

Inspire Students with Robotic Toys

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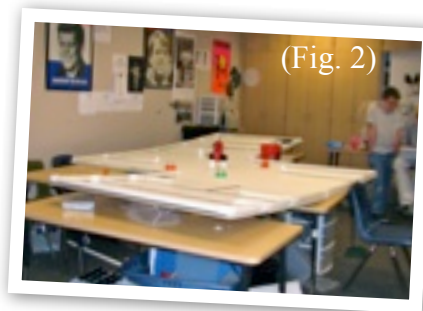
Inspire Students with Robotic Toys



As you walk into the Robotics Lab at Palm Desert Charter Middle School, your attention might be drawn to the large Botball board taking up a third of the classroom, (Fig.2) or to the racks of iRobot Create's stacked neatly



counters full of MACs and PCs. But the most unusual sight is the rack behind Mr. Clark's desk (the Robotics Elective teacher at PDCMS). Why? It is full of robotic type toys. And I mean full. (Fig. 1)



in the corner, well, truthfully, not so neatly). (Fig. 3) You might see several students searching through the plastic tubs filled to the brim with LEGO pieces (Fig. 4) or the



There are dozens of robotics toys. Some are still in their original state, but many have been stripped with the outside coverings removed.

You might wonder just what these ‘toys’ have to do with a robotics class. Children learn best when when they are given the opportunity to experience hands-on projects. One way that children develop critical thinking skills and learn problem solving is through creative play. When children participate in a hands-on activity where they’re building something, then taking it apart and putting it back together again, and finding solutions to problems that come up along the way; they really learn. The study of robotics is perfect for this type of hands-on project-based learning. In robotics they get to design, build and re-design. The ‘toys’ in the classroom provide real world examples of many robotic systems and ideas. The students study the toys, taking them apart by stripping them down to the mechanics. They can see the gears that operate a toy dogs legs, or the mechanical system the blinks and moves the eyeballs in a Furbie.

One of the main motivations for the collection of toys came from the many examples of militarized robots the kids found. The kids seem to love things that blow other things up or chop them to pieces like in the battling robot competitions. To show them that there are many other uses for robots and also many varied careers in robotics, the teacher, Mr. Clark, started the collection of robotic toys which includes Furbies, robots, a talking Elvis, mechanical arms, robotic animals, dinosaurs, and groups of motors, gears, and mechanical parts. (See Figures 6-12) The students learn that a career in robotics can include working with toys, prosthetics, animatronics, sports, medicine, video production, animation, video gaming, environmental science, and space exploration, just to mention a few. Many of the students create their own inventive videos and animations using the many toys and robots as props. (See Figure 5)



The Collection

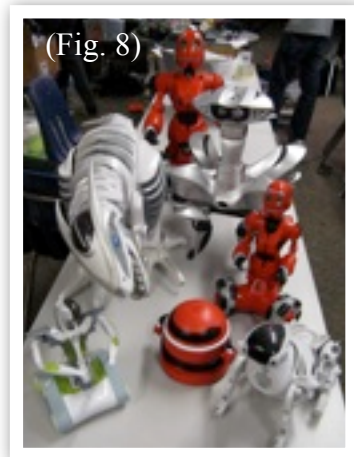
Pictures of some of the collection of robotic toys in the Robotics Lab at PDCMS



Aliens, Animals, Mechanical Parts



Group of Arms, Realistic and Mechanical



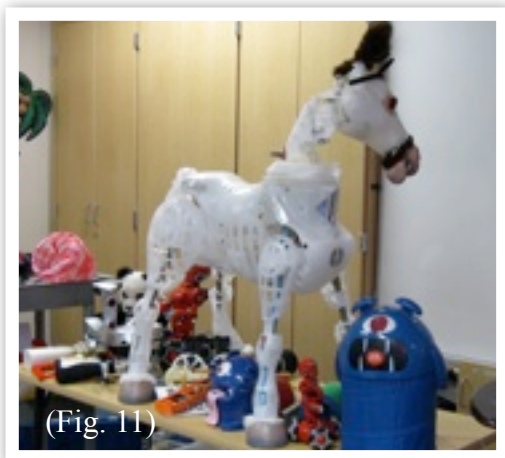
Futuristic Robots/Dinosaurs



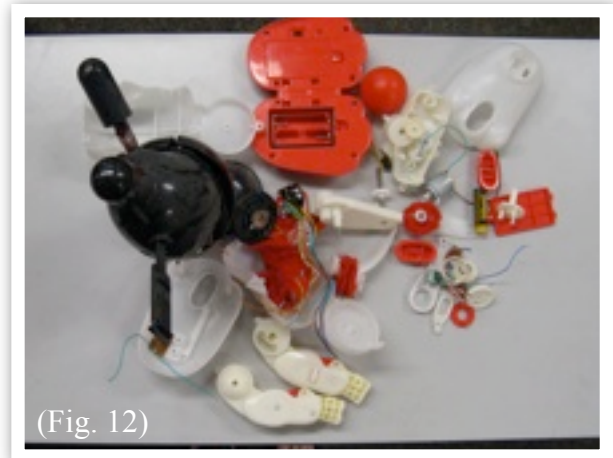
Robots, Small and Big



Talking Robot Clock

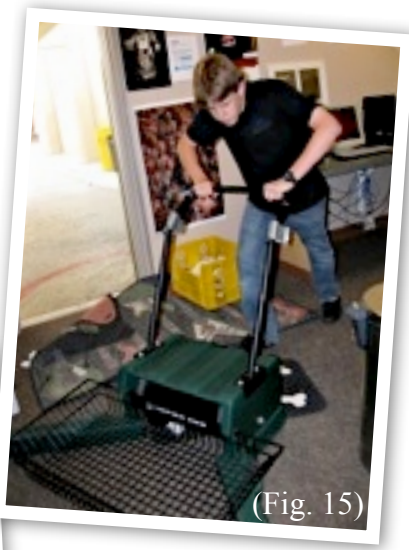


Robot Horse with Static Sensors



Mechanical Parts, Motors, and Gears

During the elective classes, the students get time to play with the toys, discovering how the robotic systems work. They can take them apart, study them, or even use the parts to create their own new robots. One group is taking apart a motorized scooter and using the parts to create a programmable robot to pick up tennis balls. (See Figures 13, 14, 15)



Scooter Parts Are Going to Drive the Robotic Tennis Ball Retriever.

Other students work with the NXT robotic controller and the Carnegie Mellon curriculum. They get the chance to build the regular robots during the class lessons and then have time to experiment on their own. Many students create devices to play the Botball game even though they are not using the approved equipment and LEGO® pieces. Not legal for the game, but they show promise. We hope many of these kids will sign up for Botball next year. They have come up with some most unusual and inventive creations. Here are just a few of them.



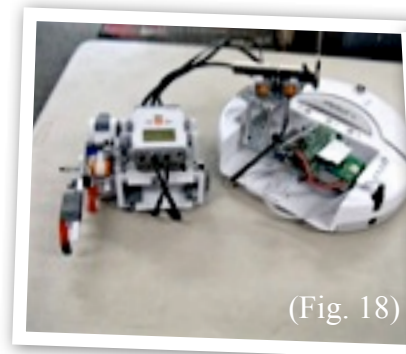
This is a NXT lawn mower. The original design might just be a toy, but the student modified it to be able to sweep up the tribbles used in Botball. It moves along mowing the tribbles into the catcher bins. (Fig. 16)

Figure 17 shows that robotics is not just for boys. Many girls are in the robotics classes and enjoy their projects just like the boys. They are creative and come up with interesting unique ways of solving problems.



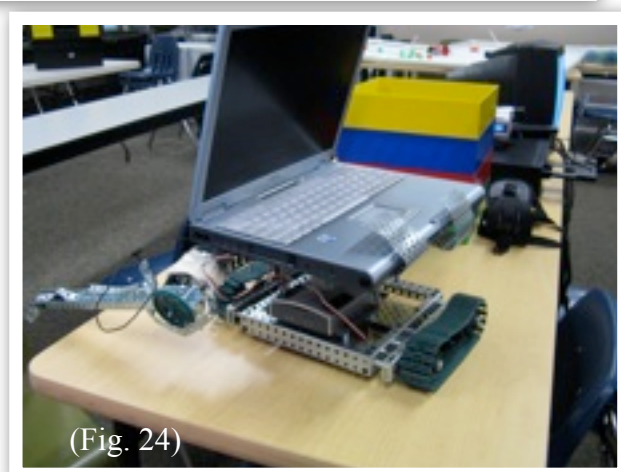
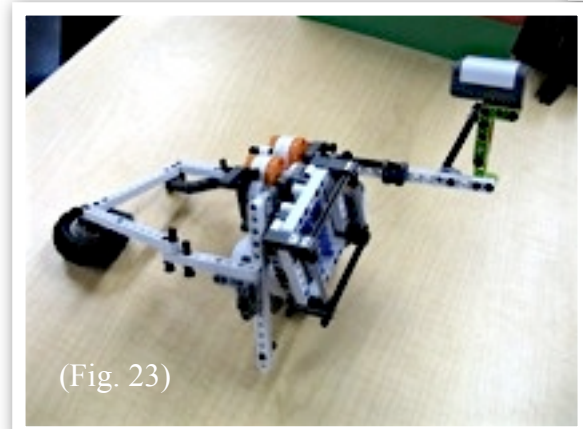
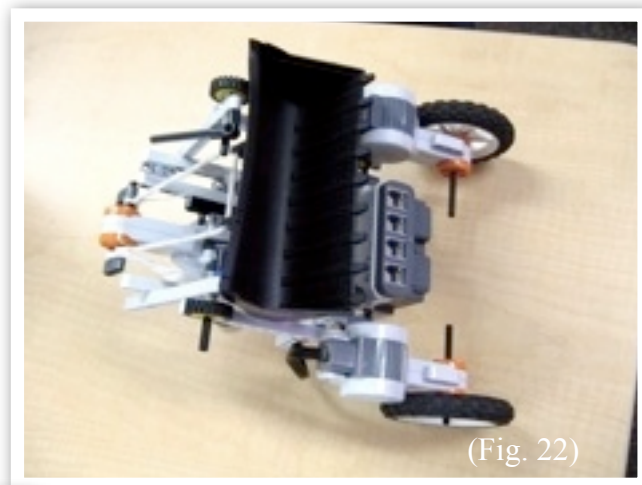
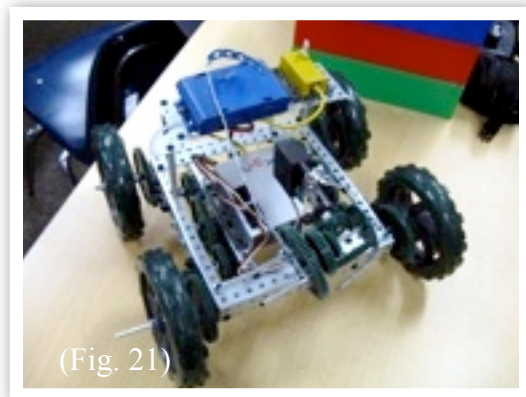
There are all kinds of pinchers, extending arms, claws, and robots built on the iRobot Create chassis.

(Fig. 18, 19, 20)

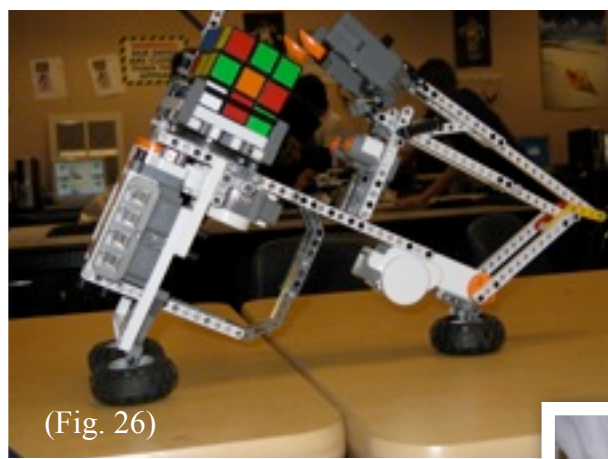


Studying what makes a good car helps the kids come up with their own vehicle designs.

(Fig. 21 and 22) Sensors are also incorporated into the student designs. The NXT has a variety of interesting sensors. You can see the touch sensor in Fig. 23 and a computer is hitching a ride on the robot in Fig. 24.

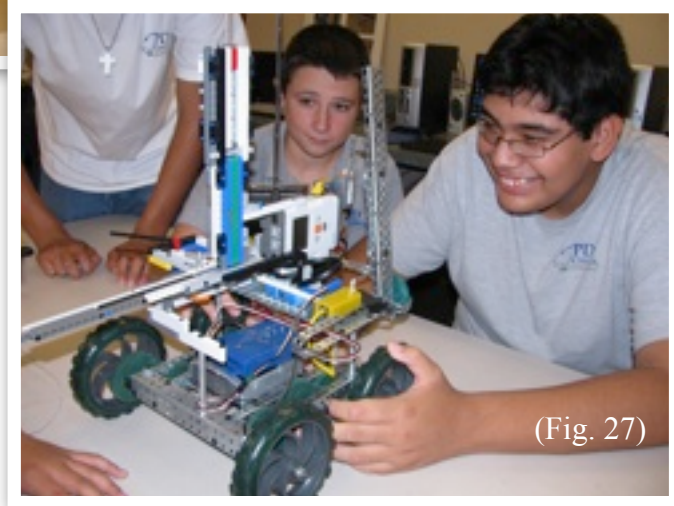


One of the most creative inventions this year is shown in Fig. 25. It is a working prototype of a toilet tissue dispenser. You move your hand in front of the device and it dispenses an appropriate amount of tissue. The student even did research and took a classroom survey to determine the right number of sheets to dispense. It is operated with an NXT and programmed to work with an ultrasonic sensor.



How about a robot that can solve a Rubix-Cube. The students have it built and now are attempting to program it to actually solve the cube on its own. It uses color sensors and a manipulator arm to move the cube. (Fig. 26)

The students in Fig. 27 built their robot and encountered problems. They were ready to give up, but then after encouragement from Mr. Clark, they continue to work on the robot. In just a few days they came up with a solution and today the robot works perfectly. More importantly, the students learned that if you keep working on a problem, you are able to figure out a solution, even when it seems hopeless.



All of the 'toys' in PDCMS Robotics Lab are inspiring students to learn, to think, to be prepared for what ever future they can dream.