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# Project NAO

By Fredrik Folkesson & Johan Nyholm



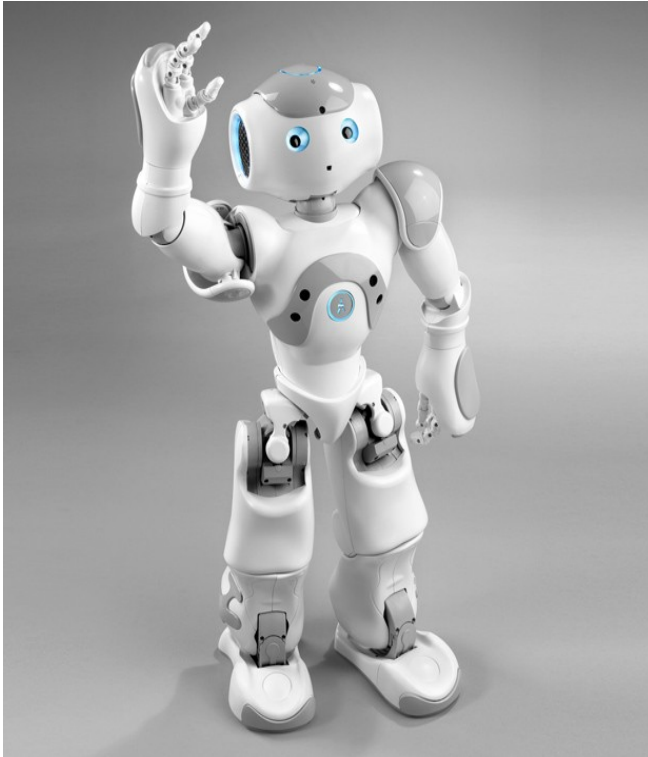
# Plans and Goals

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- **Initial Plan:** Let the NAO robot learn to recognize faces and greet people it recognizes.
- **Final Plan:** Let the NAO robot follow lines marked on the floor.
- **Additional:** Learn how to use the NAO robot python API, its restrictions and potential for serving as a platform for implementing algorithms.

# The Process 1

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- Coreographer, Python and C++.
- Read up on the NAO Python API.
- Develop out first NAO Python scripts.
  - Say "Hello"
  - Let the robot walk forward



# The Process 2

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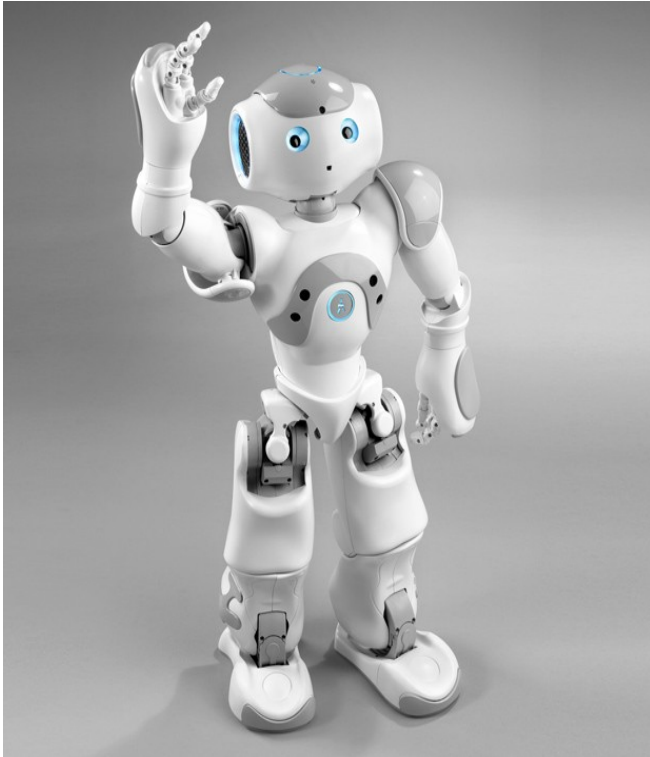


- Started researching how to do face detection and recognition.
- NAO already had finished face detection and recognition modules.
  - They were not optimal but we decided to try to follow a different path in our project.



# New Project

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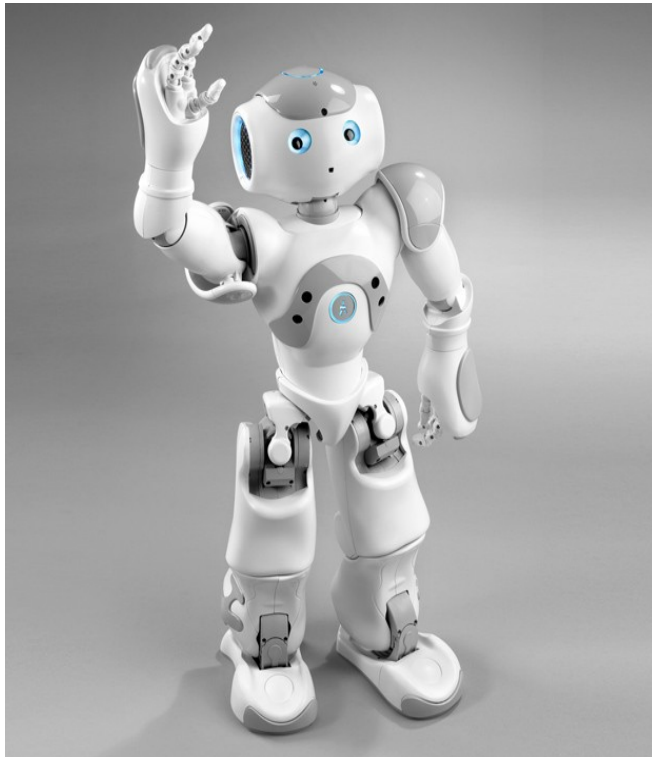


- Decided on new project to let NAO find and follow a wall.
- Decided to use the NAO robots sonar to keep a constant distance to the wall.



# Difficulties with NAO Sonar

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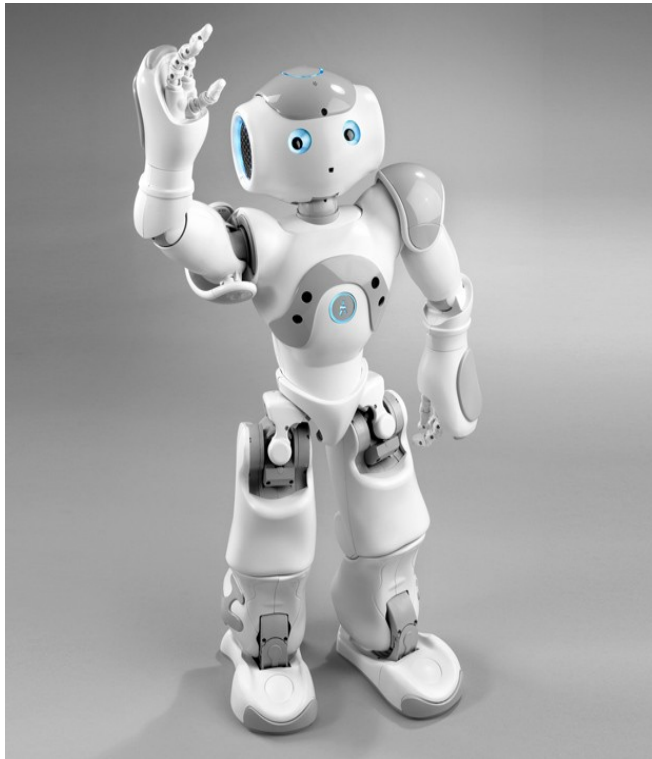


- Used NAO Sonar to measure distances to a wall.
- Tried to use sonar readings to calculate how to navigate.
- Sonars on the left and right side often gave inconsistent and erroneous measurements.
- Difficulties with Sonar API, and inconsistency in documentation.
- Stereo vision?



# Implemented navigation tools

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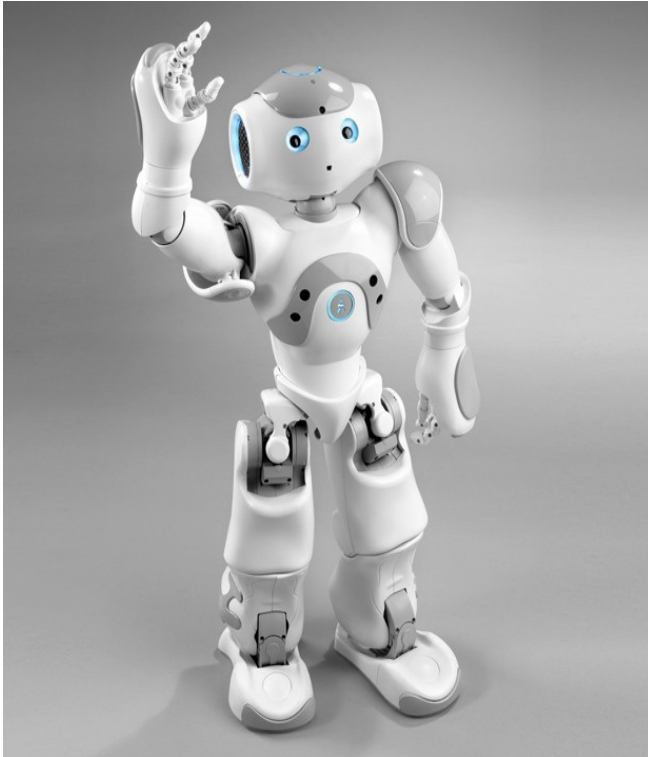
- Created Python modules in order to control the robot.
- Navigation, posture.
- Built program to control the robot with keyboard.
- Tested the use of speech recognition control. (forward vs backward?)





# NAO Image processing

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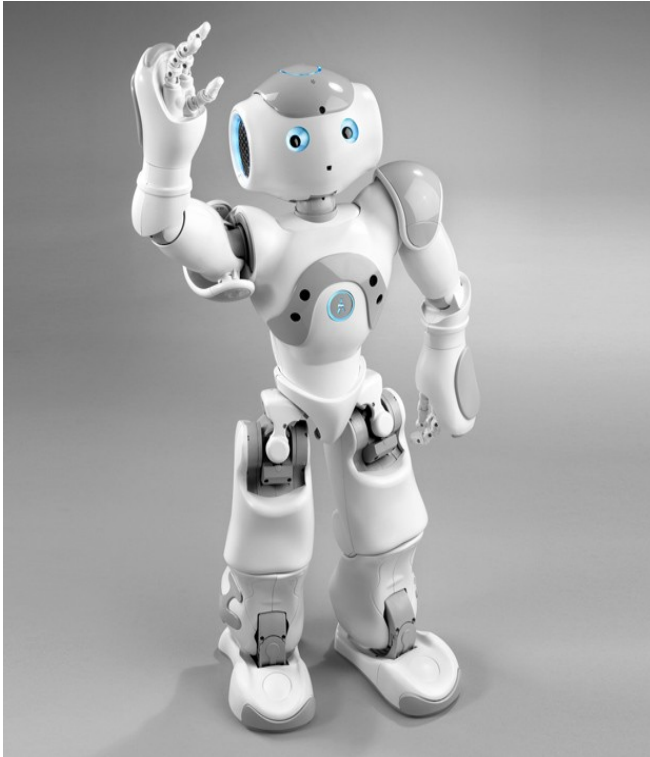
- Follow a line marked on the floor instead of a wall.
- Use NAO Camera in order to take pictures.
- Found instructions and code for NAO line detection from Aldebaran.
- Tried to make rough implementation work.





# NAO Line Follower

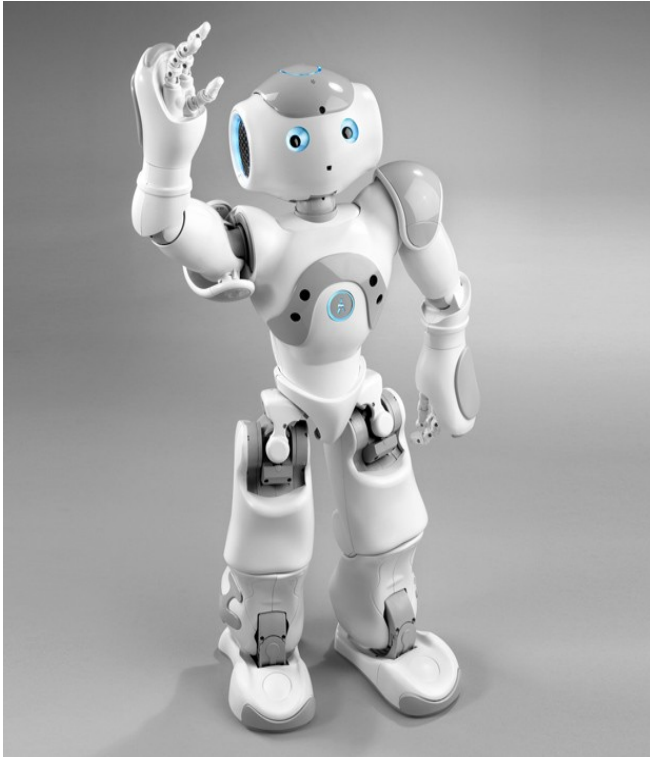
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- Code and data flow analysis.
- Image processing understanding.
- Lighting issues, glossy floor created reflections.
- Tweaked constants in algorithm.
- SOLUTION 1: Change environment.
- SOLUTION 2: Better algorithm? (Hough transform)

# NAO Line Follower Continuation

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- Extended the program, making NAO try to find a new line when finished following the last line.



# NAO Line Follower Final

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(Video not included in mail)



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