Contents

# 1 Simulation

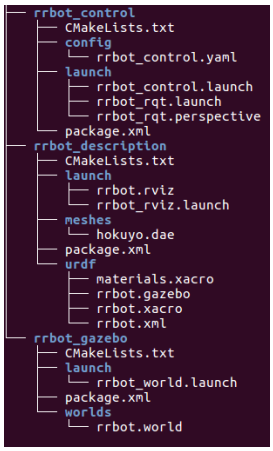
## 1.1 Launch

These files are executed one after another:

1. bb_simulation: ballbot.launch
2. bb_description: bb_description.launch
3. bb_description -> urdf: bb.xacro
4. bb_description -> urdf: bb.urdf.xacro
5. bb_description -> urdf: common_properties.xacro
6. bb_description -> urdf: bb.gazebo.xacro

## 1.2 Simulation design

Ballbot SDF Reference: Ballbotmodel
We use not the sdf but the xacro description as in this example here.




Gazebo uses different physics engines:

- Open Dynamics Engine (ODE) (Default)
- Bullet
- Dynamic Animation and Robotics Toolkit (DART)
- Simbody

which all have different friction etc. models.
Files:

- bb.urdf.xacro: Link's: Visual description of the Robot and its collision model(STL file). Pose Mass and Inertias. Joint's: Pose,axis,effort and velocity limits, friction.

- common_properties.xacro: Macros for color definition.
- bb.gazebo.xacro: gazebo references dynamics of the links: friction parameters (mu1,mu2),

Gazebo Parameter's List:

| name(xacro) | description | value | sdf group |
|---|---|---|---|
| mu1 | is the Coulomb friction coefficient for the first friction direction | 1.0 | ode |
| mu2 | is the friction coefficient for the second friction direction (perpendicular to the first friction direction) | 2.0 | ode |
| kp | spring constant equivalents of a contact as a function of SurfaceParams::cfm and SurfaceParams::erp | | ode |
| kd | spring damping constant equivalents of a contact as a function of SurfaceParams::cfm and SurfaceParams::erp. | | ode |
| cfm | Constraint Force Mixing parameter. | | ode |
| erp | Error Reduction Parameter. | | ode |
| min_depth | Minimum depth before ERP takes effect. | | ode |
| max_Vel | Maximum interpenetration error correction velocity. If set to 0, two objects interpenetrating each other will not be pushed apart. | | ode |
| slip1 | Artificial contact slip in the primary friction direction | | ode |
| slip2 | Artificial contact slip in the secondary friction dirction. | | ode |

See: ODESurfaceParams

## 1.3 Gazebo Parameters

```
git@git.sim.informatik.tu-darmstadt.de:TurtleBot/jsonlab.git
git@git.sim.informatik.tu-darmstadt.de:TurtleBot/octave_rosbridge.git
```