SWAYAT
(20 DoF HUMANOID ROBOT)

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Problem / Question

Various types of robots have been built to perform various task. But there is a need of a versatile robot that would be able to interact the best with humans.

Hypothesis

- A single robot that can perform various task.
- Robot resembling humans able to interact with them and can be a personal companion.
- A research platform for studying human development.
- A robot completely autonomous and robust.

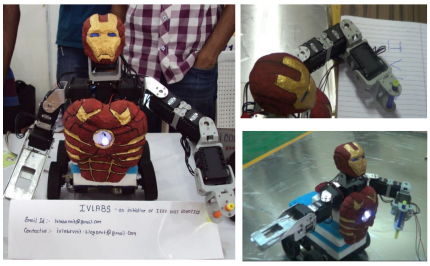
Project Overview

- Swayat is intended for research on areas such as motion planning, stereo vision and adaptive control systems.
- A humanoid design can be for functional purposes, such as interacting with human tools and environments, for experimental purposes, such as the study of bipedal locomotion amongst other purposes.

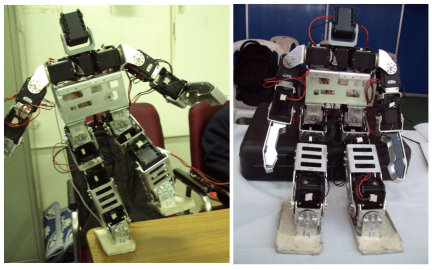
Technical Overview

- Swayat is a 20 degree of freedom kid size humanoid robot.
- 3D-CAD model of complete framework of robot is Designed in **SOLIDWORKS** software.
- All the required parts made of aluminum and fabricated using **CNC milling Machine.**
- Used combination of **Dynamixel** AX-12A , MX-28 and MX-64 motors in the robot
- Dynamixel servo are the actuators equipped with an onboard 32 bit, 72 MHz cortex M3, a contact-less magnetic encoder with 4x the resolution.
- **Robot Operating System(ROS)** used for the control of the robot.
- Developed a testing platform for kinematic analysis , generation of trajectories and visualization in **MATLAB** using **Simulink** and **Sim-mechanics toolbox**.
- Designed a sub-controller board The control of the robot using **EAGLE** circuit designing software. Sub-controller board packed a ARM® Cortex™-M4F-based microcontroller from Texas Instruments, 9-axis IMU.

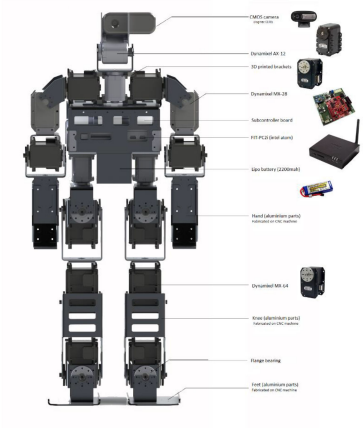
Upper Torso



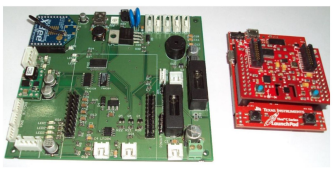
SWAYAT



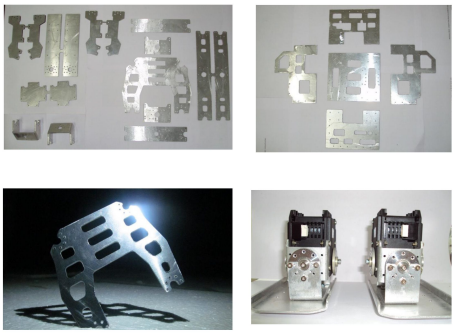
CAD-Model



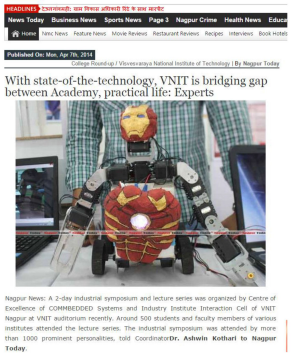
Processor & Circuit Board



Fabrication and Assembly



Achievements



- Second Humanoid Robot made completely in India.
- Humanoid Robot appreciated by Dr. A. P. J. Abdul Kalam during inauguration of AXIS 2014.
- Featured in Association of Mechanisms and Machines, October '14.
- Featured in various newspapers: The Hitavada, Lokmat and Nagpur Today.

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