



STEMBotics Meet NAO A Humanoid Robot

NAO a new way to learn programming:

Choreographe, Aldebaran's custom, icon-based, drag and drop, programming software allows students of all ages to develop engaging, thought-provoking NAO programs.

NAO is multi-lingual; so advanced students can use C++, C#, and Python to program NAO.

NAO a new way to help autistic students:

Research at Notre Dame University has shown that NAO is an effective way to reach autistic students and help them become more successful in school.

NAO a new way to teach writing and language arts:

Students can write their own stories for NAO to tell or program NAO to tell their favorite stories.

NAO project-based STEM learning with Common Core integration

SES Robotics offers **STEMBotics-NAO** : complete packages for K-12, as well as packages for colleges and universities.

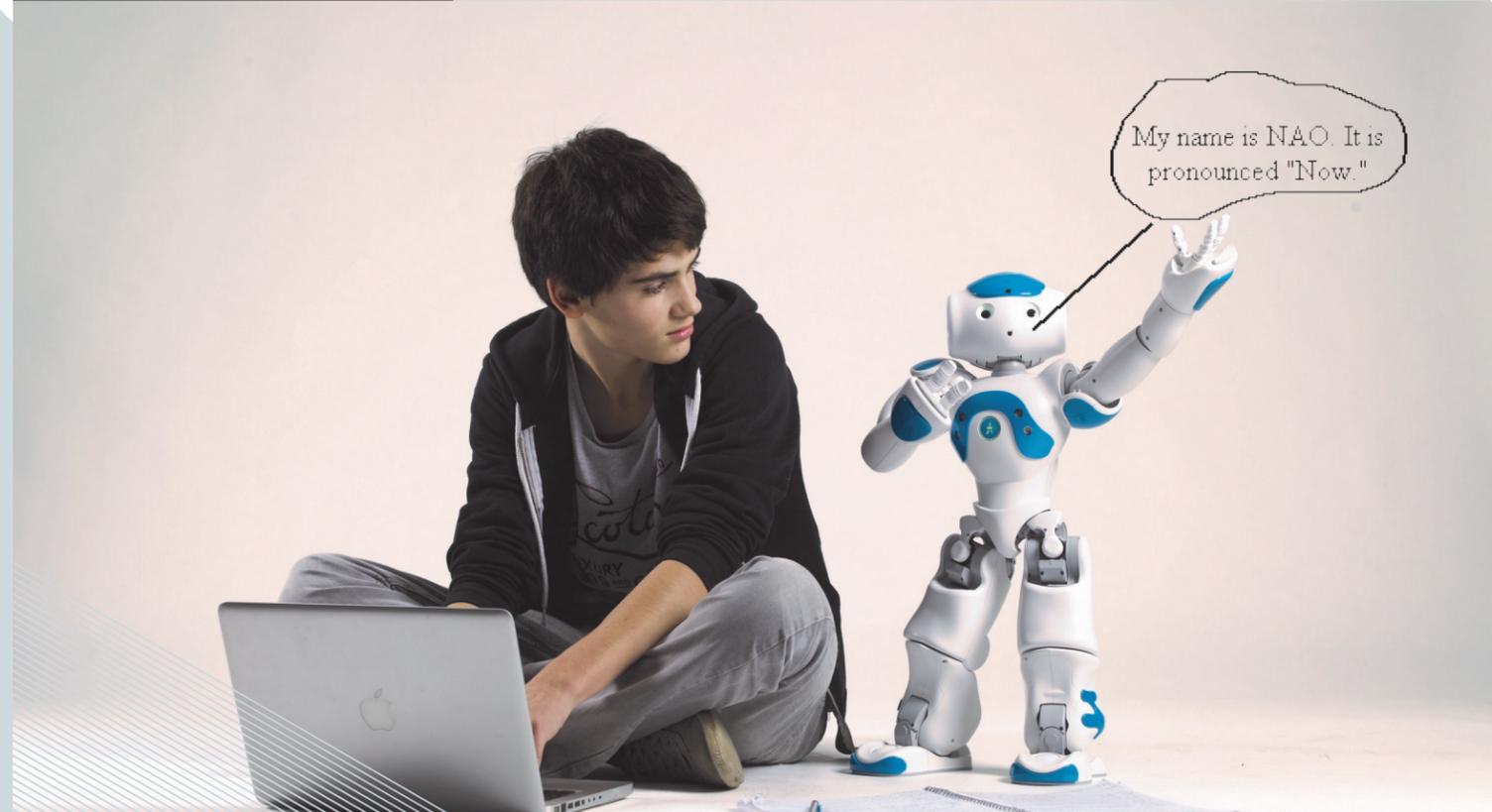
Our Elementary, Middle, and High School curriculum meet standards with exciting, hands-on applications and interdisciplinary activities utilizing NAO.

STEMBotics-NAO offers curriculum that utilizes NAO to teach:

- Computer Programming
- Science
- Mathematics
- Robotics Engineering
- Electronics



SES Robotics 112 Cedar Lane,
Carl Junction, MO 64834
(417) 649-8862
info@stokeseducation.com
www.stokeseducation.com



SES Robotics and Aldebaran Robotics
Introduce Teaching STEM with NAO
Curriculum for Elementary, Middle
School, High School, and College



NAO a Robot that Sees, Hears, and Talks

Vision: NAO has two cameras and can track, learn, and recognize images and faces. NAO sees using two 920p cameras, which can capture up to 30 images per second.

Audio: NAO uses four microphones to track sounds, and its voice recognition and text-to-speech capabilities allow it to communicate in 8 languages.

Sound Source Localization: One of the main purposes of humanoid robots is to interact with people. Sound localization allows a robot to identify the direction of sounds. To produce robust and useful outputs while meeting CPU and memory requirements, NAO sound source localization is based on an approach known as “Time Difference of Arrival.”

Why NAO?

“One of the things that amazes me most is the draw that NAO has for students; it draws women and minorities that have never shown interest in programming or robotics to the table. Students are asking teachers to teach them math as opposed to just having it forced on them by the teacher”, says Mike Beiter, chair of the Computer Systems Department, Central Tech High School in Erie, PA

Advanced Technology Accessible to Your Students



NAO STEM Education

Science, technology, engineering, and mathematics (STEM) education is more important than ever in this high-tech, fast-paced world.

Unfortunately, it is often difficult to find educational tools that make it easy for teachers to address the standards in all four STEM areas while holding students interest. The NAO Humanoid Robot along with SES's STEMBotics curriculum provide schools and teachers a great way to reach students of all ages with in-depth STEM concepts and skills.

Not only does NAO interest and motivate students it provides an excellent way to teach STEM concepts while incorporating language arts.

NAO is a programmable, 57-cm tall humanoid robot with the following key components:

- Body with 25 degrees of freedom (DOF) whose key elements are electric motors and actuators.
- Sensor network, including 2 cameras, 4 microphones, sonar rangefinder, 2 IR emitters and receivers, 1 inertial board, 9 tactile sensors, and 8 pressure sensors.
- Various communication devices, including voice synthesizer, LED lights, and 2 high-fidelity speakers.
- Intel ATOM 1,6ghz CPU (located in the head) that runs a Linux kernel and supports Aldebaran's proprietary middleware (NAOqi).
- Second CPU (located in the torso).
- 27.6-watt-hour battery that provides NAO with 1.5 or more hours of autonomy, depending on usage.
- Omni-directional walking: NAO's walking uses a simple dynamic model (linear inverse pendulum) and quadratic programming. It is stabilized using feedback from joint sensors.
- Whole body motion: NAO's motion module is based on generalized inverse kinematics, which handles Cartesian coordinates, joint control, balance, redundancy, and task priority.

