

by Dave Calkins

# CampusBot

## *Spanish Robots Show Flair at Spain's Biggest Geek Fest*

One of my favorite TV shows is "Iron Chef." I'm not a big foodie, but I love watching two cooks from different cultures take the same ingredients, and each will make something entirely different from the other. All of the components are the same, and yet at the end, you get dishes that not only taste different, but look different and are prepared uniquely from each other.

### **What Does This Have To Do With Robots, You Ask?**

Spain. Or more specifically, Spanish robot builders. They have the same servos, microchips, and sensors that US robot builders do, and yet while attending CampusBot in Valencia Spain this July, I saw robots that were very different from the ones that US builders typically make. They had line followers, snake robots, hexapods, and wheeled robots.

"Well duh — so do we!" you might be thinking. Ah, but my friend, the Spanish robots are not twins to the US bots. US robots are very good, as are Spanish robots. Much as a Spanish paella and American stew are both good. But they are still quite distinct from each other — even though they may use the same ingredients.

Take hexapods, for example. In the US, most hexapods are all skinny legs and quick moving beasties. Spanish hexapods, such as the one CampusBot organizer Alejandro Alonso Puig made, have shorter legs and full body en-

clures. It could still scurry around quickly, scare the bejesus out of people who aren't expecting robot spiders to be crawling around the floor, and was just as good as the ones we make. But yet ... it's different. Somehow it moves a bit unusually to my American eyes.

Quantity of ingredients also varied from a US show. In the US, you'd expect to see about 95% wheeled robots and 5% walkers (bipeds, quadrupeds, and hexapods.) In Spain, it's about 30/70. Just as they use fewer veggies in their cooking and more meat (not a bad thing, just ... different), you find more walking robots. I was quite surprised at the number of quadropods. Big ones, skinny ones, bots with two servos and bots with 20 servos. I must have seen more home-made quadropods in three days in Spain than I have in the last two years in the US. Nice ones, too.

In one of the best examples of dirt-cheap walkers, one student built a quadropod out of eight, low-end servos, a single sonar, and a PIC. This little guy could really move — something you're more likely to see in a hexapod with its inherent dual-tripod balancing than in a dual-bipod. But it cruised around the floor of the venue like a sneaky spider soldier. A real treat!

Snakes aren't the kind of cuisine most people look for when ordering, but the specialty of the house was Juan González-Gómez's amazing servo-driven snake bot. All snake robots I've ever seen — even Gavin Miller's amazing bots — cheat. They use wheels. They repli-

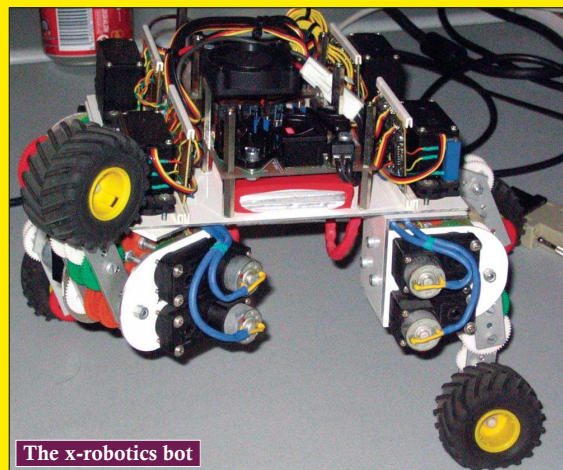
cate a snake's motion, be it sinusoidal, caterpillar, or side-winding, but always with wheels on the bottom to eliminate friction and help the bot along. Gomez, however, perfected a system that most closely replicates how snakes really move. There are no wheels on his robots. Just his own servo housings.

Watching a snake robot skitter across the floor is always cool. But when you pick up Juan's bot and realize that it's got no wheels and can still move the same way any snake can, you're truly awed. Even more inspiring is the fact that his bots are totally modular. You can have as few as two modules or as many as 256 — good for both garter snakes and anacondas!

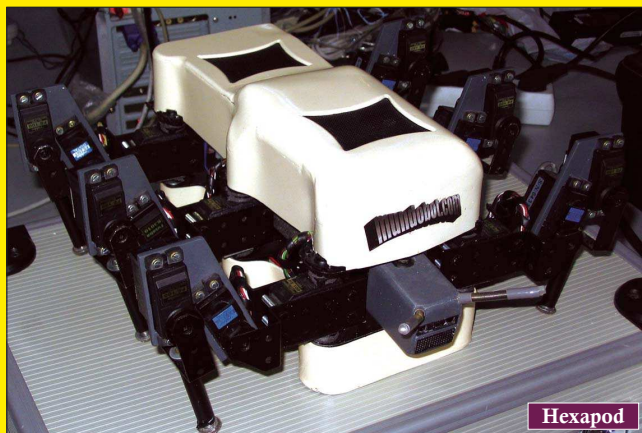
Innovative motion solutions weren't limited to snake bots and walkers. In the past seven years, I've seen a lot of cool robots, but one of the coolest I've ever encountered is the x-robot. Good wheeled robots have some kind of suspension or shock absorption. They might even have independent suspensions — but I've never seen anything like the x-robotics bot. As shown in the photo, each wheel is on a completely independent leg. A leg with three degrees of freedom!

When going through a tight spot, the bot can bring the wheels in closely under the robot. If it needs to go over a rock, it can stretch them out wide. It can rotate them and do a 90-degree shift in vector for an instant shift in direction. It can raise each leg independently to go over rough terrain, even giving the robot knees to allow

“Spanish hexapods ... have shorter legs and full body enclosures. It could still scurry around quickly, scare the bejesus out of people who aren't expecting robot spiders to be crawling around the floor, and was just as good as the ones we make. But yet ... it's different.”



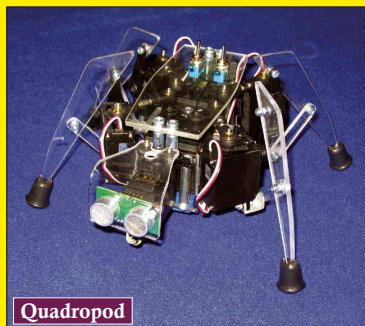
The x-robotics bot



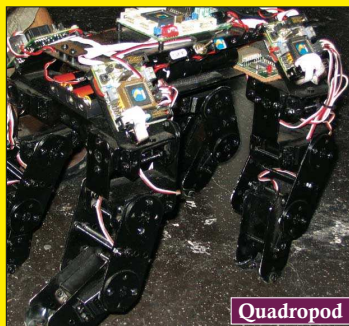
Hexapod



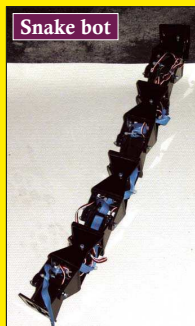
Music bots



Quadropod



Quadropod



Snake bot



R2-D2

for further mobility. The legs can even go over the body of the robot for full invertability. I've never seen such a clever marriage of a walker and a wheeled bot. While it was only one foot square, it was probably the most agile robot in existence. This is the kind of bot we should be looking to for the next generation of space explorers!

Speaking of space robots, the most famous robot in the galaxy made a

guest appearance at CampusBot. R2-D2 opened the festivities along with Stephen Hawking! Just like us, the Spanish robot building community holds a special place in its heart for R2 — who probably inspired more robot builders than any other robot. R2 wasn't there to compete, however. Being retired from the movie biz, he just wanted to hang out and spend some quality time on the sunny beaches of Valencia!

An interesting thing about Spanish cooks ... erm, robot builders — a good number are women! While many robot builders in the US are men, the percentage is still much too low (hear that girls!). In Spain however, at least 30% of robot builders at the show were women. And like their US counterparts, they build robots that are different from the styles that men build. It was quite refreshing to see so many gals at the



show — and not for the usual reason!

One of the highlights of the trip was the robot music group. Spare auto parts and miscellaneous electronics had been salvaged and cobbled together to make a five-piece band. This was no static art piece, but a functional set of robots that played real instruments. The star was the guitarist (just like human bands), who could strum and play slide guitar. A pretty amazing feat for a musician with no head and a muffler for a body!

In America, we usually sit down to Saturday dinner at about 5 pm. In Spain, the restaurants don't even open until 9; 11 pm is typically a good dinner hour. And so it goes with robot shows. If you plan on going to bed at 9 pm, you're going to miss all the fun! CampusBot was a week-long party, but was generally deserted until about 2 pm. As the sun started its return journey across the sky, builders slowly showed up, but the crowd wouldn't get solid until about 8 or 9. And then, it went all night! No overhead lamps

were needed — all the light the participants needed was provided by their own computers. It's a magical site to see several thousand computer monitors lighting up a hall. (Total attendance of participants for CampusParty was 5,700! Although only about 5-10% of that were robot builders, the rest were programmers, gamers, and hackers.)

Another difference in American cooking and Spanish cooking is simmer time. While many of the robots there were built over the course of years and were ready to go on arrival, many of the robots were made at the event. Not because the builders procrastinated, but because that was the point. Most builders brought a big box of parts and saw what they could come up with over the course of the week. A whole competition was based on what you could whip up in five days at the show.

My favorite built-on-site project was "Spanish Tetsujin." No, you didn't have to lift weight — you had to go blind! Much like Luke Skywalker putting on the blast shield for light

saber training, a group of builders made a paper mache helmet that completely covered the face of the wearer. But inside the helmet were speakers, connected to a sonar array. Attendees got to put on the helmet and learn what it's like to be a robot. You had to navigate your way out of a maze using only the sonic feedback of a salvaged PC speaker. If you've never tried to navigate by sonar, let me tell you — robots have it hard! It's far more difficult than you'd imagine. I've promised to be far more kind to all my bots from now on.

One flavor remained the same in Spain as it does in America — sportsmanship and cooperation. If any builder had a problem, 10 others immediately showed up to lend a hand. That's the thing that always sticks in my mind about the robot community — no matter what country I'm in, no matter what kind of robot event it is, and no matter how old the participants are, the camaraderie and positive attitude always remains the same. And that's the best spice of all! **SV**

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