



- PAN coordinator
- Router
- End Device

Factory Automation using ZigBee modules

Hugo Boss Textile Industries is one of the first to successfully implement a factory automation system using the new ZigBee technology for control and monitoring of its manufacturing lines in a production site environment with a lot of heavy steel equipment. The solution is based on an RF module platform provided by Radiocrafts.

*By **Cem Çakmak**, IT Manager, HUGO BOSS TEXTILE INDUSTRIES, LTD. and **Peder Martin Evjen**, Managing Director, RADIOCRAFTS AS*



Terminal

Hugo Boss Textile Industries in Izmir, Turkey, is the largest production facility of Hugo Boss AG, specializing in the production of men's and women's wear. Constantly improving the quality of its processes, the company decided to create a communication link from each sewing / pressing machine.

A wireless ZigBee network was selected for cost, robustness and flexibility reasons. ZigBee, released in December 2004, is an open wireless standard for low-power networking with automatic routing, self-healing and self-repairing capabilities. Operating in the license-free frequency band at 2.45GHz, the same solutions can be used world-wide.

In this case, a new proprietary application profile was developed on top of a commercially available ZigBee stack implementation. Initially the star topology has been used, with a plan to migrate to mesh topology as soon as the technology matures. Experience has been gained on the challenges of reflections and multi-path effects at 2.45GHz compared to lower frequency bands, suggesting that the mesh technology is required to improve the performance and robustness in factory halls by providing alternative paths through the network.

For the hardware platform, a ready-made tiny shielded module solution was chosen; the RC2200 from Radiocrafts. Combined with only a keypad encoder and an alphanumeric LCD, this is a cost-effective solution. The firmware specially developed by Hugo Boss for the application was embedded into the module's microcontroller. The system is connected to the company's proprietary production

and logistics software via a serial ZigBee gateway. The ZigBee nodes (terminals) are placed on the sewing / pressing machines. Operators enter various production-related data and get an immediate reply from the production database. Management uses the data to track order status, productivity and losses while operators benefit from receiving the information they need instantly at the touch of a button. Later, quality and maintenance data will be entered via these wireless terminals as well, providing data for the large display panels in the production halls. The RC2200 ZigBee-ready module from Radiocrafts is a general hardware platform with integrated antenna, containing a 128KB Flash controller (Atmel AVR), offering 32 digital I/O, 8 analogue inputs (10 bit ADC), 2 USARTS, SPI, JTAG and ISP. Hence the whole application firmware can be implemented to run on the module measuring only 16.5 x 35.6mm.



Sewing machines

With all RF circuitry integrated the motherboard development complexity is reduced and development cycles are kept to a minimum, and simplifying component sourcing and logistics. It also avoids investing in RF instrumentation to verify and qualify an RF design at 2.45GHz. Transferring a design to manufacturing sites and developing automatic test systems that can handle radio frequency is another challenge solved by the modular approach. A pre-certified modular solution saves the integrator substantial time to get the product to the market.

RADIOCRAFTS
TEL. +47-970-86676 FAX +47-22-712915
Enter 13614 at www.tlm-info.com/ien