OrCAD™
CADENCE PCB SOLUTIONS

FlowCAD

home2net ®
smart cloud solutions

Meeting Board Space Constraints and Time-to-Market Targets with OrCAD PCB Design Tools
home2net and Cadence

About home2net

home2net is a German enterprise selling secure and easy-to-use smart cloud solutions to OEMs for use in Internet of Things (IoT) and industry 4.0 applications. The company creates all of its hardware and software products in house. In addition, home2net offers integrated cloud solutions in cooperation with a high-availability European datacenter.

Its target markets include industrial automation, cloud, and smart building. Typical applications cover areas such as remote control, remote operation, data logging, remote services, and administration, as well as remote connections to arbitrary devices and buildings via the cloud or an app.

Key Challenges

Many companies want to add IoT functionality to their products, whether it's a sauna, garage door, or a coffee machine. However, often, these companies lack experience with apps, cloud computing, databases, secure TCP/IP, wireless connectivity, and other elements that enable the IoT.

home2net offers a flexible solution providing an IoT use model for traditional products with a customized product-specific interface. The goal is to optimize the use model of traditional products by incorporating a smartphone's display to act as a worldwide remote control. To meet its customers' needs, the company needed to have a flexible platform that would support multiple OEM apps, as well as a fast development process.

home2net's web@ctrl1 solution routes serial interfaces to Ethernet and connects peripherals to the cloud. Peripheral devices are connected via RS232/RS485 interfaces or digital inputs. The web@ctrl1 can also read analog values and drive inductive loads with its digital outputs.

The solution needs to fit into a European standardized Rail Mount 1 TE housing for home control appliances. This standard defines the location of power connectors. The company's biggest challenge was to fit all of its electronic components into the

Challenges

- Provide flexible platform for multiple OEM apps
- Shorten development time for IoT market
- Be able to place dense electronics inside limited 3D housing
- Manage many different I/O interfaces
- Support digital and analog design with measurement and high-power circuits

Cadence Solutions

- OrCAD® Capture CIS
- OrCAD PCB Designer Professional
- OrCAD Productivity Toolbox

Lessons Learned

- Use hierarchical simulation capability in OrCAD PSpice Designer to model microphone preamplifier circuits
- Take advantage of benchmark simulations to evaluate circuit behavior under different environmental conditions, like extreme temperatures

Results

- 30% faster development cycle
- 15% cost savings
- Ability to meet stringent time-to-market targets

pre-defined mechanical CAD environment. About one-third of the available space is already predefined with connectors. The company also needs to be able to manage multiple I/O interfaces for its solution.
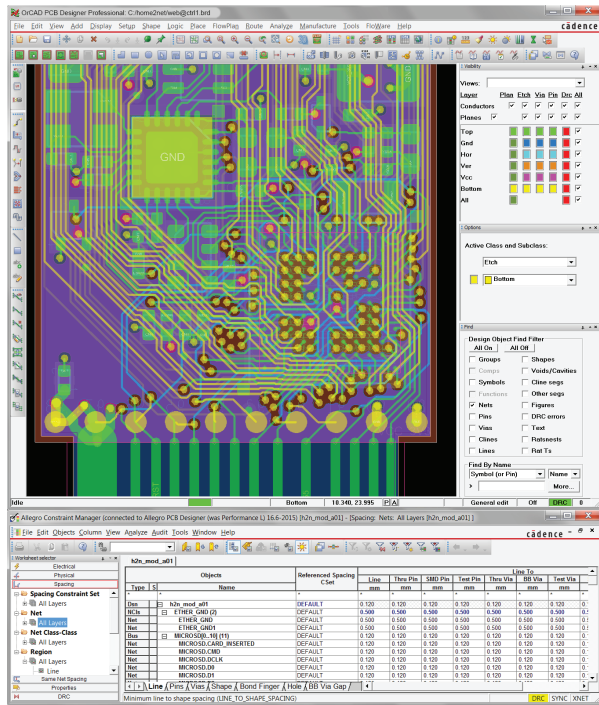
Figure 1. home2net uses OrCAD PCB Designer Professional for hierarchical schematics in its PCB development process.

Electrostatic discharge (ESD) protection with up to 15 kilovolts and false-polarity protection requires many ferrites and TVS diodes. These safety and filter components, which have to be located close to the connectors, consume another one-third of the available space of the PCB. home2net's design challenge was to fit the circuit with power nets (230V, several amps) in the remaining space right next to a fine-pitch BGA. The board outline has only a few rectangular corners and all parts have to be squeezed into the remaining space while still meeting spacing rules.

The Solution

For hierarchical schematics, home2net uses Cadence® OrCAD Capture CIS and Cadence OrCAD PCB Designer Professional. During a primarily analog PCB development process, the most used features of these tools are the shielding and supply planes and dynamic healing when routing or moving components. The design rules are entered in the constraint manager and are grouped into netclasses for different signals and shapes. Different rules have to be applied to single nets depending on the location of the board. Rules by area manage the huge number of specific rules and exceptions, i.e. if you have multiple amps next to a sensitive µBGA.

> *The easy-to-use constraint manager in the OrCAD tool helps us manage hierarchical design rules by regions and enables online DRCs as immediate feedback. This is essential to keep up the hardware development speed with the fast software changes in the IoT market.*

Hans Mühlbauer, CTO, home2net

Design rules in combination with the online design rule checking (DRC) provide home2net with immediate feedback of what is possible in such a dense and miniaturized design. For cost optimization, home2net creates one layout to serve different applications for multiple customers. OrCAD Capture CIS manages assembly variants for one PCB layout. The company uses the OrCAD Productivity Toolbox to standardize its manufacturing output flow, since fast and flawless generation of manufacturing documents is essential to meet time-to-market targets.

The Results

As a result of using the OrCAD solutions for PCB development, home2net has achieved a 30% faster development cycle, has reduced costs by 15%, and can readily meet its stringent time-to-market goals. home2net is using hierarchical and modular design approaches reusing proven circuitry at the schematic level and in layout. Furthermore, the company uses the part manager feature in the tools to create and control multiple configurations of one design.

"The easy-to-use constraint manager in the OrCAD tool helps us manage hierarchical design rules by regions and enables online DRCs as immediate feedback," said Hans Mühlbauer, CTO of home2net. "This is essential to keep up the hardware development speed with the fast software changes in the IoT market."

Summary

In the future, home2net's web@ctrl platform will be available as a module which can be added to OEMs' PCBs on a dedicated land grid area. This provides many traditional products with an IoT solution.

www.orcad.com