

## Supplemental information about the virtual HSR used in the SIGVerse

### Joint of HSR

Detail definition of the joint of HSR is available from

[https://github.com/ToyotaResearchInstitute/hsr\\_description](https://github.com/ToyotaResearchInstitute/hsr_description)

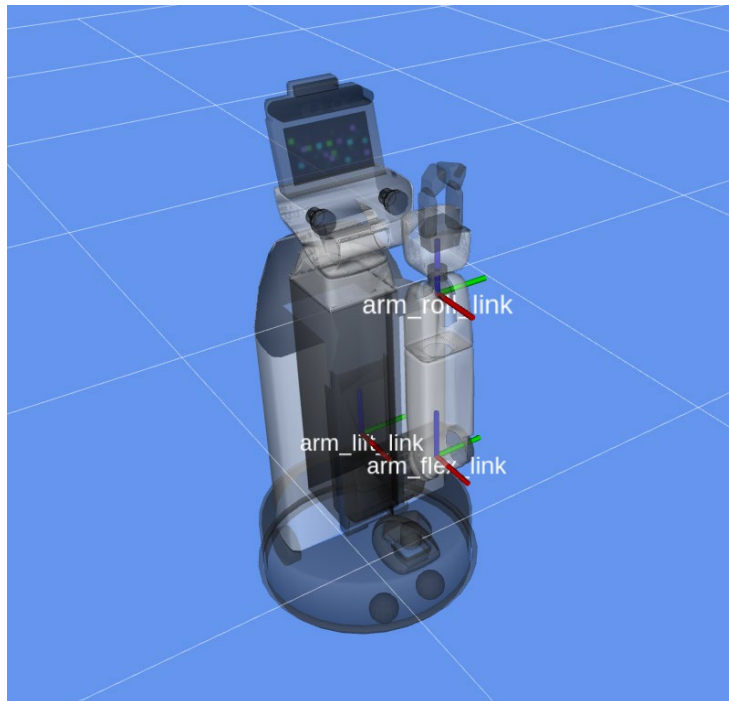
Joint name	Parent link	Child link	Type	Movable range
base_roll_joint	base_link	base_roll_link	Rotation	No limit
base_l_drive_wheel_joint	base_roll_link	base_l_drive_wheel_link	Rotation	No limit
base_r_drive_wheel_joint	base_roll_link	base_r_drive_wheel_link	Rotation	No limit
arm_lift_joint	base_link	arm_lift_link	Prismatic	0~0.69[m]
arm_flex_joint	arm_lift_link	arm_flex_link	Rotation	-150~0[deg]
arm_roll_joint	arm_flex_link	arm_roll_link	Rotation	-110~210[deg]
wrist_flex_joint	arm_roll_link	wrist_flex_link	Rotation	-110~70[deg]
wrist_roll_joint	wrist_flex_link	hand_palm_link	Rotation	-110~210[deg]
head_pan_joint	torso_lift_link	head_pan_link	Rotation	-220~100[deg]
head_tilt_joint	head_pan_link	head_tilt_link	Rotation	-90~30[deg]

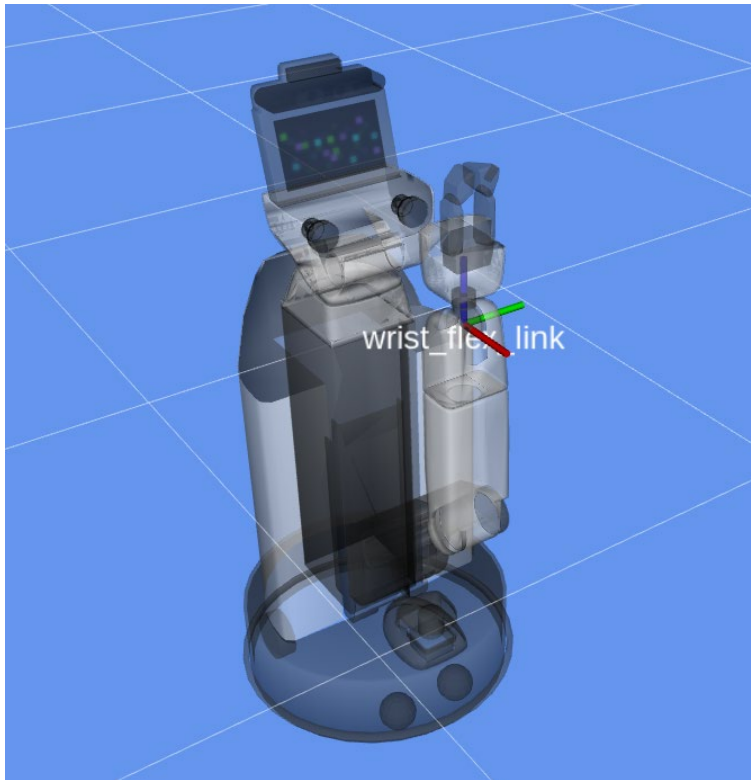
Gripper of the HSR is implemented by the two joints named `HandLProximalJointName`, and `HandRProximalJointName`. Range of each joint is -3[deg] to 35[deg] and -35[deg] to 3[deg] respectively, that means the maximum angle of the opened gripper is 70[deg]



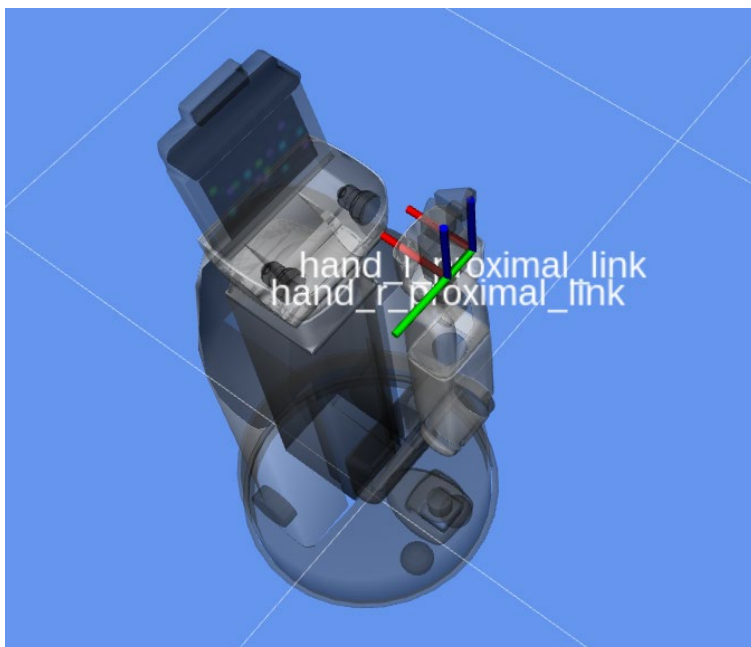
The correspondences between the joint names and appearance of the robot is as follows.

#### Arm joints

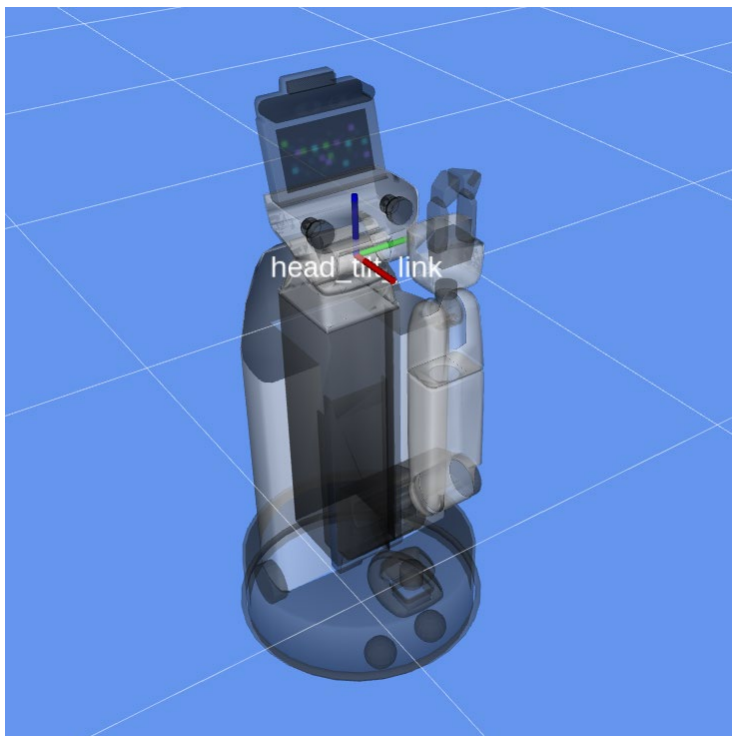
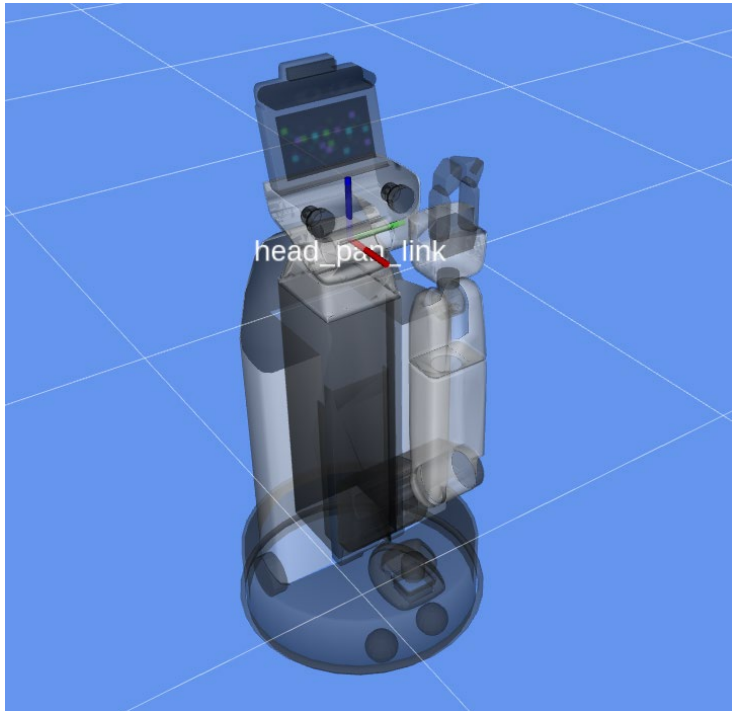




Hand joints



## Head joints



## Frequency of the ROS topic

This table shows the frequencies of data transfer process in SIGVerse. Note that these values are rough, and actual frequencies are slightly different due to the computer status.

TOPIC name	Data transfer frequency [Hz]
/hsrb/joint_state	10
/sigverse/HSR/tf	10
/hsrb/base_scan	5
/hsrb/head_rgbd_sensor/depth/camera_info	10
/hsrb/head_rgbd_sensor/depth/image_raw	10
/hsrb/head_rgbd_sensor/rgb/camera_info	10
/hsrb/head_rgbd_sensor/rgb/image_raw	10
/hsrb/head_l_stereo_camera_/camera_info	4
/hsrb/head_l_stereo_camera_/image_rect_color	4
/hsrb/head_r_stereo_camera_/camera_info	4
/hsrb/head_r_stereo_camera_/image_rect_color	4
/hsrb/head_center_camera/camera_info	10
/hsrb/head_center_camera/image_raw	10
/hsrb/hand_camera/camera_info	10
/hsrb/hand_camera/image_raw	10

## HSR Sensors

- Spec of Laser Range Finder (/hsrb/base\_scan)  
Range of the measurement angle : 240[degree] ( $\pm 120$ [degree])  
Maximum distance 20[m]  
Minimum distance 0.05[m] (5[cm])
- Spec of depth image (/hsrb/head\_rgbd\_sensor/depth/camera\_info)  
Maximum distance 8[m] (different from the real Xtion)  
Minimum distance 10[cm] (different from the real Xtion)

## **Maximum speed and angle of HSR joint**

Detail values are defined in the Unity script file:

<https://github.com/PartnerRobotChallengeVirtual/common-unity/blob/master/Assets/Competition/Common/Models/HSR/Scripts/HSRCommon.cs>