

ROBOGAMES CLASSICS

ROBOT

THE LATEST IN HOBBY, SCIENCE & ROBOTICS

**ALDEBARAN
NAO** Pg. 26

**GENIBO
ROBO DOG**

**PARALLAX'S
NEW
STINGRAY**

**RETROBOT
WOODEN
MACHINE**

**CES
ROBOTS**

**MICROMOUSE
MAZE SOLVING
BOTS**

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QUAD FLYER Pg. 90



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UPDATE

by Tom Atwood

THE SEARCH FOR A THEORY OF THE MIND

We recently received an email from a reader who proposed that by combining the resources and research already well along at three technology companies, it might be possible to create a "fully sentient robotic mind system" that could be employed to help humanity. The topic of artificial intelligence is always a conversation starter, and his approach seemed interesting and perhaps new). He asked: what if we could combine the VMware virtualization software system (www.vmware.com), which is at the forefront of cloud computing and which won a "Wall Street Journal" 2009 Technology Innovation Award, with the Character Engine software developed by Hanson Robotics (www.hansonrobotics.com)? What if we then plugged all of this into John Koza's "Invention Machine"—a massively parallel computer that is capable of finding elegant solutions to design problems, including writing software code and using genetic programming technology (www.genetic-programming.com)? Would we then have all the ingredients to create a true robotic mind? Among some of our contributors, this triggered a conversation that inevitably returned to the question of the theory of the mind. One pointed out that a machine made out of electronic library cards that could arguably pass the Turing test (see www.loebner.net/Prize/loebner-prize.html for background) could be a simple "finite state device" without awareness. Another suggested that we ask our readers for a definition of machine intelligence that would attempt to define what would embody a self-aware machine. We think this could generate some great ideas, so email editors@botmag.com with your definition of a sentient robotic mind system. We will publish the most interesting responses.

HIGHLIGHTS

One of the institutions in our great robotics hobby is RoboGames—the annual competition that the Guinness World Records recognizes as the largest event of its kind in the world. See Sam Coniglio's "A Pictorial History of RoboGames," page 20, for a real treat that's jam-packed with cool robots and roboticists. The much heralded Aldebaran Nao is coming to market; Thomas Marsh offers a fascinating overview of this humanoid on page 26. Technical editor George Mitsuoka is back with comprehensive coverage of the robots exhibited at CES, see page 40.



Jim Phelan and Steve Norris combine forces in "Parallax Stingray," page 56. This new platform uses the Propeller chip and is a great next step after you have mastered the Basic Stamp or similar technology and are ready to move on to a more advanced platform. Those who are seeking robot companionship will find "Move Over Rover," page 30, riveting. The DasaRobot Genibo-QD is a multifaceted robot dog that, as Thomas Marsh reports, can also be programmed and used as a research platform.

Two brilliant hobbyists who like to build their own machines from scratch are published this issue. Eric Ostendorff shows how to make a very capable robot platform on a budget; see "Basic Transportation," page 64. We are also delighted to report on the incredible robots designed and built by a leader in the builder community; don't miss "Tom Jozwiak's Home-Built Robots," page 44.

There is lots more here; we hope you enjoy this issue. This is your magazine; email editors@botmag.com with your comments and suggestions.

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A PICTORIAL HISTORY OF ROBOGAMES

GAMES

Story & photos by
Sam Coniglio
<http://www.sphotography.net>



Sparks fly as metal scrapes metal in this vicious robot battle at RoboGames 2008.

Mighty menagerie of mechanical marvels!

Since it began in 2004 as ROBOlympics, RoboGames has become the world's largest robotics competition. The event's 74 competitive categories showcase the diversity and maturity of hobby robotics from the USA and around the world. RoboGames is one of the few places in North America where you can see state-of-the-art robots from Europe, Japan, South Korea and other parts of Asia and South America (<http://robogames.net/>). The next few pages show a just small sample of the wide spectrum of bots and humanoids that make RoboGames such an electrifying robotics tradition.



Would you like that shaken, stirred, or on fire? Michael "Flash" Hopkins (before he became famous as the star of Discovery Channel's "Doing DaVinci") mixes cocktails using ComBots' fire-spewing Blender of Doom.

EXOSKELETON BOT

Nearly 20 years ago, Monty Reed was injured in a parachute accident while serving as a U.S. Ranger, and he temporarily lost the ability to walk. While struggling with rehabilitation, he read the novel "Starship Troopers," which contains mention of body-enhancing armored space suits. Not long after that, he started "They Shall Walk"—a nonprofit organization working to develop an intelligent robotic powered brace. The LIFESUIT™ allows paraplegics and the elderly to walk freely again (<http://www.theyshallwalk.org/>).



These are the big boys: the 340-pound class. Of that weight, Ziggy is 120 pounds of titanium and delivers over 7,000 pounds of explosive thrust through its flipping arm. Sewer Snake has two movable wedges that it uses to attack other bots and to right itself. It gets its name from its entertaining ability to flip itself over and over again. Both teams are regulars at RoboGames.

FIGHTING BOTS

In another fight from RoboGames 2008, super-heavyweight fighting bot Super Megabyte duked it out with the flame-throwing Alcoholic Step Father. Super Megabyte ripped off Step Father's wedge weapon, but it kept on fighting and trying to inflict damage and was consumed by its own flames.



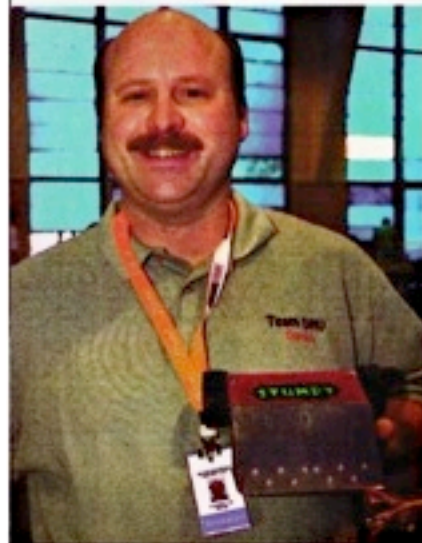
FIGHTING BOTS

The "BattleBots" TV series is long gone, but the dream the show inspired lives on with Combots. Held in an industrial-strength polycarbonate-and-steel arena, Combots is the main event for fighting robots. In this photo (below), super-heavyweight Bounty Hunter flips spinner bot Steel Piranha in a classic match from RoboGames 2008. Bounty Hunter went on to win the bronze medal that year.



Above: this Brazilian team is an amazing success story! After suffering a humiliating loss in 2008 RoboGames, the team set down with veteran bot builders to learn tips and tricks to make a successful fighting robot. Both the 120-pound Touro and the 80-pound Touro Light won gold medals in 2007 (<http://www.rbotz.com.br/>).

Left: on the other end of the Combots spectrum is the 1-pound ant-weight class. Dave Wiley poses with Stumpy, his tiny but mighty fighting robot. Stumpy fared well at the 2008 RoboGames. It won three of five one-on-one fights as well as a rumble in which 12 ant-weight robots fought one another to be the last one standing (<http://calbugs.com/>).



Geek superstars come to RoboGames 2007: Carlo Bertocchini is known for his legendary four-time BattleBot champion BioHazard. Here, he teams up with "Mythbusters" TV co-host Jamie Hyneman to demonstrate Robozars—a new type of combat using boxing humanoid robots (<http://www.robogames.com/>).



Battle of the Giants. Super-heavyweight robot The Judge is famous for its spike. The power of these titanium-armored beasts is something to behold. With a striking force of several tons, its spike has been known to punch holes right through its opponents and the armored floor of the arena! Ziggy, on the other hand, has a lifting arm with the force of a few tons.

ART BOTS

Unique to RoboGames is the art bot category—robots that have no function other than "to be entertaining to the viewer" (according to the event rules). A recent addition is the drinkbot category—yes; that's right: bots that make cocktails!

Drinkbots have become very popular at RoboGames. This sophisticated new genre of social robotics originated at the Robozotica festival in Vienna, Austria. Here are Ken Mochel, Samuel Coniglio (author of this article) and Joe Phillips with COSMOBOT—a rocket-shaped robot that makes the perfect Cosmopolitan cocktail!



Left: RoboGames founder David Colkins and robot hacker Matt Bauer control soccer bots for Team USA during RoboGames 2008.

SOCCER BOTS



Sony Alibo robot dogs are not only cute, but they can also play soccer! At RoboGames 2008, international teams of four played several matches. The bots were programmed to spot the bright orange ball and try to nudge it towards a goal. When, in late 2006, Sony announced that it was discontinuing its production and support of the Alibo, rosters sought a new type of soccer bot (<http://support.sonyeuropa.com/alibo/>).

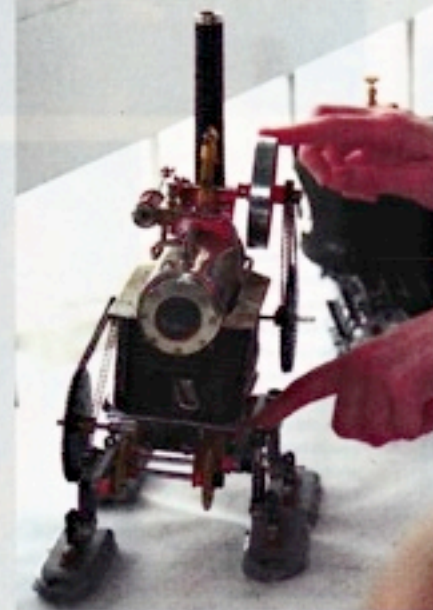


Goal! At its premiere at 2008 RoboGames, Hitec's RoboNova-1 became the bot of choice for soccer-bot players. Upgraded with X-Bee wireless receivers, the RoboNovas worked well, despite occasionally tripping on the Astroturf. Shown here in blue is the Team USA bot shooting a goal through Team Brazil's defenses. It is probably the only time when the USA could ever beat Brazil in soccer—using robotics! (<http://www.robosova.com/>).



"Mechanical Woman Walking" by artist Marko Galt. This kinetic art bot gets its motion by pulling a chain and causing a series of gears to move the legs and arms. This piece won a gold medal at RoboGames 2008.

Steampunk robots! A collection of robots powered by boiling water amazed visitors and old-school robot geeks. Artist I-Wai Huang of Crabfu Steamworks created this Steamwalker, whose detailed mini gauges and gears landed it the gold medal for kinetic art bots at RoboGames 2008 (<http://www.crabfu.com/steamtoys/>).



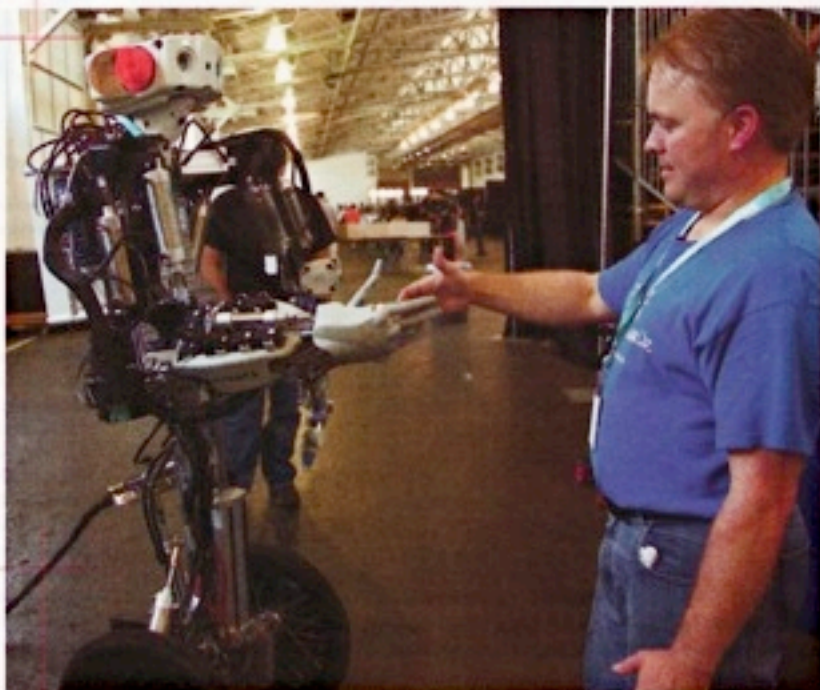
Watch out for the swarm! ORBSWARM is a kinetic art robot group who design unique rolling bots featuring lights and sounds. Four rolled around the site at RoboGames 2008, playing and interacting with the children (<http://orbsswarm.com/>).

HUMANOID BOTS



A Bioloid robot elegantly bows to the audience at the ROBOTIS booth during RoboGames 2008. Humanoid robots are now common at RoboGames, and every year, they're more sophisticated (<http://www.robotis.com/>).

Monty meets "Monty." The wheel-balancer robot from Anybots shakes hands with Monty Reed, builder of the LifeSuit exoskeleton. Anybots is a Silicon Valley startup company developing "robot telepresence solutions." Instead of simply having a video teleconference, an Anybot lets you remotely control your proxy robot to do highly complex tasks such as shake hands (<http://www.anybots.com/>).

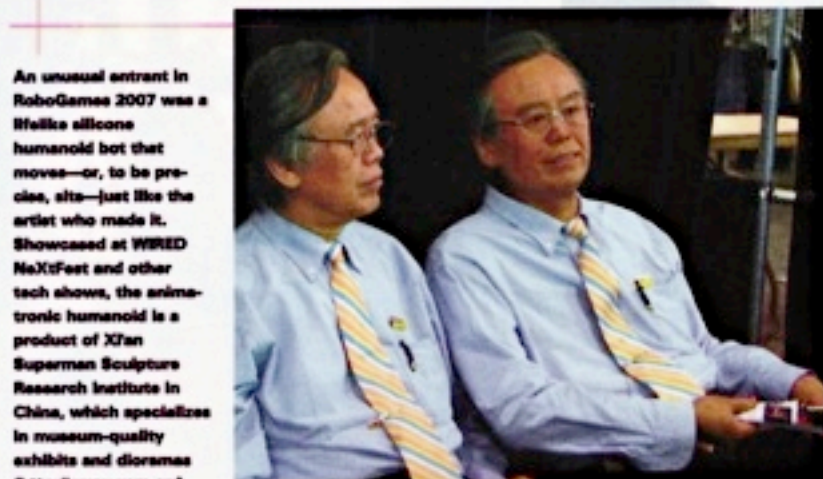


HEXAPOD BOTS

Nick Donaldson (UK) is a pioneer in hexapod (multi-leg) robots. For years, he ran unopposed at RoboGames as the only contributor in the hexapod category. Ziggy (shown here) has the distinction of being the only robot to win a gold medal every year (<http://www.gotrobots.com/>).



A self-taught hardware hacker, Matt Bauer gained notice for giving his Robonova-1, "Rook's Pawn," superhero upgrades. He doubled the power supply, added a video camera, installed Bluetooth for wireless remote control, added more servos for 20 degrees of freedom and created claws for climbing and picking up pencils!



An unusual entrant in RoboGames 2007 was a lifelike silicone humanoid bot that moves—or, to be precise, sits—just like the artist who made it. Showcased at WIRED NextFest and other tech shows, the animatronic humanoid is a product of Xfan Superman Sculpture Research Institute in China, which specializes in museum-quality exhibits and dioramas (<http://www.xfan.cn/>).

LEGO BOTS

Something of a celebrity in the LEGO Mindstorms world, Steve Hassenplug helped to design the next generation of LEGO robotics: Mindstorms NXT. Steve arrived at RoboGames 2006 with NXT models to demonstrate to awestruck hobbyists (<http://www.teamhassenplug.org/>).

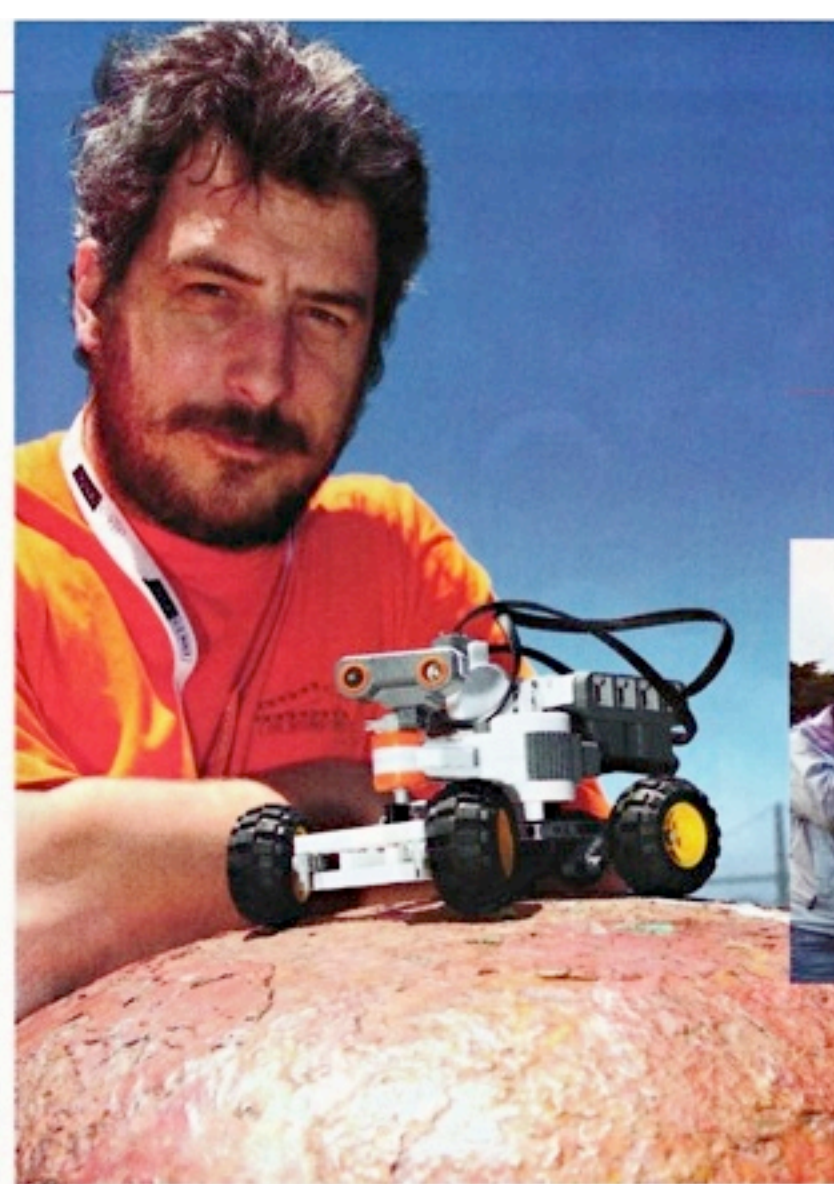
ROBOMAGELLAN BOTS



RoboMagellan bots compete in what might be considered miniature DARPA Challenge fields—autonomously finding a goal while avoiding obstacles.

Editor's note: Why not take your robot to compete or simply to share your technology with other robot enthusiasts? Or just go to join the fun! Contact info is in the link below.

Links
Robogames, www.robogames.net
For more information, please see our source guide on page 89.



The seventh annual RoboGames will be held on April 23 through 25 at the San Mateo County Event Center, San Mateo, CA—about a 30-minute drive from San Francisco.



Is hobby robotics popular? You betcha. As you can see from the 2006 RoboGames group photo, over 100 people from dozens of countries come to San Francisco to show off and test their robots against other teams. As a testament to RoboGames' prestige, the 2009 Gold Medal teams from Indonesia and Mexico were honored by the presidents of their respective countries.