

# Writing with NAO

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# Goal of our project

We want to make our robot NAO write!



[1]

Analysis of handwriting and extraction of trajectory function

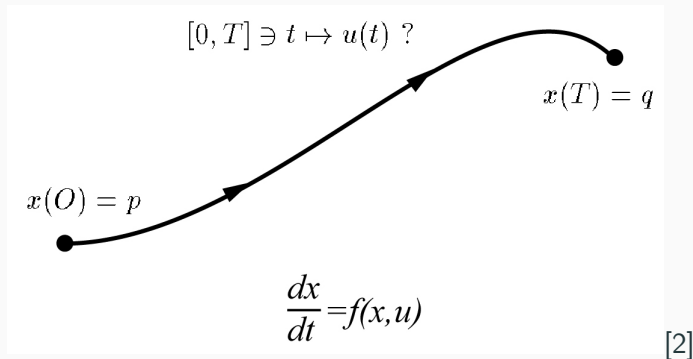
Inverse kinematics

# **Analysis of handwriting and extraction of trajectory function**

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# trajectory function

We formalize what we want to write by a trajectory function.

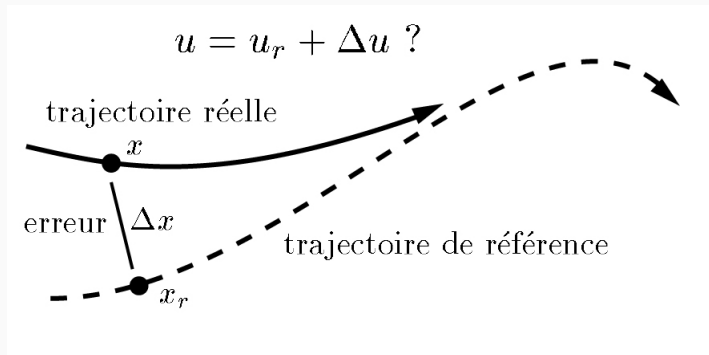


# Inverse kinematics

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## approaching the goal trajectory

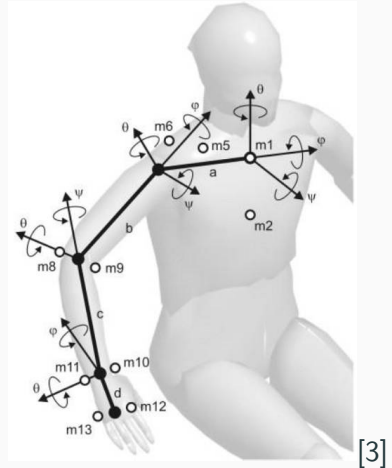
We approach this goal trajectory by solving a sequence of optimization problem: minimizing the errors between the goal trajectory and the real trajectory.



[2]

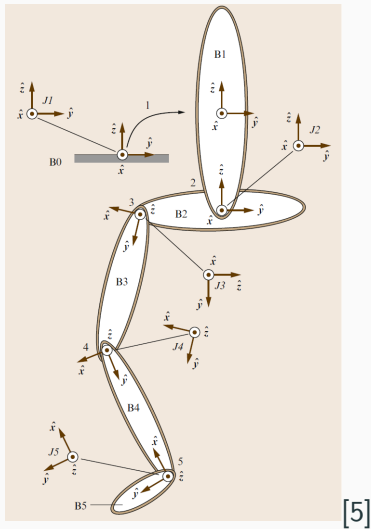
# modeling the coordinate system i

The robot is a n-joint system.  
We find the position of end-effector (the pen) by composing a sequence of *change of coordinates*.





## modeling the coordinate system ii





NAO robot illustrating a TechCrunch article.

[https://www.robotlab.com/blog/  
nao-robot-illustrating-a-techcrunch-article](https://www.robotlab.com/blog/nao-robot-illustrating-a-techcrunch-article)



Planification et suivi de trajectoires.

<http://cas.ensmp.fr/~petit/smai/>



*Interfacing of Kinect Motion Sensor and NAO Humanoid Robot for Imitation Learning.*

[https://www.youngscientistjournal.org/article/  
interfacing-of-kinect-motion-sensor-and-nao-humanoid-ro](https://www.youngscientistjournal.org/article/interfacing-of-kinect-motion-sensor-and-nao-humanoid-ro)



Emrehan Yavşan, Ayşegül Uçar. *Teaching human gestures to humanoid robots by using Kinect sensor.*

[https://www.researchgate.net/publication/282829504\\_Teaching\\_human\\_gestures\\_to\\_humanoid\\_robots\\_by\\_using\\_Kinect\\_sensor](https://www.researchgate.net/publication/282829504_Teaching_human_gestures_to_humanoid_robots_by_using_Kinect_sensor)



Oussama Khatib. *Springer Handbook of Robotics*. Fig. 3.5