

Simmechanics simulation of the model

Now we will move to the physical modelling of our bot.

For that we will first use Simscape Multibody which is toolbox of matlab and simulink.

First way:

<https://youtu.be/QtmVFIZi5T8>

You can take this tutorial to design your bot. Remember that your bot should not be exactly same as this video.

Now you have to merge your simulink model to you physical model. For that you can take help from this tutorial.

<https://youtu.be/SY8KtZ2hO9Q>

Second way:

<https://youtu.be/RsiplE81uSk>

How to install simmechanics(simscape multibody) and link it to solidworks.

Similar tutorial can be found for autodesk inventor.(use joints and coordinates carefully)

After designing cad of our bot, export it in .xml file and import it in matlab using `smimport('filename.xml')` command in the command prompt. This will automatically change your cad into simmechanics blocks.

Now you have to merge your simulink model to you physical model. For that you can take help from this tutorial.

<https://youtu.be/SY8KtZ2hO9Q>

Gazebo Simulation of the model

The final task is to simulate the model in a Gazebo environment. You can refer to the following tutorial and can take most of it but it won't be the same as our objectives are a bit different.

<https://www.theconstructsim.com/ros-projects-exploring-ros-using-2-wheeled-robot-part-1/>

Now, after building the basic model by following the above tutorial, we need to implement the additional functionalities which we have developed so far e.g., LQR Control and Kalman Filtering. You can refer to the repo https://github.com/sezan92/self_balancing_robot

P.S. - You can also refer to any other resources which you find helpful.

