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Review Analysis of Software Installation of A BIPED Robot System for Object Detection

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Abstract- ***The world of robotics is growing and many people are interested in learning how to design versatile robots. Many limitations exist and engineers around the world are sharing their ideas and experiences with each other concerning methods to overcome these obstacles. I am making software for autonomous Robot which use biped for walking and it will detect the object. The need of robots to Assist Human Activities in daily environments, such as offices, homes and hospitals, is growing rapidly. Such robots must communicate with humans and accomplish tasks in the human's daily environments. Our daily environments are constructed so as to accommodate human bodies. Therefore, a humanoid with the anthropoid shape (two arms and two legs) is a uniquely appropriate form.***

Keywords**: SAR, AHA.**

1. INTRODUCTION

The robot is designed for specific customer. This project is being carried out for our own personal knowledge and to help other engineers in designing similar devices. The ultimate goal of the humanoid project is to build an autonomous humanoid robot capable of walking and detecting the object. It can be shown that bipedal robots have a significant future in robotics applications. Bipedal robots have advantages over conventional wheeled or tracked robots. They are more easily capable of interacting with the built environment, as they behave similarly to those for which it is intended – humans. In order to allow maximum interaction with the built environment, it is important to ensure that the motion of the robot is as similar as possible to that of humans. To this end, the robot must have a large number of degrees of freedom, acting in axes corresponding to human joints. Also, link Lengths must be similar to the corresponding human limbs, as must be the centers of gravity of the links.

2. BIPEDAL DESIGN

The signals are sent to and fro via Zigbee. Since the communication used is of both to and fro, the man can also control its motion to follow a particular direction/ object from the remote location. This project is helpful for the military/ space expedition etc to verify the atmospheric situations in a particular area without any human intervention. The object is detected using Infrared Sensor module which comprise of a transmitter and receiver section. If the distance to the object from Biped robot is found less than the predefined value, the Sensor produces control signals to the CPU that changes the motion algorithm that matches to the situation and changes the path of the robot.

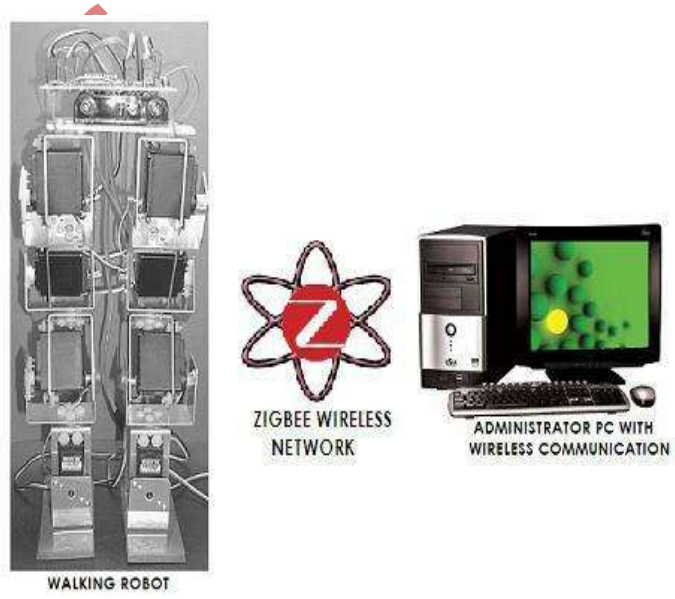

Figure 1. Block Diagram

3. BIPEDAL MOTION.

A bipedal locomotion system can have a very simple structure with three point masses connected with mass less links or very complex structure that mimics the human body. Foot– ground impact remains one of the main difficulties one has to face in the design of robust control laws for walking robots. To enable the movement of the robot seven servo motors have been used. For Right Ankle, Left Ankle, Right Knee, Left Knee, Right Top Joint, Left Top Joint and for Head. And now for the remote sensing purposes we have

attached light sensor & temperature sensor. Distance sensors are used for the purpose of obstacle avoidance and X-Y-Z sensors for balancing purposes.

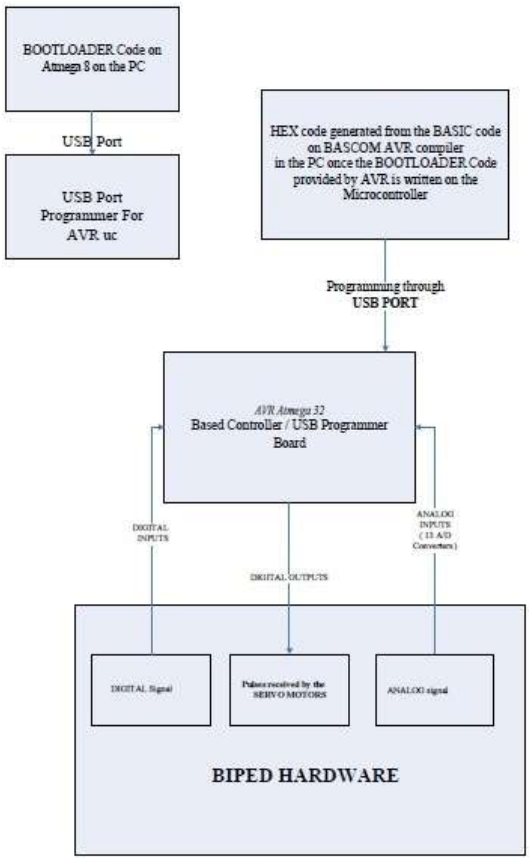

Figure 2: Control flow

Any effort that involves analytical study of the dynamics of gait necessitates a thorough knowledge of the internal structure of the locomotion system. The robot is mounted with a wireless camera for video surveillance purposes. The figure below shows the microcontroller based embedded system in the robot. Although the complexity of the system depends on the number of degrees of freedom, the existence of feet structures, upper limbs, etc., it is widely known that even extremely simple unsaturated systems can generate ambulatory motion.

3.1 *SERVO MOTORS*

Servos are controlled by sending them a pulse of variable width. The angle is determined by the duration of a pulse that is applied to the control wire. This is called Pulse width Modulation. The servo expects to see a pulse every 20 ms. The length of the pulse will determine how far the motor turns. For example, a 1.5 ms pulse will make the motor turn to the 90 degree position (neutral position). When a pulse is sent to a servo that is less than 1.5 ms the servo rotates to a position and holds its output shaft some number of degrees counter clockwise from the neutral point. When the pulse is wider than 1.5 ms the opposite occurs. The minimal width and the maximum width of pulse that will command the servo to turn to a valid position are functions of each servo.

Figure 3: Servo motors

What are problems of biped control?

The main control problems for coping with a complex control system are the stability to avoid falling down in any posture, the capacity of the mechanism to absorb impact during foot landing and the adaptation to any surface, the attitude for maintaining the reference biped body orientation These walking patterns are the starting point of the mechanical design and the control system of the biped robot, because they define the number of degrees of freedom and working angles of each joint, which are the input of the kinematics and dynamics models and the references of the control system. This is the objective of this thesis. From the previous section, the control problems of a biped machine, which are included in the "Postural reflex level" and will be detailed in other work from a colleague of the humanoid team, could be summarized as following:

1. The stability problem Stability is maintained by controlling a non-physical degree of freedom, which is called "Zero Moment Point" (ZMP). This criterion was proposed thirty years ago by Professor Miomir Vukobratovic.
2.The absorbing impact and adapting to any surface problem Imperfections or changes in the walking surface and changing the support foot while walking

drastically cause force variations on the landing foot. Those facts degenerate the biped structure.
3. The attitude problem During the walking motion, the dynamics and gravitational effects cause tipping torques which cause the biped to fall down. Furthermore, structural imperfections cause important flexion on some joints.

4. MATHEMATICAL BACKGROUND

Coordinate Frames and Transformations

The relationship between a joint and any adjacent joint can therefore be represented by a matrix transformation a series of rotations and translations in matrix form. Fortunately this method can also be applied to a biped robot which, like a manipulator arm, is simply a series of rigid links connected by actuated joints although with a much specialized purpose. Robotic manipulators consisting of a series of links and joints are quite common, and techniques for mathematically modeling them are very well known. To describe a pure rotation relative to a fixed co-ordinate frame it is only necessary to use a 3x3 matrix, for example the rotation of a position vector around the x-axis of a coordinate frame is

$$Rot_z(\theta) = \begin{bmatrix} \cos(\theta) & \sin & a \\ \sin(\theta) & \sin & d \\ \cos() & \cos & l \end{bmatrix}$$

$$T = \begin{bmatrix} Rotation(3\times3) & Translation(3\times1) \\ [0,0,0] & 1 \end{bmatrix}$$

If, however, we wish to involve the translation operation in our transform, it is necessary to use what are known as homogeneous co-ordinate frames.
The general format for a homogeneous transformation is shown below. The top left partition of this frame is a rotation, and the top right partition is a vector of length 3 describing the x, y, and z values of the translation.

The bottom two partitions are used to describe other effects of the transformation, called scaling and perspective, however these are of no interest for this particular application.

5 .PROGRAMMING MODEL

The programming of this robot can be broken down into two sections, firstly the developing board, secondly the walking program.

5.1 The Developing Board

Developing board is programmed in a way so that it is capable of executing the actions that we desired of our motors. Some of the main criteria that we felt were necessary for the developing board were size, features, how recent the technology was, and if it would have the capabilities to eventually add more advanced features in the future.

5.2 Walking Program

The walking program for the robot was intended to have all 4 motors working simultaneously to allow the robot to walk. The main walking program would coordinate the walking motion of the legs with the movement of the motors providing counter weight in order to better allow it to maintain its balance. Another aspect of the walking program was allowing the robot to correct its hip placement before walking. This was all written in the BASIC programming language.

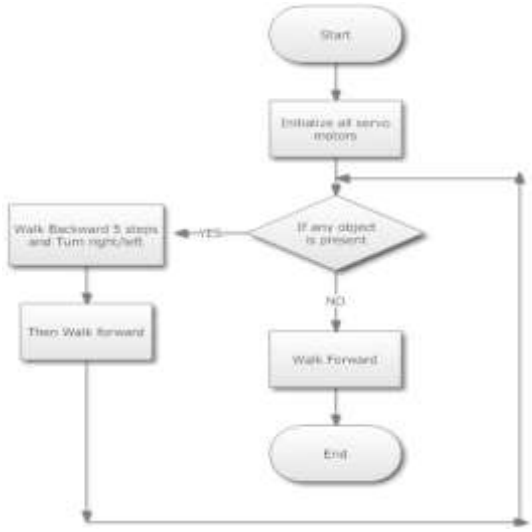

Figure 4: Program flow chart

6. APPLICATIONS OF BIPED ROBOTS

In terms of product that is available to customers, Sony developed a robot named Qrio which runs, dances, recognize faces, maintain its balance, and can get up if

knocked over. Biped robots will eventually be expanded upon in the work force. These robots are being used as receptionist in large company as well as some university's technology. Some of the capabilities of these robots are including greeting people when they enter, giving directions and transferring phone call. This hall contains robots that created to imitate past and current presidents. Their life-like mannerism and appearance adds an element of humanity to attraction, while still being fascinating technologically.

Its capabilities are including patrolling round the clock, using an elevator, replacing its own battery and wielding a fire extinguisher.

7. CONCLUSION

The population of robots is growing rapidly. This growth is led by Japan that has almost twice as many robots as the USA. All estimates suggest that robots will play an ever-increasing role in modern society. They will continue to be used in tasks where danger, repetition, cost, and precision prevents humans from performing. Passive mechanisms helped make control simple, efficient and natural looking. Actuators with Negligible Dynamics are Important.

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