Sergey Bashkirov

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Summary

Programming engineer with 12+ years of professional experience in firmware and software solutions in areas related to RTOS and bare metal programming, hardware interfaces, USB, networking; worked closely on actuators control, signal acquisition and processing, user interface design, robotics; have experience in computer vision applications, machine learning; electrical engineering, PCB design; good background in math and physics; mature problem solving ability.

Areas of expertise

Firmware design: Real time firmware, actuators control, physical properties measurement, RTOS and bare metal firmware

Crossplatform programming: GUI, hardware communication

Visualization: Widgets design, Spatial, 3D geometry, 2D/3D visualization

Scripting and automation: Scripting languages, embedded scripting, bare metal firmware scripting

Electrical: PCB design, electrical debugging, soldering skill

Math: Computer vision, machine learning, statistics, data, image processing, Kalman / Extended Kalman filter

Most recent professional achievements

- Reduced development time and eased prototyping by implementing hardware embedded real time scripting language and scriptable GUI builder.
- Created full control solution for pneumatic mechanism of variable complexity by designing expandable stackable PCB set consisting of identical PCBs, designed GUI for embedded Linux, communication library based on XMPP protocol, made real time firmware for ~10 interconnected by common bus microcontrollers.
- Created robot SDK with microcontroller embedded Pawn scripting language for real time algorithms and single board computer based Python SDK for complex logic tasks; made it expandable by making PCB set stackable.
- Achieved high precision with equipment made of the lowest cost components by applying machine learning techniques to calibration process.
- Reduced hardware design time by making expandable stackable PCB solutions consisting of identical PCBs with identical firmware.
- Simplified "find the same place" task for AFM after sample reinstallation by making video aligning and navigation by video mode via applying regression by recognizable points.
- Created from scratch software for controlling Atomic Force Microscope.
- Reorganaized production and supplies purchase processes by perforing statistical predictive contracts analysis. Made business control software for warehouse keeping, product assembling, purchasing and contracts tracking.

Technical proficiencies

Platforms: Linux, Windows, ChibiOs, FreeRTOS

Frameworks, tools: Qt, Boost, OpenCV, VTK, CMake, Buildroot, OpenWRT, VisualDSP, Keil, PMLab, Eclipse, QDeveloper, SW4STM32, Cube for STM32

Programming: C, C++, Java, microcontroller assembler

Devices: Avr8, Cortex-M, NXP ARM7TDMI, AD Shark DSP, Altera FPGA/CPLD Verilog programming and testbench

Interfaces: USB, TCP/IP, UDP, I2C, SPI, UART, SMBus, PWM, DAC, ADC, JTAG debugging

PCB design: KiCAD, Altium, Eagle, NGSpice

Scripting: Lua, Ruby, Python, R, MATLAB, SQL, Shell scripting, Pawn

Aplications: Stepper, BLDC, DC motors control; piezoceramics, temperature, humidity control, data acquisition, signal processing, FIR/IIR filtering, Kalman filtering, automation

Most recent work experience

Aist-NT Inc. **Novato, CA**

Software Engineer, April 2007 - present

Firmware development, embedded real time scripting language design, AFM software development, image processing, AFM modes design, AFM-Raman coupling, actuators control, data acquisition and processing

Transmag **Santa Rosa, CA**

Contractor, August 2013 - December 2013

Designed USB based BLDC motor controller's interface. Designed firmware, user interface, suggested proper USB schematics.

IPM RAS **Moscow, Russia**

Contractor, remote position, April 2012 - February 2015

Created firmware and software for pneumatic robot control modules, developed scriptable SDK, programmed movement algorithms.

Education

Moscow Institute of Physics and Technology **Moscow, Russia**

Master of Science in Applied Mathematics and Physics, February 2004

Moscow Institute for Problems in Mechanics **Moscow, Russia**

Courses in robotics, control theory and stability, June 2004

Laboratory of Robotics and mechatronics.

Most recent courses taken: Circuits & Electronics, Machine learning, SAAS, Autonomous navigation, Statistics with R, Node.JS, Angular.JS, Booststrap, JavaScript.

Open source projects participation

grambo-pi.com: Created expandable stackable PCBs set for RaspberryPi computer for robot prototyping.

xonotic.org: Created Blend2map Blender3D to MAP exporter.

chibios.org: Submitted I2C slave mode driver, IWDG driver.

QtLua: Provided a patch making Object::connect() work in the same way as in Qt.

Gaw: Provided a patch fixing crashes with default configuration file for gaw waveform viewer.