

Build `smart' with ZigBee

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ZigBee-enabled sensors are set to make the dream of a wireless, intelligent building come true.



INTELLIGENT light bulbs, efficient meters and automatic ACs are just samples of applications of a wireless technology we know so little of: ZigBee.

Yet, groundbreaking research in this domain is happening right here in India. Many companies are involved in building ZigBee-enabled sensors to make the dream of a wireless, intelligent building come true.

What is Zigbee all about? ZigBee is a wireless standard that allows small amounts of data transfer to a radius of 10-100 metres. It can be integrated with a sensor to send minor packets of information (such as temperature, pressure) wirelessly to a command centre, which can then direct devices in the building.

ZigBee is a new standard, based on the IEEE 802.15.4 standard. It was set up in December 2004 when an alliance was created to promote and build upon this standard. This ZigBee alliance includes big players such as Intel, Freescale, TI, Honeywell and MindTree.

The main advantages of ZigBee are that it uses very low power and its open standard nature. "A ZigBee-powered device can run for 4-6 years when compared to other devices lasting only two years on the same battery," says Shankar Velayudhan, CTO, Mindteck India, a US-based wireless product company with an office in Bangalore.

The company makes energy monitoring systems for apartments in the US. It recently installed meters in a 590-home apartment community in Rochester, New York, US, that record the boiler energy delivered to each apartment. The devices wirelessly transmit consumption and diagnostic information from conventional water, gas and electric meters.

Honeywell's Indian R&D arm has been working on reference designs for industrial automation, the company's focus area. The Bangalore-based set up has been working on ZigBee since the 1990s.

Y.V. Prakash, Business Unit Lead, Research and Technology, Honeywell Technology Solutions Lab, says, "Monitoring of temperature can be done with ZigBee. By integrating sensors that measure temperature and humidity with the ZigBee controls in air-conditioners in various rooms in a large building, an intelligent centralised AC control can be created. This will be able to monitor and control temperatures throughout the building."

Another good market appliance in India, he points out, is in supermarkets such as Food World and Big Bazaar, which have huge refrigerators for cold storage of food. "ZigBee can be used to learn about temperature alterations in cold storage. This information can be used to maintain the quality of food."

Ganesh Guruswamy, Country Manager, Freescale Semiconductors (primarily a chipmaker, but also does research on ZigBee at its Phoenix centre) gives another example of its use in car manufacturing plants for production lines.

"Defective goods can be flagged, removed and the production line restarted using ZigBee. It can also be used to sense temperature to determine a change in the manufactured part, so it can be modified immediately," he says. ZigBee will help build secure homes too, he stresses. "Office and home security is a global phenomenon. There is a necessity for security systems that are centrally monitored. ZigBee can help in this too."

Other applications include water and electricity meters, alarms, energy (lighting) management, etc. "Residential communities in metros will soon have ZigBee meters in each complex. This will eliminate any manual mistakes and improve efficiency of the electricity and water board," says Guruswamy.

"ZigBee can contribute to energy saving measures such as lights that come on only when sensors detect the presence of people, or air-conditioners that switch off or on depending on the temperature of the room."

"In the future, you could pre-set the lighting in your living room to automatically dim at a certain time. "If your favourite TV serial is on at 8 `o' clock, you could use your remote to send the time component data to your room's lighting control over ZigBee protocol. The lights would be dimmed at the touch of a button, to enable you to view the serial better," says Subrata Saha, General Manager and head of R&D in ZigBee at MindTree.

The company also carries out research in other wireless data transfer standards such as UWB and Bluetooth.

Another remarkable application of ZigBee is in making remote-controlled toys last longer. "Toys are the biggest consumers of batteries. The cost of replacing the cells time and again might add up to be much more than the toy's worth. But ZigBee-compliant remote controls make them last longer," says Guruswamy of Freescale.

With the prices of apartments in the metros soaring, builders are a worried lot. They can get a competitive advantage by using ZigBee. According to Prakash of Honeywell, builders could save almost half their expenditure on constructions by using ZigBee for wire-free homes.

"This would bring in a tangible benefit to apartment builders. They can build in a lot of new features."

ZigBee eliminates wiring and relaying costs, which will amount to 30 per cent savings, he estimates.

India - Target Market

According to the Zigbee alliance Web site, the market for this technology will be around \$206 million this year. While most companies working on it here are exporting their products to the US and Europe, they are unanimous in the view that India will soon become a target market.

"It will come very soon to India. In a couple of years, India will be able to make personalised Zigbee-enabled appliances," says Guruswamy.

"India has a huge potential," says Prakash of Honeywell, adding, "In two years' time, we will see more products that are ZigBee."

"ZigBee standard has still not matured, and is still in the infant stage. Once Intel and TI begin to back the standard, it will reach the markets. By the end of this decade, we will lead much more automated and easier lives, thanks to ZigBee," says Saha.