Kraft Embedded

We Develop Your Electronics

Services

Development of Embedded Systems and Software

Contents:

Our experience in the development of hardware:

- digital electronics (ARM Cortex M and A, TI DSPs, a long list of different 8 to 32 bit MCUs.

- development of analog electronics in the low-voltage range

- PCB layout, digital and mixed signal (e.g. professional audio hardware), EMC and HF compliant, with unlimited number of layers

- we own a fully equipped laboratory

- we build professional prototypes with all component types (incl. BGA)

- mechatronics and robotics, constructions with steppers of all sizes and kinds

- testing setups for electronic, software and mechanical testing

- housings, 3D design (Rhino/NURBS), realization in plastic and metal

- FCC and CE conformity certification (outsourced)

Our experience in software development:

- C, C++ and Assembler for all common 8 to 32 bit MCUs

- bare-bone systems and/or RTOS based systems (uC, freeRTOS, mbedOS and others)

- hardware programming of drivers for all common interfaces and protocols, DMA and/or interrupt driven, including SPI, CAN, USB, USART, I2C, I2S, Ethernet and more

- own small footprint robust RTOS (non-preemptive, message driven)

- even so we are not certified (yet), we have worked in the development of safety related systems, especially under Medical Device Software standards ISO 13485 and IEC 62304.

- we love to work with AI, especially computer vision, self-learning and genetic algorithms. We have as well first experiences with Intel Movidius DNN.

- we wrote a lot of speed-optimized DSP algorithms

- together with our partner Impact Wave we develop front- and back-end solutions for our IoT hardware

- development of platform independent apps for Windows/Mac/Linux, Hybrid or Browser-based

- Javascript, Java, Python, HTML 5, CSS, PHP, JSON and more

- Version Control (git, SVN, Bitbucket)

Management:

- agile project management (Scrum) using Jira

- requirement management

- experience with international clients. We speak fluent business level
  - English
  - German
  - Portuguese
  - Italian

  More, we speak as well an acceptable French and Spanish.

- organization of (abroad) production and component acquisition

- consulting and feasibility studies for projects / devices

Projects we are proud of:

Development of a battery powered Wi-Fi IoT device. Besides running in cloud-connected mode, the device can also act as a Wi-Fi hot-spot with inbuilt server. This allows to run the device without network connectivity, using a platform independent browser-app, which is downloaded directly from the device.

The device is based on a low-power, low-cost STM32L432 ARM Cortex M4 and a modified ESP8266. Hard- and software have been optimized for long-term battery usage.

Cortex M4 USB high-speed driver development for an existing medical measurement device. USB is used to transmit frame-synchronized video data, while serving contemporary as a real-time interface for a complex control protocol. Bandwidth usage could easily exceed 80% of the high-speed USB port.

This demanding project, build on Micrium µC/OS, comprised as well the development of a software for Windows (VS 2017), for unit tests and production support.

Development of a battery driven DC motor control with a self-learning fast adaption algorithm for precise switching of motor speeds under strongly varying power conditions. More, the device includes a Bluetooth BLE Modul for the transmisson of testing- and usage data.

Industrial data logger with a bare-metal kernel on an ARM Cortex M7. Besides Wi-Fi and Ethernet connectivity, the device offers networking over an Iridium Satellite module (9603).

Audio recorder for under-water operations with a hydrophone. The recorder works with a 24 bit Delta-Sigma ADC at a maximum sample-rate of 220 kHz. It has to be able to record uninterruptedly into circular memory and to switch recording, if triggered, to SD-card for longer duration.

For its high data rate, a predictive memory management for the SD-card (FAT32) had to be developed. The device is based on a pro-audio recorder, formerly developed by us.

Development of a modular synthesizer (musical instrument) as a software for Windows, as well as a firmware for an ARM Cortex M4 (STM32F407). The synthesizer comprises a total of 44 floating point DSP modules, which can be interconnected freely by the user. It was one of the requirements, that any module interconnection has to be possible - even if nonsensical - without bringing the application/device into an unstable condition.

The firmware has to elaborate the audio from up to 44 modules with a latency of less than 2 milliseconds. For the Cortex M4 that meant maximum optimization of the C source code, as well as usage of assembler and C-intrinsic opcode.

The hardware comprised an audio codec with I2S audio and I2C control interface, as well as the usage of USB and a USART for the native MIDI port. Audio IO was done via DMA with only 2 buffers.

The layout of the PCB was carefully refined to satisfy the high requirements of pro-audio standards.

Contact:

I would be happy to clarify any questions and details personally. Please don't hesitate to get in contact.

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