Humanoid Robot

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***Abstract*— A dream of humanoid robot researchers is to develop a complete "human-like" (whatever that means) artificial agent both in terms of body and brain. We now have seen an increasing number of humanoid robots (such as Honda's ASIMO, Aldebaran's Nao and many others). These, however, display only a limited number of cognitive skills in terms of perception, learning and decision-making. On the other hand, brain research has begun to produce computational models such as LIDA**

I. INTRODUCTION

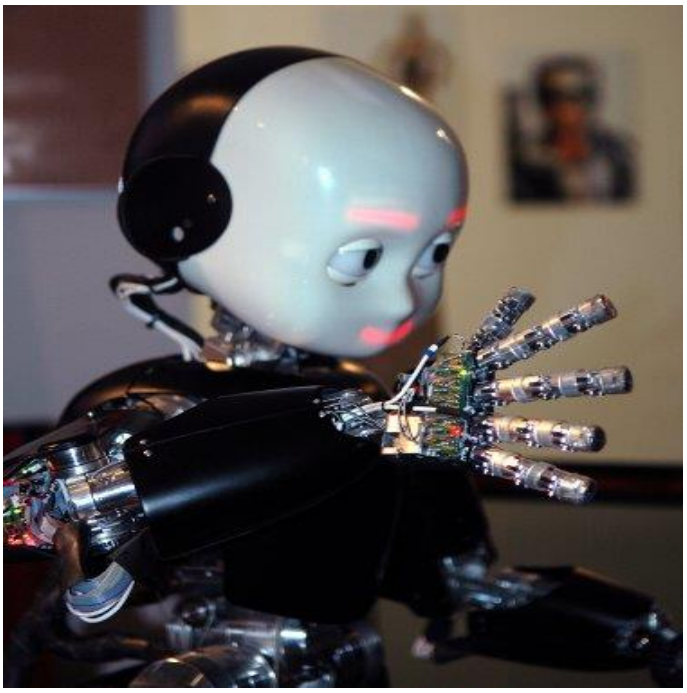
The field of humanoids robotics, widely recognized as the current challenge for robotics research, is attracting the interest of many research groups worldwide. Important efforts have been devoted to the objective of developing humanoids and impressive results have been produced, from the technological point of view, especially for the problem of biped walking. In Japan, important humanoid projects, started in the last decade, have been carried on by the Waseda University and by Honda Motor Co. The Humanoid Project of the W asedaUniversity, started in 1992, is a joint project of industry, government and academia, aiming at developing robots which support humans in the field of health care and industry during their life and that share with human information and behavioral space, so that particular attention have been posed to the problem of humancomputer interaction. Within the Humanoid Project, the Waseda University developed three humanoid robots, as research platforms, namely Hadaly

II. PURPOSE OF HUMANOID ROBOT

Researchers study the human body structure and behavior (biomechanics) to build humanoid robots. On the other side, the attempt to simulate the human body leads to a better understanding of it. Human cognition is a field of study which is focused on how humans learn from sensory information in order to acquire perceptual and motor skills. This knowledge is used to develop computational models of human behavior and it has been improving over time.

It has been suggested that very advanced robotics will facilitate the enhancement of ordinary humans. See transhumanism.

Although the initial aim of humanoid research was to build better orthosis and prosthesi for human beings, knowledge has been transferred between both disciplines. A few examples are powered leg prosthesis for neuromuscularly impaired, ankle-foot orthosis, biological realistic leg prosthesis and forearm prosthes



Types of sensor

l.Sensor

A sensor is a device that measures some attribute of the world. Being one of the three primitives of robotics (besides planning and control), sensing plays an important role in robotic paradigms.

Sensors can be classified according to the physical process with which they work or according to the type of measurement information that they give as output. In this case, the second approach was used.

1) Proprioceptive sensors

2) Exteroceptive sensors

Proprioceptive sensors

Proprioceptive sensors sense the position, the orientation and the speed of the humanoid's body and joints.

1) In human beings the otoliths and semi-circular canals (in the inner ear) are used to maintain balance and

orientation. In addition humans use their own proprioceptive sensors (e.g. touch, muscle extension, limb position) to help with their orientation. Humanoid robots use accelerometers to measure the acceleration, from which velocity can be calculated by integration; tiltsensors to measure inclination; force sensors placed in robot's hands and feet to measure contact force with environment; position sensors, that indicate the actual position of the robot (from which the velocity can be calculated by derivation) or even speed sensors

Exteroceptive sensors

. Arrays of tactels can be used to provide data on what has been touched. The Shadow Hand uses an array of 34 tactels arranged beneath its polyurethane skin on each finger tip.[3] Tactile sensors also provide information about forces and torques transferred between the robot and other objects.

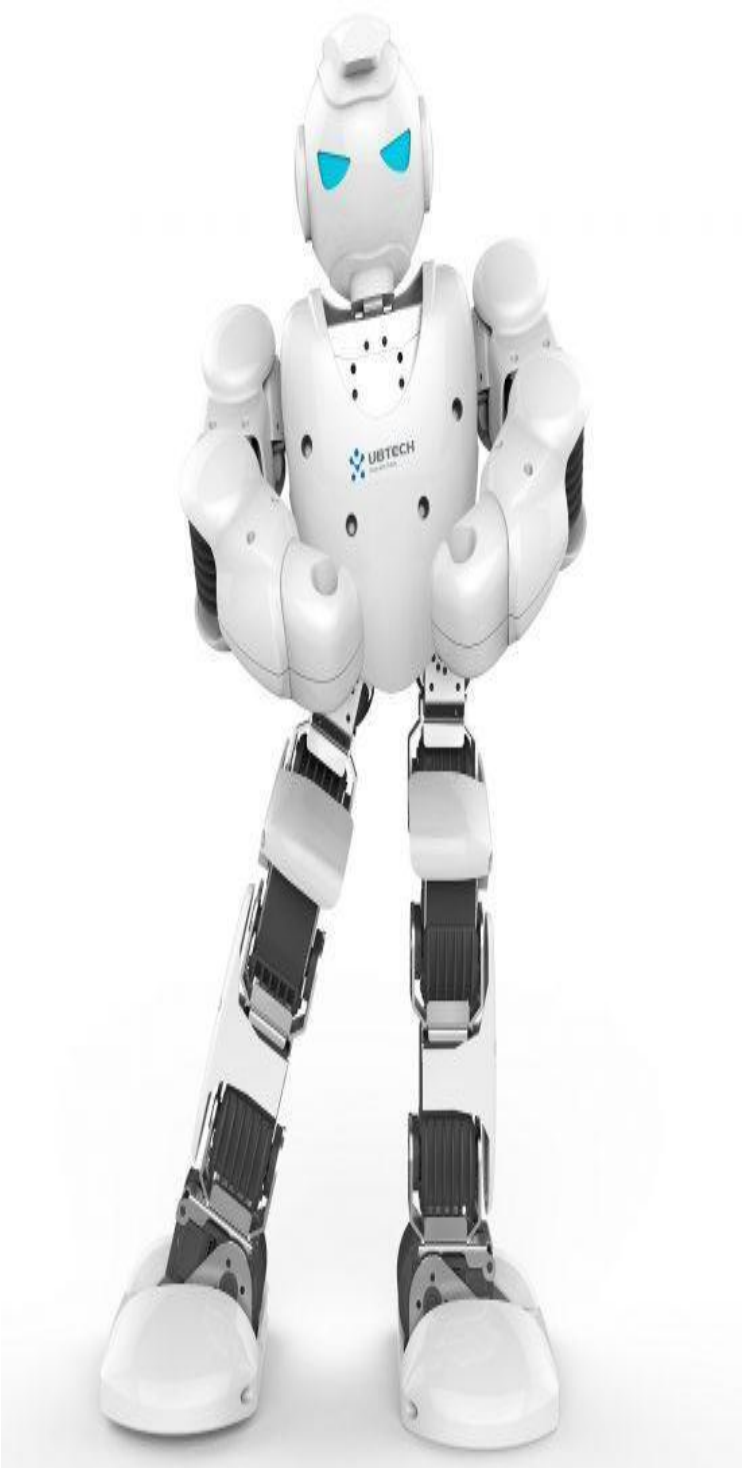
Vision refers to processing data from any modality which uses the electromagnetic spectrum to produce an image. In humanoid robots it is used to recognize objects and determine their properties. Vision sensors work most similarly to the eyes of human beings. Most humanoid robots use CCD cameras as vision sensors.

Sound sensors allow humanoid robots to hear speech and environmental sounds, and perform as the ears of the human being. Microphones are usually used for this task.

planning and control,

The essential difference between humanoids and other kinds of robots (like industrial ones) is that the movement of the robot has to be human-like, using legged locomotion, especially biped gait The ideal planning for humanoid movements during normal walking should result in minimum energy consumption, as it does in the human body. For this reason, studies on dynamics and control of these kinds of structures has become increasingly important.

The question of walking biped robots stabilization on the surface is of great importance. Maintenance of the robot's gravity center over the center of bearing area for providing a stable position can be chosen as a goal of control.[4]



To maintain dynamic balance during the walk, a robot needs information about contact force and its current and desired motion. The solution to this problem relies on a major concept, the Zero Moment Point (ZMP).

Another characteristic of humanoid robots is that they move, gather information (using sensors) on the "real world" and interact with it. They don't stay still like factory manipulators and other robots that work in highly structured environments. To allow humanoids to move in complex environments, planning and control must focus on self-collision detection, path planning and obstacle avoidance.

Humanoid robots do not yet have some features of the human body. They include structures with variable flexibility, which provide safety (to the robot itself and to the people), and redundancy of movements, i.e. more degrees of freedom and therefore wide task availability. Although these characteristics are desirable to humanoid robots, they will bring more complexity and new problems to planning and control. The field of whole-body control deals with these issues and addresses the proper coordination of numerous degrees of freedom, e.g. to realize several control tasks simultaneously while following a given order of priorit

Work of humanoid robot

As the name says it is robot resembling human body. humanoid robots have a head, body arms and legs, similar to human body. It has sensors to sense its surroundings or required measurements or readings. It has actuators to get the work done through motion. There are several motors which are responsible for the robot's motion. They are programmed to be intelligent enough rather than performing the repetitive tasks.

Types of robot

- Mobile robot
- Industrial robot
- Service robot
- Teler robot
- Beam robot
- Micro robot

III. APPLICATION

There are many a applications of Humanoid Robot. They can be used an refugees to help out in tough conditions where there is a need of human skill , but is dangerous to human life,for example like bomb disposal,mine full of harmful gases.
The humanoid robot also help us to under the human structure and the movement of limbs and all . This knowledge can help full for building prosthetic limbs for disables and can be used in Operation theatre.

These were few of my answers for you question , may be helpful to you.

IV. CONCLUSION

Today we find most robots working for people in industries, factories, warehouses, and laboratories. Robots are useful in many ways. For instance, it boosts economy because businesses need to be efficient to keep up with the industry competition. Therefore, having robots helps business owners to be competitive, because robots can do jobs better and faster than humans can, e.g. robot can built, assemble a car. Yet robots cannot perform every job; today robots roles include assisting research and industry. Finally, as the technology improves, there will be new ways to use robots which will bring new hopes and new potentials.

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