System integration services for a successful product creation in home/building automation and industrial applications

Home automation system integration based on in-house IP blocks

RT-RK has built a strong expertise in home automation covering the full vertical from the low level, real-time, embedded components, up to the high level, cloud-based services. By integrating our IP OBLO solutions that seamlessly interact with lighting and electrical appliances within home we create engaging indoors and save energy.
For more comfort, more options, and more connectivity with smart home our IP portfolio contains:

- Modular retrofit **Smart Dimmers**, locally and remotely controlled
- Modular retrofit **Smart Outlets**, with power overload protection and power consumption monitoring
- **Remote Controllers**, ergonomically and intuitively designed, supporting multiple lighting groups and user-defined scenes
- **Home Server**, incorporating all the devices (dimmers, outlets, remote controllers, handheld devices, smart appliances) into an integral system. The server has insight into energy consumption of the home. Based on signals from the environment (e.g. user commands, weather forecast, Smart Grid) it applies different control patterns targeting energy consumption optimization. LAN and WiFi connectivity ensure interoperability with 3rd party systems
- **Manager and Mobile application** for control of all the available devices supported by Home Server. Via computers, tablets, and smart phones you will discover new freedom of managing the devices from one central place. Each family member can personalize their usage of the manager application through an intuitive and fun-to-use graphical user interface.
- **Cloud Services** for access over the internet to the resources at home: monitoring, data analytics, etc.

**Case study:** for a global market leader in the development, manufacturing and application of multi-sensor shopping experience, we combined embedded and web/enterprise technologies into an extendable, flexible, and scalable platform.

**Product development**

In the over two decade long history of involvement in embedded system development, RT-RK has built a significant knowledge base in the home automation area. The main route of knowledge acquisition is provision of design services for world-known customers as well as development of own product portfolio.

The design services RT-RK offers in this field may cover a full product life-cycle, starting from product concept (software, hardware, mechanical design, prototype development, testing, certification) to hand over to mass production (EMS) including factory test support.
**Innovative Sensors**

Color picker for lighting. Innovative usage of sensors for controlling the environmental lighting. Color sensor picks up surface color. Light sensor determines operation. Accelerometer allows light fine tuning. Done for a leading company in the lighting market. Early stage project engagement.

**Home Automation Node**

Automation node used in home automation systems. Allows interfacing with the system. Software, hardware, and mechanical design done by our company. Product level maturity reached. Full environmental and precompliance tests performed. Shared IP with the customer.

**Smart TLD Control**

Plug and play smart TLD lamp controllers. By combining sensors and time they allow energy saving with no installation. Full product design (software, hardware, mechanics) done by RT-RK, from the idea up to handing over to mass production, including certification. Done for a leading company in the lighting market.

**Turn-key Remote Management Solution**

A platform for remote management of field-deployed interactive devices. Full software stack design integrating OTS components. Involves development of real-time embedded nodes, sensors, connectivity and management features, cloud platform and clients. The customer is a leading company in consumer electronics. Numerous deployments worldwide at airports, shops, and proprietary facilities.

**USB VoIP Gateway**

VoIP terminal used in military vehicles. Military graded product design (software and hardware). Extensive testing according to the applicable standards (environmental, vibration, shock, ESS, EMC). So far installed over 10k units.

**Solar Powered Smart Road Marker**

An integral solution for outdoor light marking using renewable energy. The concept, design (software and hardware) is fully done by RT-RK. Field tests were conducted to prove the concept and evaluate the results.

**Brushless Motor Control**

Full brushless DC motor control development. Started from a concept, ended in a commercially available IC of a leading semiconductor company. Extensive knowledge of motor control, as well as customized solutions for e-bike market.

**Product**

1. Concept
2. Prototype
3. Product
4. Deployment
Innovative thinking and awareness of the state-of-the-art technologies is something we feel is crucial in efficient product development. This mindset resulted in vast experience in many fields:

- **Usage of versatile connectivity technologies** — LAN, RF, WiFi, Zigbee, IR, and NFC
- **A variety of microcontrollers** and SoCs (8/16/32 bit) built in our designs, running either commercial or free RTOS, programmed in assembler, C or C++
- Many analog and digital **sensors** incorporated in our designs (cameras, temperature, humidity, color, proximity, 3D, PIR)
- Power is a key aspect in home automation: development of **low power** devices to preserve battery life, careful design of power components to be compliant with EMI regulations, products dealing with high power (light control, home appliance control, power management at home level, etc.)
- **Know-how of controlling power efficient lighting technologies** (CFL, LED, TLD)

**Case study:** for a global market leader with recognized expertise in the development, manufacturing and application of innovative lighting solutions, we developed a TL lamp motion sensor - an electronic switching device for 36-58W EM fluorescent lamp circuits. The device is equipped with a motion sensor which is able to switch off the lamp without using the ‘normal’ mains switch.

**System integration in industrial applications**

In industrial applications of various control systems for operating equipment such as machinery, processes in factories, heat treating appliances, switching in networks, steering and stabilization of devices, and other applications with minimal or reduced human intervention, we **develop embedded solutions and combine versatile technologies** to apply required specific regimes. Those applications might need:

- Ability to switch devices on/off and combine settings from devices behavior recipes to reach desired steering levels
- Ability to restore system settings in case of failure (e.g. power failure, bus cut)
- Ability to retrieve setup configuration (e.g. on/off durations, levels, running recipe)
- Ability to manually enter the system into specific power regime (e.g. maintenance, repair)
- Ability to manually run the predefined level/power behavior sequences (e.g. test recipe)
- Ability to monitor information from local or remote location from the external network
- Ability to manage different users and permissions
- Ability to be integrated within a specific brand, and deployed as a running scenario to a number of end-devices
- Ability to redeploy recipes and configuration files in case of update
- Ability to use specific brand end-device drivers framework for the installation and later maintenance

**Case study:** as an example of industrial application here we highlight a system integration of lighting control regime in context of fish growth installed in the North Sea.

**ABOUT RT-RK**

RT-RK is a service provider and product development company in the fields of consumer electronics, communications and multimedia. The company shares revenue from engineering services, integration of own IP blocks, and sales of products. RT-RK IPs are:

- Complete TV SW stack and multimedia solutions, according to European and US standards - [www.iwedia.com](http://www.iwedia.com)
- Home automation line of products - [www.oblo.rs](http://www.oblo.rs)
- Consumer products testing tools - [www.bbt.rs](http://www.bbt.rs)

**GOAL**

Our goal is to establish new collaborations with companies within our standard business models:

- Near-shore development center
- Project based cooperation

**RT-RK Institute for Computer Based Systems**

Web: [www.rt-rk.com](http://www.rt-rk.com)