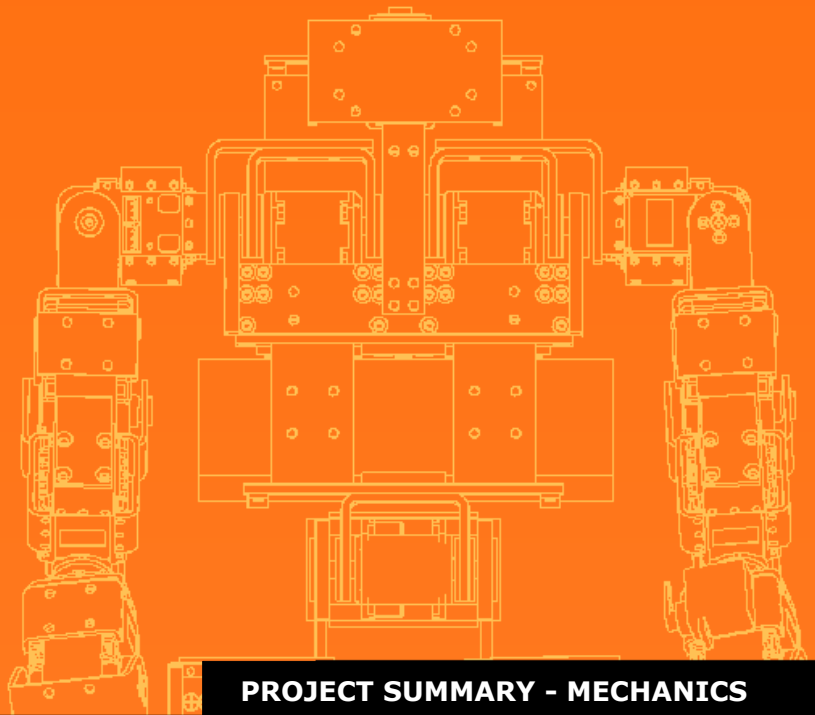


ABASTROBOT

THE HUMANOID PROJECT

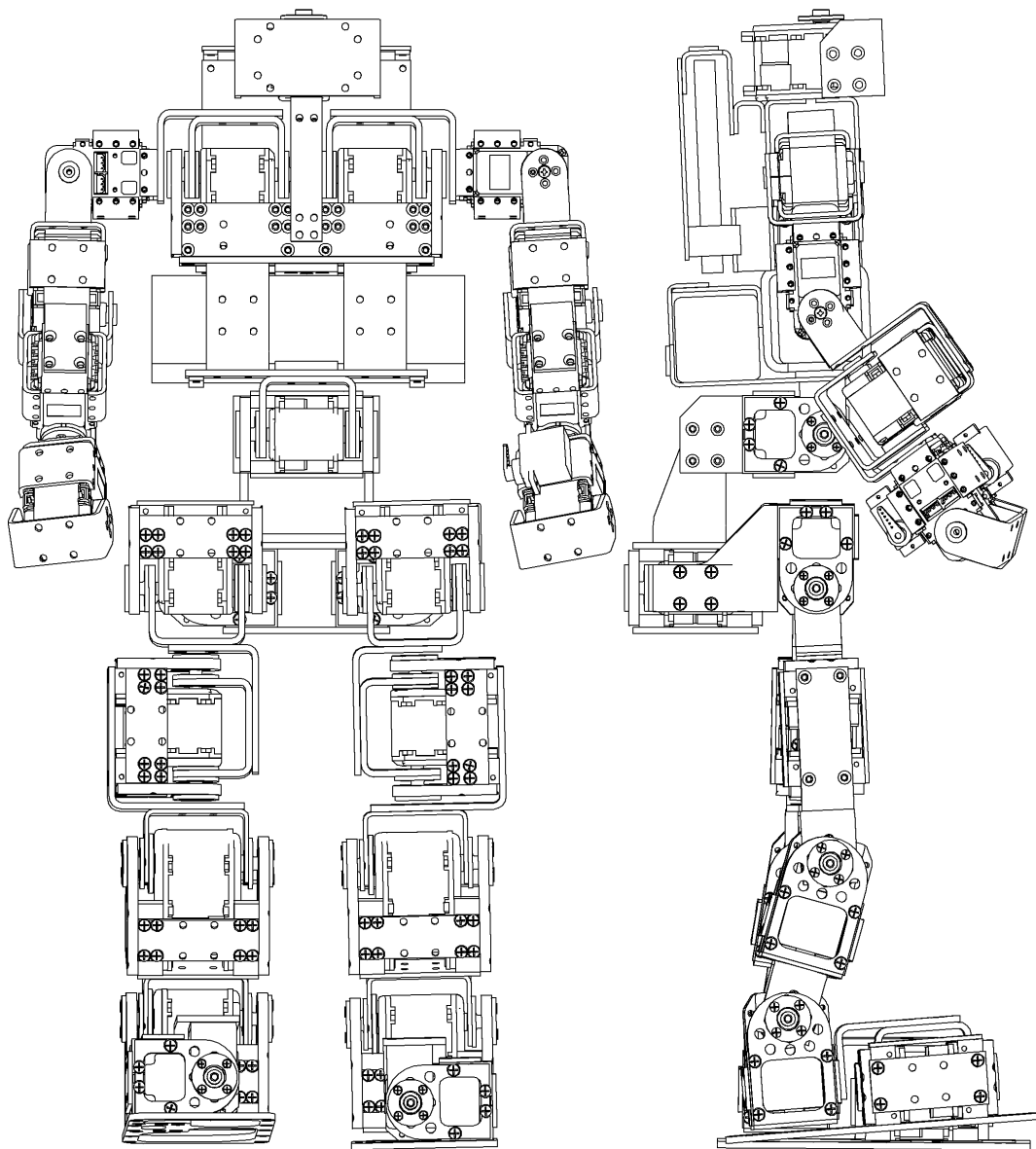


PROJECT SUMMARY - MECHANICS

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MECHANICAL DESIGN

Each servomotor that drives legs, torso, and the first degrees of freedom of hands was encapsulated in a protective structure with an additional bearing. This treatment significantly increased the stiffness of the joints. Additional bearings carry both the load applied perpendicular to the axis of rotation, as well as the small axial load. Bearings are tightly fit into bindings and the shaft mounted to the actuator. Despite relatively large size of the actuators according to the whole structure, they are placed in a way that the appropriate rotation axes intersect at single point or line. This helps the movement control of the limbs and reduces the load applied on the structures.



Drawing 1: Mechanical construction design

MODULAR DESIGN

The construction of our robot consists of modules containing servomotor with its protective structure, connected directly to other modules (by threaded joint) or indirectly, by means of additional elements. The modules have a standardized hole pattern on several surfaces, which allows to apply fast changes in the structure without further mechanical treatment.

DEGREES OF FREEDOM AND KINEMATIC FEATURES

Table 1 presents the total number of ABASTROBOT degrees of freedom.

Robot part	Amount
Legs	12 DOF
Arms	10 DOF
Head	2 DOF
Torso	1 DOF

Table 1: Degrees of freedom (palms not included)

Kinematic structure of a robot will allow to imitate the following human movements:

- walk and run in straight position
- moving on four limbs
- squats
- twines
- moving to a sitting position, and getting up
- bowing down
- flip
- grasping and manipulation of objects
- head moving - "target tracking"
- gestures

MECHANICAL TREATMENT TECHNOLOGIES:

- laser cutting
- bending on a press
- milling
- lathing
- threading
- drilling
- chamfering

MATERIAL:

- aluminum - main structure components
- structural steel - cooperating rollers with bearings

PREFABRICATED ELEMENTS

- aluminum sheet 2mm, 3mm, 4mm
- aluminum blocks
- aluminum and steel rods \varnothing 22mm, \varnothing 10mm

ASSEMBLY:

- direct and indirect threaded connections
- pressing bearings