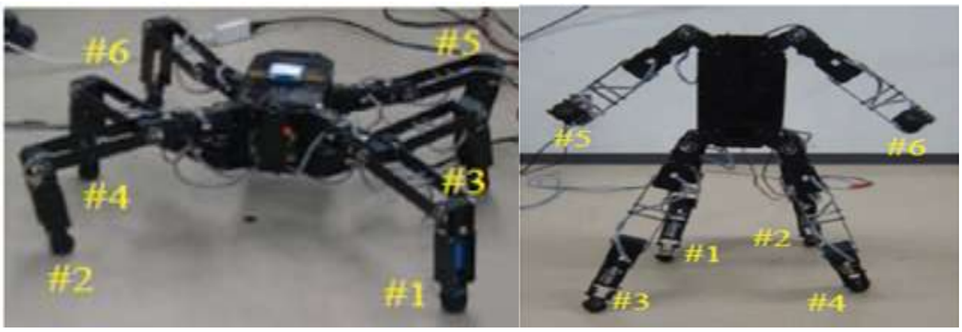

Figure 4: Six-legged mode (left) vertical four leg two arm mode(right)

Fig 4 shows the six-legged robot with vertical view and four legs two arm mode. This robot can detect human faces and can be implemented in disaster places.It can also implement as firefighting a robot.It can implement as anunderwater robot for rescue mission. The robot moves in manual mode as well as Self Mode. To detect the obstacles, two sensors placed in the facade portion of the robot.

V. CONCLUSION

A hierarchical control for a six-legged robot has been built that allows it to walk on uneven surfaces. The procedures and general organization in layers described here are applicable not only to our particular robot, but to any robot that performs statically stable walking. With some adaptations the controller could be used in robots with articulated legs, or even in robots with four or eight legs. The walk level can be seen as a low level of locomotion that keeps the robot advancing on rough terrain, comparable to the level at which a wheeled vehicle keeps the robot advancing on at ground at a constant speed. The drive level constitutes an example of an upper level that controls walk, driving the robot according to its own navigational purposes.

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