KUKA youBot developers

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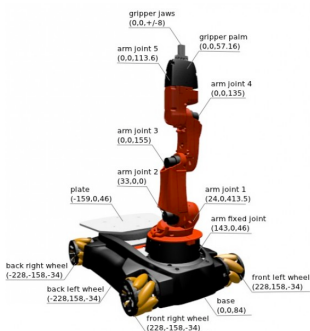# KUKA YouBot Kinematics, Dynamics And 3D Model

Manufacturer: None

Item number: do1003

None

Price on request

Amount:

1

Add to quotation list

Description

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In this section you can find a specification of the kinematic chain of the KUKA youBot, its dynamic properties and related 3D models. The 3D model is given in the following formats: .blend (Blender), .dae (Collada), and .stl.
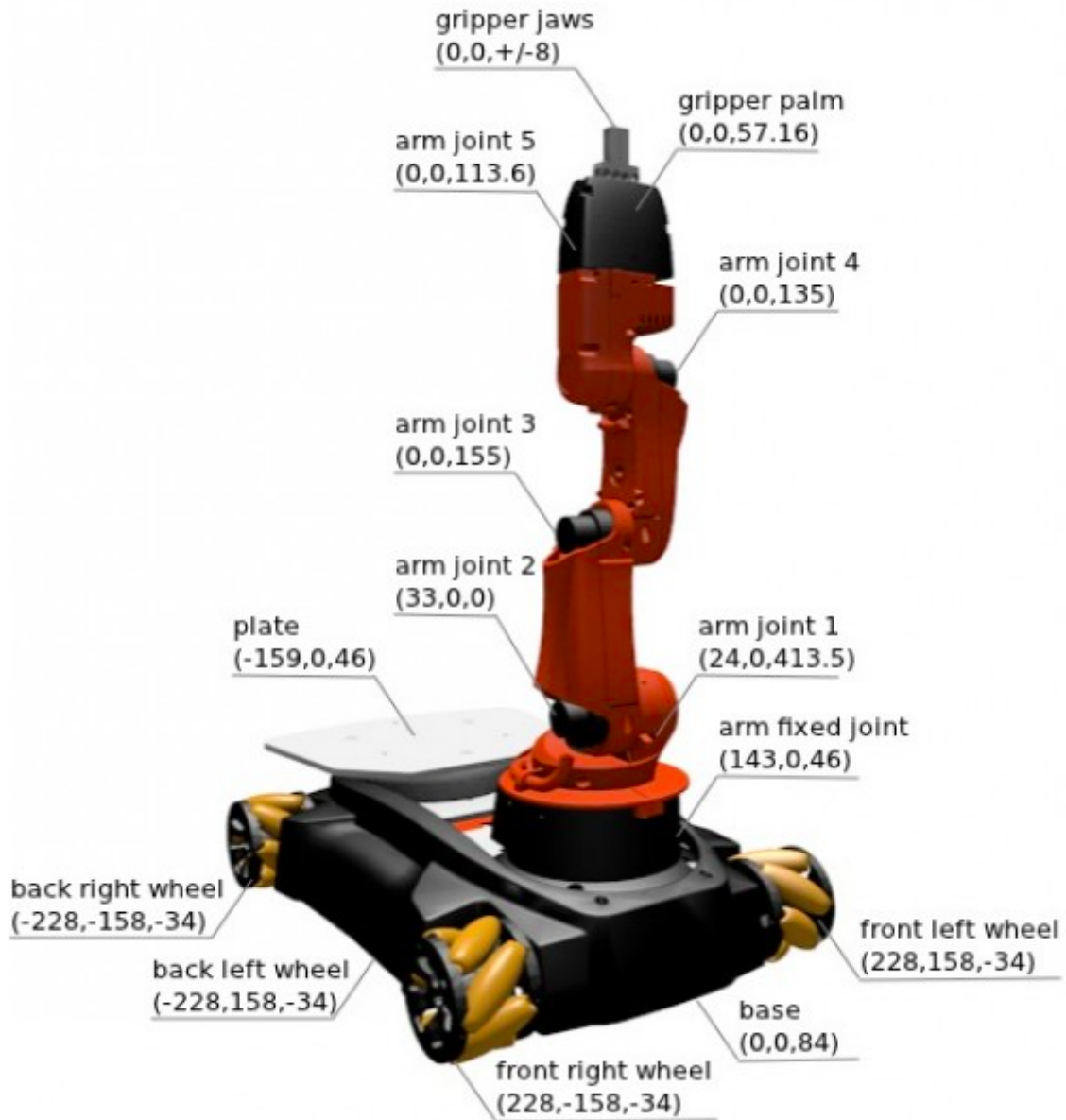
Related items

Figure 1. 3D model of the KUKA youBot. Relative positions of joints are in millimeters.

In the list below each rigid body has a relative position and orientation with respect to its parent frame. Orientation is described in Euler angles. The composite rotation convention is Yaw Pitch Roll (ZYX). Joint type describes the type of a constraint, where type can be one of the following: revolute - a hinge joint that rotates along the axis and has a limited range specified by the upper and lower limits; continuous - a continuous hinge joint that rotates around the axis and has no upper and lower limits; prismatic - a sliding joint that slides along the axis, and has a limited range specified by the upper and lower limits. Joint axis is the axis of rotation for revolute joint or the axis of translation for prismatic joint. Joint axis is specified in the joint frame. The dynamics related parameters are mass, relative pose of center of mass and moment of inertia tensor.

- base frame
- Relative positionXYZ = "0mm 0mm 84mm"
- Mass = "19.803kg"

Note: Mass of the base includes the metal frame, the plastic cover, electronics, the battery, the motors and the shafts. It only excludes wheels and the plate.

- front-left wheel joint
- Parent joint = "base frame";
- Relative positionXYZ = "228mm 158mm -34mm";
- Joint type = "continuous";
- joint axis = "0 1 0";
- Mass = "1.40kg".

Note: Mass of the wheel excludes the motor and the shaft. The motor and the shaft are already included in the base.

- front-right wheel joint
- Parent joint = "base frame";
- Relative positionXYZ = "228mm -158mm -34mm";
- Joint type = "continuous";
- Joint axis = "0 1 0";
- Mass = "1.40kg".

- back-left wheel joint
- Parent joint = "base frame";
- Relative positionXYZ = "-228mm 158mm -34mm";
- Joint type = "continuous";
- joint axis = "0 1 0";
- Mass = "1.40kg".

- back-right wheel joint
- Parent joint = "base frame";
- Relative positionXYZ = "-228mm -158mm -34mm";
- Joint type = "continuous";
- Joint axis = "0 1 0";
- Mass = "1.40kg".

- plate
- Parent joint = "base frame";
- Relative positionXYZ = "-159mm 0mm 46mm";
- Joint type = "fixed";
- Mass = "2.397kg".

KUKA YOUBOT 5-DEGREE-OF-FREEDOM ARM

- arm base frame

- Parent joint = "base";
- Relative positionXYZ = "143mm 0mm 46mm";
- Joint type = "fixed";
- Mass = "0.961kg".

Note: If the KUKA youBot arm system is operated without a mobile platform, the arm base frame is the origin frame. In this case, its relative positionXYZ is "0,0,0". If the arm is mounted on the mobile platform, the arm base frame represents a coordinate transformation with respect to the mobile platform base frame.

- arm joint 1
- Parent joint = "arm base frame";
- Relative positionXYZ = "24mm 0mm 115mm";
- OrientationZYX = "0° 0° 180°";
- Joint type = "revolute";
- Joint axis = "0 0 1";
- Joint limits = "-169° 169°";
- Mass = "1.390kg", max. torque = "9.5Nm";
- Principal axis of inertia:
- positionXYZ = "15.16mm 3.59mm 31.05mm";
- orientationZYX = "180° 20° 0°";
- inertia = "xx = 0.0029525kg·m² yy = 0.0060091kg·m² zz=0.0058821kg·m²".

- arm joint 2
- Parent joint = "arm joint 1";
- Relative positionXYZ = "33mm 0mm 0mm";
- Orientation ZYX = "-90° 0° 90°";
- Joint type = "revolute";
- Joint axis = "0 0 1";
- Joint limits = "-65° 90°";
- Mass = "1.318kg", max. torque = "9.5Nm";
- Principal axis of inertia:
- positionXYZ = "113.97mm 15.0mm -19.03mm";
- orientationZYX = "-90° 0° -90°";
- inertia = "xx = 0.0031145kg·m² yy = 0.0005843kg·m² zz=0.0031631kg·m²".

- arm joint 3
- Parent joint = "arm joint 2";
- Relative positionXYZ = "155mm 0mm 0mm";
- OrientationZYX = "-90° 0° 0°";
- Joint type = "revolute";
- Joint axis = "0 0 1";
- Joint limits = "-151° 146°";
- Mass = "0.821kg", max. torque = "6.0Nm";

- Principal axis of inertia:
- positionXYZ = "0.13mm 104.41mm 20.22mm";
- orientationZYX = "0° 0° 90°";
- inertia = "xx = 0.00172767kg·m² yy = 0.00041967kg·m² zz=0.0018468kg·m²".

- arm joint 4
- Parent joint = "arm joint 3";
- Relative positionXYZ = "0mm 135mm 0mm";
- OrientationZYX = "0° 0° 0°";
- Joint type = "revolute";
- Joint axis = "0 0 1";
- Joint limits = "-102.5° 102.5°";
- Mass = "0.769kg", max. torque = "2.0Nm";
- Principal axis of inertia:
- positionXYZ = "0.15mm 53.53mm -24.64mm";
- orientationZYX = "0° 180° 40°";
- inertia = "xx = 0.0006764kg·m² yy = 0.0010573kg·m² zz=0.0006610kg·m²".

- arm joint 5
- Parent joint = "arm joint 4";
- Relative positionXYZ = "0mm 113.6mm 0mm";
- OrientationZYX = "0° 0° -90°";
- Joint type = "revolute";
- Joint axis = "0 0 -1";
- Joint limits = "-165° 165°";
- Mass = "0.687kg", max. torque = "1.0Nm";
- Principal axis of inertia:
- positionXYZ = "0mm 1.2mm –16.48mm";
- orientationZYX = "0°90°0°";
- inertia = "xx = 0.0001934kg·m² yy = 0.0001602kg·m² zz=0.0000689kg·m²".

KUKA youBot 2-finger gripper

- gripper base frame
- Parent joint = "arm joint 5";
- Relative position = "0mm 0mm 57.16mm";
- OrientationZYX = "180° 0° 0°";
- Joint type = "fixed";
- Mass = "0.199kg";
- Principal axis of inertia:
- positionXYZ = "0mm 0mm 28.9mm";
- orientationZYX = "180° 0° 90°";

- inertia = "xx = 0.0002324kg·m² yy = 0.0003629kg·m² zz=0.0002067kg·m²".

- gripper left finger joint
- Parent joint = "gripper base frame";
- Relative position = "0mm 8.2mm 0mm";
- Joint type = "prismatic";
- Joint axis = "0 1 0";
- Joint limits = "0mm 12.5mm";
- Mass = "0.010kg".
- gripper right finger joint
- Parent joint = "gripper base frame";
- Relative position = "0mm -8.2mm 0mm";
- Joint type = "prismatic";
- Joint axis = "0 -1 0";
- Joint limits = "0mm 12.5mm";
- Mass = "0.010kg".

Here you can download hi-poly and low-poly KUKA youBot 3D models in different file formats.

- Original 3D model, converted from CAD drawings: in Blender format;
- Simplified 3D model, suitable for visualization:in Blender format, in Collada format;
- Convexhull approximation of the model above, reduced number of polygons, suitable for collision checking: in STL format.

Or simply follow this link to download entire package.

In addition, a model of the KUKA youBot is also available in the Webots package.

KUKA provides simplified STEP files of the platform and the arm.

If you have any questions regarding the models, please write to users@youbot-community.org.

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