1. **Determine rotation matrix**

We have rotation matrix:



A translation matrix: 

Then we expand both to a 4x4 matrix:

, 

By multiplication of two matrix above, homogenous transformation matrix  can be described as:



1. **Forward kinematic**
   1. *D-H table*

- is associated to body

- is aligned with

-  is the common orthogonal axis to both  and 

-  axis intersects both and  axes.

- The origin of joint i is at the intersection of  and : 

-  is the rotational displacement around the axis  between and 

-  is the translational displacement along the axis  from  to 

-  is the rotational displacement around the axis  between  and 

-  is the translational displacement along the axis  from  to 

(Unit: mm)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Link** | **(mm)** | **(rad)** | **(mm)** | **(rad)** |
| 1 |  |  |  |  |
| 2 |  |  |  |  |
| 3 |  |  |  |  |
| 4 |  |  |  |  |
| 5 |  |  |  |  |
| 6 |  |  |  |  |

* 1. *Components of rotation matrix*
* Transformation matrix between robot links :





Where:

 

 