

## ROBOTICS

**Made In India**

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**There are many reasons why robotics should take off in India. But, strangely enough, a lot depends on soccer.**

**E**xactly 13 years ago, professor and entrepreneur Prahlad Vadakkepat engineered a few games of soccer that eventually led to the birth of a multi-million dollar industry in South Korea. This was soccer with a twist. The players were not humans, they were robots. The games in question were part of the first Federation of International Robosoccer Associations (FIRA) championship, which kicked off in Korea, in 1996. Vadakkepat, who was living there at the time, co-founded FIRA. That event helped robotics top the popularity charts and spawned many start-ups.



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**Bangalore will encourage entrepreneurs and manufacturing in the robotics space.**—Prof Prahlad

Vadakkepat, Co-Founder, Federation of Int'l Robosoccer Associations

Now, Vadakkepat is planning an encore in Bangalore. India has several skills essential to robotics: a large pool of high-quality engineering talent, experience in software and embedded systems, etc. But robotics development still needs a big push. Vadakkepat is hoping that the robosoccer tournament will be the inflexion point, as it was in Korea.

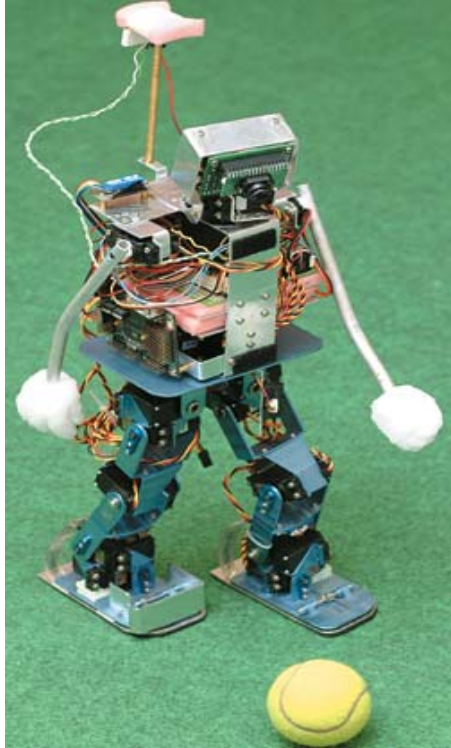
Since that event, Vadakkepat has developed dozens of humanoids (including MaNUS and GeNUS, both winners at FIRA events), biomorphs, biopeds, microbots and other such robots. He now lives in Singapore and has made several trips to India, speaking to over 100 audiences in educational institutes, etc, evangelising the theory, practice and passion of robotics. He also co-founded Robhatah Robotics Solutions. The Indian Angel Network invested about Rs 2 crore in this Bangalore-based start-up in May last year.

On his more recent India trips, Vadakkepat found growing interest in robotics. That gave him the courage to make a pitch to FIRA to host the 2010 event in Bangalore. FIRA agreed. "It's a risk," concedes Vadakkepat. "But I am hoping the event will give a big push to entrepreneurs and also

encourage manufacturing in the robotics space."

**Inflexion Point**

Vadakkepat timed the Bangalore FIRA cup to near perfection. The last two years have seen several robotics start-ups like ThinkLabs and Gridbots grab the attention of consumers and investors. ThinkLabs, a robotics education start-up, got \$1 million from Seedfund in early-2008. Interestingly, both ThinkLabs and Gridbots were born in academic institutions. ThinkLabs was incubated at the IIT Bombay campus at the Society for Innovation and Entrepreneurship (SINE) and Gridbots at IIM-Ahmedabad's Centre for Innovation, Incubation and Entrepreneurship. Both are keen on taking robotics to end-consumers.



**Bending It:** The MaNUS humanoid, 46 cm tall and 2 kg in weight, struck it rich in the robosoccer championship.

Gridbots launched its most popular product, Turtle, an educational robot, in May 2009. It sold 100 Turtles in the first four days after launch. The Turtle is a simple robot. It has a square-shaped board, with circuits, set on a bunch of wheels. The robot comes unassembled. Instructions and illustrative videos help the consumer assemble it in only 15 minutes. This done, the Turtle can follow a black line on the floor, and detect and avoid obstacles as it moves. It can also find and follow a light source as well as retract from light—all with the aid of 10 sensors.

Gridbots has sold about 890 Turtles, which cost Rs 5,000 each, until end-July. Last quarter, the Turtle helped Gridbots earn almost as much revenue as it earned in FY09 (Rs 50 lakh). “The Turtle is aimed at making people comfortable about having robots around,” says Pulkit Gaur, CTO and founder, Gridbots. Its next big launch is a robot that will sweep the floor and mop it, Indian style. Gaur is mulling a Rs 25,000-30,000 price band. This robot can also be upgraded to provide video surveillance and remote navigation through the Web or mobile phone. “The processors are imported, but the fabrication is indigenous,” says Gaur. This helps him get to an affordable pricing.

## The Power Of Learning

This summer, ThinkLabs went to schools in Bangalore, Mumbai and New Delhi. It was able to teach 1,000 students, aged between 10 and 14, how to program robots using its recently launched iPitara kit. Abhishek Biswal and Gagan Goyal, the two young founders of ThinkLabs, are hoping to catch them young. Since it started up in October, 2006, ThinkLabs has taught 35,000 college students. “We have seen a 100% annual growth,” says Biswal, who heads marketing and business development. iPitara, priced at Rs 7,500, packs 50 components, including a microcontroller chip and many sensors. The kit can be connected to a computer and lets children create robot programs with a simple visual interface that involves connecting pictures in a logical sequence. It is 30% cheaper than similar foreign kits available locally.

ThinkLabs earns revenues from training workshops at educational institutions, primarily colleges. It charges a content licence and service fee, and also earns some revenues from support services for faculty. Retail sales of kits constitute a smaller portion of revenues. Last year, the company clocked Rs 1.5 crore in revenues and it makes operational profits.

## Bots in India

The size of the Indian robotics market is surprisingly large—robots worth about Rs 3,500 crore are estimated to have been sold so far. But almost all are in the industrial space, a market that’s now estimated to be about Rs 1,000 crore annually. Personal robotics, the kind talked about so far in this story, is still nascent.

Maruti Suzuki, with about 650 robots on its lines, has India’s largest robotic installation. Gurgaon-based KUKA Robotics has sold about 450 robots to Tata Motors and Volkswagen. Auto companies, which account for 70% of applications in India, use robots primarily for spot and arc welding, material-handling, press-shop and paint-shop jobs. Other sectors like foundry, food, logistics, healthcare and entertainment

are also adopting robots. "About 400-500 industrial robots are sold in India annually," estimates Raj Singh Rathee, Managing Director, KUKA Robotics.

But, for a robot to make economic sense, vehicle production in a factory needs to be in excess of 100,000 units a year. A complete robot system may cost anywhere between Rs 20 lakh and Rs 5 crore, if not more. For example, a six-axis robot system, as dexterous as a human arm, costs Rs 2.5-3 crore. Investment in robots doesn't stop with buying a robotic arm. It starts with it. A systemic change is needed in the entire manufacturing process. For example, robotics systems have low tolerance to even marginal inconsistencies in the dimensions of the parts they handle. In all, robots cost about 2-6 times more to set up, compared to conventional factories manned by human workers.

But the recent economic slowdown has been a boon for the industry, says Ranjit Date, founder and Joint Managing Director of Pune-based Precision Automation and Robotics India (PARI). With revenues likely to touch of Rs 250 crore this year, 10-year old PARI is India's largest company in the industrial robotics market. A pressing need to cut costs and bring in greater efficiencies is forcing even government sectors such as the railways and power utilities to turn to automation, he says. The industry is growing at 100% year-on-year and may soon find itself constrained to meet the growing demand.

That is why PARI is setting up a Rs 250 crore robotics super-complex, Automation City, off the Pune-Bangalore highway. This will house manufacturing and R&D facilities over 73 acres. On completion in four years, the complex will house 1,000 engineers and technicians.

Phase-I, which cost Rs 50 crore to build, is complete and can handle projects worth Rs 400 crore. But it is phase-IV that is the most exciting for Date. This will see R&D facilities being rolled out on a scale that will allow collaboration between PARI, its customers and competitors. "It will be a common shared facility. Collaboration is the only way that the industry can progress," says Date.

Healthcare is another growing application for robotics. Apollo Hospital in Chennai and HealthCare Global Enterprises in Bangalore have installed robotic cyber-knives to operate on cancerous tumours. KUKA provided the robots and controllers, and US-based Accuray executed the project. Such high-end 'clean room' robots cost Rs 5-10 crore.

Defence is another application. Gridbots is working with the Ministry of Home Affairs on a few classified projects to provide robotic surveillance solutions. "Our core strength lies in artificial intelligence," says Gaur. The company also offers underwater robots that are used in industries like plastics and pharmaceuticals. Close to 10 orders are under process, for robots that can clean thick layers of sludge in water tanks. Gaur is also planning to offer robots to the Indian Navy for underwater surveillance.

But Vadakkepat and his ilk aren't happy to see personal robotics in India lag so far behind industrial bots. Perhaps a few soccer games in Bangalore next year will help correct that.