HUMANOID ROBOT: ISSUES AND DESIGN

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ABSTRACT

This paper discusses a simplified issues and style of Humanoid Robot with 8 DOF. The most objective is to research the theoretical and practical challenges involved in making it. The paper emphasis on bringing down the control complexity by reducing the amount of actuators used. This successively simplifies the whole design processes and reduces the assembly cost. It also describes the steadiness issues and different walking phases intimately. The proposed robot finds the place in between simple, miniaturized humanoids and therefore the most advanced, sophisticated humanoids. Albeit the market size remains small at this moment, applied fields of robots are gradually spreading from the manufacturing industry to the others in recent years. One can now easily expect that applications of robots will expand into the primary and therefore the third industrial fields together of the important components to support our society within the 21st century. There also raises strong anticipations in Japan that robots for the private use will coexist with humans and supply supports like the help for the housework, care of the aged and therefore the physically handicapped, since Japan is that the fastest aging society within the world.

KEYWORDS - Humanoid Robot, Emotion Expression Humanoid Robot Intelligent Robot Biped Robot

I. INTRODUCTION

Humanoid Robots basically resembles human body . Humanoid Robotics is an effort to style a tool that works with human and is specifically not an effort to recreate person . Humanoids are expected to co-exist and work along side humans in environments which are meant for citizenry . Such Robots has got to interact with humans, who lives a social life. Simulation of physical body gives a far better idea about Humanoids. A minimalistic approach for designing Humanoids is achieved by utilizing springs and therefore the oscillatory motion of pendulums.

Robots designed with such an approach have simple control mechanisms, minimal functionality, minimal energy consumption and low production cost.Though robot locomotion by walking might be accomplished with these robots, it lacks areas of application thanks to its insane structure and style . On the opposite hand researches are being administered for developing complex humanoid robots, which is analogous to citizenry . this might be called the complex approach.

The ASMO humanoid manufactured by Honda, the WABIAN series of humanoids of Waseda University, Bonten-Maru II[2] , KHR-2, HRP2 are documented for human like design. Researchers has also developed designs for humanoid robot from the attitude of DOFs and joint angles to achieve Flexibility in human-like motion .to realize this they closely monitored body flexibility of human and correlated it to their design. The objective of this research is to develop a humanoid robot that would find an area in between, the robots developed using the two approaches. The proposed robot design requires minimal computational and mechanical efficiency, at a minimum.

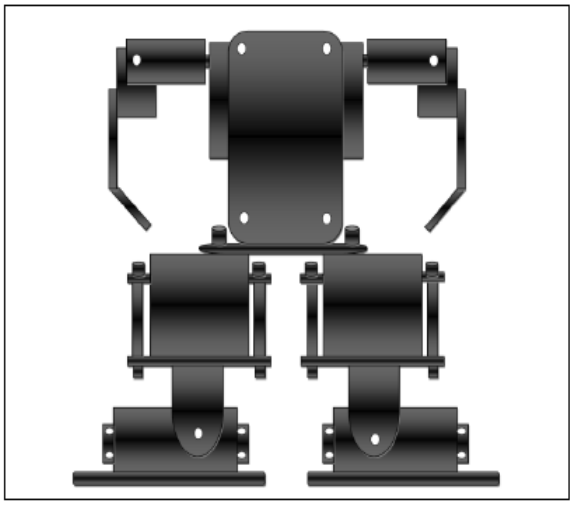


Fig. 1 : Model of Proposed Robot

Actuators, simple control algorithms and electronics and most significantly it reduces cost . The Robot has 8 DOFs, with 4 DOFs on upper body and 4 DOFs on lower body. The upper body has 2 arms with shoulder and elbow (2 DOFs each .) Lower body has 2 legs with Hip and Ankle (2 DOFs each). Design model of the proposed humanoid robot is shown in Figure 1.

II. MECHANICAL DESIGN

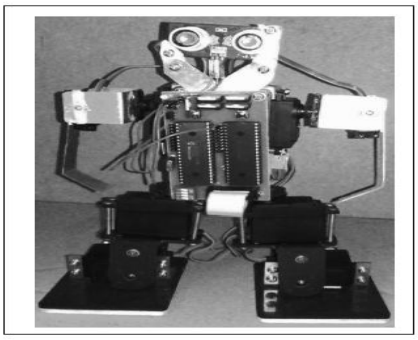
Design Considerations the Design considerations are as follows,

1) Height of the Humanoid
2) Angle of body in frontal plane
3) Angle of body in lateral plane
4) Position of feet with reference to body
5) Position of feet with reference to floor

III. ELECTRICAL DESIGN

Every Robot features a number of motors to supply actuation and sensors which are controlled employing a processing element. There are verities of actuators, sensors and processing elements. during this project, two separate PIC 18F452, microcontrollers are employed as processing elements. The circuit is meant in such how that, just one microcontroller are going to be active at a specific time. Controller selection switch is provided to pick the microcontroller to be used the thought of implementing the planning using two microcontrollers is to extend the amount of applications, which will be performed by the robot in future. By this the whole load of applications might be divided on to 2 microcontrollers, thus making the control part easier and straightforward .

A 4 pin DIP switch is provided to pick a specific application embedded in each controller. thanks to space limitations in Main Controller Board, a Servo Extension board is provided. This board provides power and signals for the servo motors. Servo Extension Board is connected to Main controller board via FRC.



IV. ISSUES OF OF HUMANOID ROBOT :

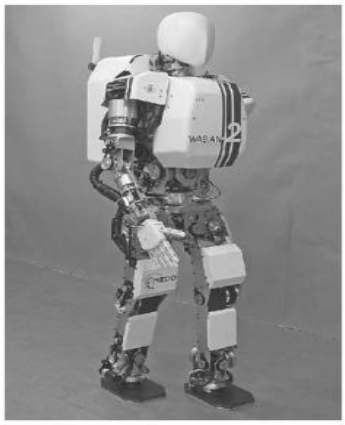
Even though the market size remains small at this moment, applied fields of robots are gradually spreading from the manufacturing industry to the others in recent years. One can now easily expect that applications of robots will expand into the primary and therefore the third industrial fields together of the important components to support our society within the 21st century.

There also raises strong anticipations in Japan that robots for the private use will coexist with humans and supply supports like the help for the housework, care of the aged and therefore the physically handicapped, since Japan is that the fastest aging society within the world. As a result, human robots and / or animoid robots are considered subjects of robotics research in Japan as a search tool for human / animal science, an entertainment / mental robot or assistant / agent.

Humanswithin the human living environment. Over the last few years, some manufactures began to develop prototypes or maybe to sell production robots for the needs mentioned above, like the SONY'S pet robot AIBO and therefore the small size humanoid robot QRIO, the TMSUK's tele-humanoid robot TMSUK04 and therefore the TMSUK-SANYO's home utility robot ROBORIOR, the HONDA's humanoid robot ASIMO, the TOYOTA's partner humanoid robots, the NEC's information agent robot PaPeRo, etc.

Most of these robots have some lifelikeness in their appearances and behaviors. Moreover, AIST, METI of Japan launched some

national projects, like Humanoid scientific research (HRP) in 1998 and therefore the New Generation Robot Project in 2004 to develop humanoid robots and repair robots, to accelerate the market growth of private and repair robots within the near future. Bipedal Humanoid Robot WABIAN-2 Looking back, many researchers have studied the control and mechanism of double robots in recent years (Sakagami et al. 2002), (Nishiwaki et al. 2000),



Based upon the research philosophy mentioned above, we've been doing researches on humanoid robots, like the Biped Walking Robots as WL(Waseda Leg) series and WABIAN(WAseda Bipedal humANoid) series.

Mastication Robots as WJ(Waseda Jaw) series. flutist Robots as WF(Waseda Flutist) series. Emotion Expression Robots(Waseda Eye) series. speaking Robots as WT(Waseda Talker) series, etc. during this paper we introduce the mechanical design of the newest bipedal humanoid robot WABIANand therefore the emotion expression humanoid robot WE-4RIII.

V. CONCLUSION

The reduction in number of DOF of the robot, reduces the robot development cost also as increases robustness. The biped gait discussed is straightforward and will be implemented easily. because the number of DOFs increases, the complexity of mechanical design and style of control electronics becomes more complex. Making a humanoid to steer with lesser number of DOFs may be a choice of interest, because it results in energy efficient design. This article proposes some of the foundations for further research and development of human robots with a minimal number of DOFs.

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