

Newspaper in Education Presents

# inquiziKidz

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Are you a Robot Hero?

Robotics

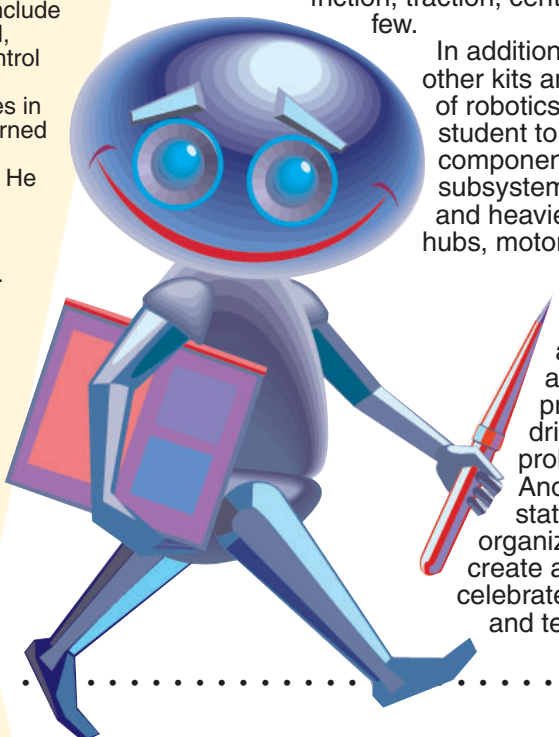
## Why Robotics in Education?

Learning about building robots at school: why would anyone do that? The answer: it gives our students the opportunity to gain some very valuable engineering, science and math experience in an exciting, problem solving, hands-on way.

Students learning robotics are actively involved with learning various mechanical, electrical, pneumatic (air powered cylinders) and programming systems. Their mission is to learn how various gears, belts, pulleys, wheels, axles, tracks, levers- simple machine components, work together to create an integrated system designed to solve a problem or function under certain conditions. In order to control what they have created, students must learn to create a program using a computer and then beam that program to their robotic creation's onboard computer. To accomplish all this, the students are using Lego Mindstorm Team Challenge kits and RoboLab software. After learning basic commands like making drive motors turn on for various periods of time, so that the robot can travel in straight lines or make turns, the students eventually learn to program sensors so that the robots can actually interact with their environment. An example of this interaction would be giving the robot the ability to sense the edge of a table top, and reverse directions without falling off...or changing directions after coming in contact with an obstacle. Later, the students learn more advanced programming techniques such as using modifiers, branches, loops, containers, random number generators and so on. Ultimately, students' robots and their operating programs are designed to meet specific challenges. These include activities such as Sumo-bot where robots "wrestle" each other towards the edge of an arena, or navigating through a maze, or pulling the greatest number of soda cans out of a ring, or even following a black line on the floor using a light sensor, and many more. In programming the robots to meet a particular challenge, students use many math skills, dealing with logic conditions, distance, time and force. They also use a lot of science and technology in developing the robot's mechanical systems, dealing with forces such as friction, traction, center of gravity, and mechanical advantage to name a few.

In addition to the Lego Mindstorm based program, there are other kits and systems available such as the Gears IDS system of robotics. This system is very open ended, requiring the student to understand and work with more industrial level components for the electronic, pneumatic, and mechanical drive subsystems. They work with heavier, mostly metal components and heavier duty chains and sprockets, gear motors, axles and hubs, motor controllers, receivers and transmitters, pneumatic cylinders, solenoids, pressure regulators, valves and structural members.

Perhaps the most important skill students learn, aside from the science, math and technology, is the ability to problem solve. Whether de-bugging a program, or selecting the most beneficial gear ratio in a drive train, the ability to analyze and create solutions to problems is a skill that will always be in high demand. Another way to sum up the goal of robotics education is stated by Dean Kamen, founder of US First, a major organization dedicated to robotics in education. It is "... to create a world where science and technology are celebrated...where young people dream of becoming science and technology heroes."



## explore it ROBOTICS

S X X T S V H G O M B E J I S  
 D T I U H R O T S V T V D B T  
 S V E D U N G C R R R B J D E  
 B C Y E S C I T A M U E N P K  
 B H I B R T V N A B Y A S N C  
 I Y K L O I S N A E E M D F O  
 Z Z X B U M N T E H P T K W R  
 G E O T I A T G S C P H F G P  
 O R M T A E R G E A R G W W S  
 K L T R R N W D R F O I Z D K  
 O E N Y R D K P Y T G L C D T  
 R D O O B H P C W H R V J V U  
 V D T M G M K L Q W A Y Z P H  
 S O L E N O I D V X M N C I B  
 M C G J R L R O S N E S U Y J

- BATTERY
- GEAR
- HYDRAULICS
- LIGHT
- MOTOR
- PNEUMATICS
- PROGRAM
- ROBOTICS
- SENSOR
- SERVO
- SOLENOID
- SPROCKETS
- STEERING
- TANK
- TRANSMITTER

## kidzbiz Can't get enough

Steven Early is an 8th grader at Sara Scott Harlee Middle School, an engineering magnet school. On Tuesdays and Thursday mornings, one can find Steven busily working away in Mr. Davis' Technology lab. Steven's latest project is designing a Gears IDS robot. Gears IDS is a very open ended kit, that includes some heavy duty industrial quality components. The kit shows how the various electrical, remote control, mechanical and pneumatic components are hooked up as individual systems, but leaves the integration and application of those components into a final complete robot entirely up to the designer. It's not a cook-book type kit. It's very open ended and creative.

Steven's says his favorite classes are math and technology. He likes technology because it's hands on. Some days, when he comes in for Mr. Davis' morning robotics club, and then attends technology class during the day and stays after school for 2 more Boys and Girls Club sessions of Technology, he ends up having the time equivalent of about 5 technology class periods in one day...and he still can't get enough. "That's the kind of spirit and enthusiasm I love to see in my students," says Mr. Davis. When Steven grows up, he would consider becoming an automotive technician or a mechanical engineer. His hobbies include playing baseball, football, basketball, building model cars, and remote control cars.

One of the most memorable activities in school was building his robot. "I learned how to do electronics, pneumatics, mechanical and drive components." He likes the Gears IDS kits because he feels they are more advanced than Legos. Steven is looking forward to competing with his robot against Mr. Davis and also other students in robotic events such as "capture the flag." He likes the challenge of technology classes.

## School biz Combining mechanics & programming

This year, at Harlee Middle School, Presidential Award winning science teacher Don Davis is putting on a new hat. He is piloting a new technology program that places its major emphasis on robotics. "So many technology, science and math skills are involved with robotics" says Davis. "As this program gets off the ground, the biggest challenge will be the students' mastering the programming language that controls the robot's on-board computer. All the intricacies of branches, loops, containers, modifiers and so on present quite a challenge to the neophyte programmer." Davis also indicated that some of the mechanics can get quite involved, but the students seem to have an easier time with that aspect. He starts the students off with some of the basics using simpler mechanical kits so that they understand basic concepts such as gearing and drive trains and also so they get used to working with Lego type assemblies.

Additionally, he said that one of the challenges of robotics from a teaching standpoint is keeping the students using the suggested mechanical designs in the instructional sequence and not going off designing their own creations until they have the programming basics down. "One of the high points of teaching robotics is to see the excitement and wonderment in the students when they create a successful program and watch their miniature robots perform" Davis added. "Then, when they couple that skill with their own mechanical designs, the fun really begins." As an extra challenge, some of Mr. Davis' students are working with the Gears IDS system which uses some real world components to create radio controlled robotics with on-board pneumatics.

"When Doug Wagner, director of Adult, Career and Technical education in Manatee County (ACT) approached me about piloting this program, I jumped at the opportunity" Davis said. "It is an exciting challenge for both me and the students and I know it's a program that will make a difference in the lives of many students. It's a great addition to an already solid program at Harlee Middle School Engineering Magnet."



Steven Early



Don Davis

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- Sugg Middle School
- Ballard Elementary Magnet
- Daughtrey Preparatory Magnet
- Harlee Middle Magnet
- Johnson Middle Magnet
- Lee Middle Magnet



- Lincoln Middle Magnet
- Manatee Elementary Magnet
- Rowlett Elementary Magnet
- Tillman Elementary Magnet
- Wakeland Elementary Magnet

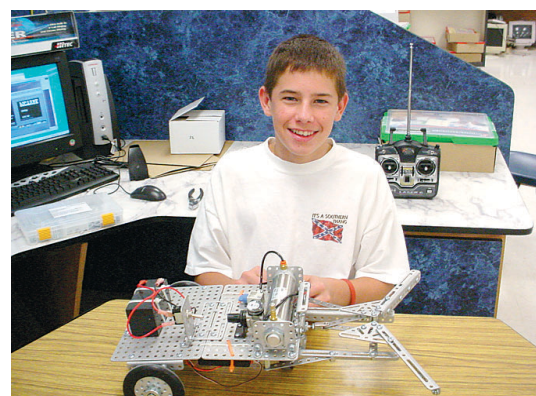
Schools listed in red offer instruction in the subject area featured in today's InquiziKIDz



There are many careers in the field of Robotics:

- Drafting
- Engineers
- Computer Applications
- Computer-Assisted Designer (CAD)
- Software Engineer
- Robotics engineer
- Robot Technicians
- Researcher
- Programmer
- Product Developer
- Software Simulator

For more career information see your school counselor and get information on-line at:  
<http://www.khake.com/page42.html>  
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