Humanoid Robot
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Research and development on this project began in 1986. In 1996 the prototype P2 made its debut, followed by P3 in 1997. "ASIMO", Advanced Step in Innovative Mobility, is a further evolved version of P3, it has a people-friendly size which allows it to perform tasks within human living environments. Honda found that leg and foot movements were not effected with absence of toes. Support comes from the base sections of the toes which are the balls of feet, and joint areas. Foot joints are needed to feel contact with a walking surface. Knee joints are needed to go up and down stairs. Honda also integrated a coxae, knee joints and articulation pedis into their robot for more realistic walking. Joint alignment is based on an equivalent human skeletal structure. Range of motion is based on test date from walking and movement up and down stairs. Center of gravity, weights, and dimensions are all based on the human body. Torque acting on the joints was based on measurements from human joint movement and reaction vectors from contact surfaces. Equilibrium is ensured by three sensing mechanisms. Acceleration is sensed by the statoliths. Three semicircular canals detect angular velocity. The bathyesthesia of muscles and skin is used for detecting angles, angular velocity, muscular dynamism, pressures on plantae, and sense of contact. The visual sense of the robot system needed to incorporate G-force and six-axial force sensors to detect the conditions of legs/feet while walking, and an inclinometer and joint-angle sensors to detect the overall posture.

A human eases the impact of walking with a combination of structures and functions of movement. The former includes soft skin, ankles and arch-like structures comprised of several bones at the toe joints. The latter is ensured by the bending motions at joints when the plantae come into contact with the walking surface. The robot has to feature similar shock-absorption mechanisms, the structural measurements were not viable because they might have reduced the robot's stability. To solve this instability impact absorption was ensured through precise control of each component which were based on the specifications from the robot's legs and feet.

Through I-Walk technology and mechanical adjustments based on the human body structure and our center of gravity.

Walking pattern have changed from straight-pause-turn-pause-straight to Asimo's straight- turn- straight. Asimo is able to create walking patterns based on real time and make the necessary adjustments as it moves.

References

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