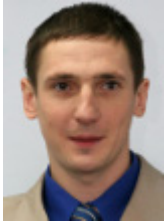


CEO Interview: Roman Pakholkov of Promwad

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Foreword -- Roman Pakholkov is founder and CEO of Promwad, a fast-growing independent product design center in Eastern Europe. In this fascinating interview, Pakholkov describes Promwad's history and early successes, with a special focus on the role of embedded Linux in the company's past and future. Enjoy . . . !

Q1 -- Please briefly describe Promwad's history.

A1 -- Back in 2002, a group of loosely connected associates were working on projects all around the world. Some worked in military electronics, some in measurement equipment, and others in IT outsourcing. However, all of us were developing mobile platforms on Intel StrongARM and PXA processors, operated by Linux operating systems. (I myself headed up a team developing measurement equipment for fiber optics and universal measurement platforms.)

After a range of successful projects, it became obvious that the collective technical expertise of this group was in great demand, at that moment, in multiple industries. So, we decided to unite into one company. That day, Promwad's history began.

By 2004, we had chosen the strategy of contract electronics development, in part because it allows all our engineers to stay on the cutting edge of technology. Throughout the next couple of years, we worked in local markets, built up our project portfolio, and eventually started selling our services around the world. By 2007 and 2008, we were working actively with clients in North America and in Europe, and were shifting toward a specialization on multimedia. Today, Promwad has become a recognized design center for mass produced electronics products.

Q2 -- Where is Promwad located?

A2 -- The main group of developers is located in Minsk, Belarus, but the company provides its services widely abroad. Mainly, we work in Eastern Europe, Switzerland, Germany, and Canada. Some of our clients are located in Russia. This year, we are opening subsidiary offices in the UK and in Russia, to be closer to our clients.



Q3 -- How many people does Promwad employ, and how many are engineers?

A3 -- In all, 35 specialists work in our company today. There are 15 software engineers, 12 hardware engineers, three designers, and five managers.

We employ only those engineers who have had a great deal of experience, with a primary focus on embedded design. Our Hardware department has a digital schematic designer, analog schematic designers, PCB designers, FPGA designers, and firmware engineers. Our Software Department has specialists from firmware engineers to system programmers, and also application developers and Linux kernel developers. Our Industrial Design Department has mechanical designers and industrial designers. Among our managers, we have a business developer, risk manager, product manager, and sales managers.

Q4 -- What services does Promwad offer with regard to embedded Linux?

A4 -- From the very establishment of our company, embedded Linux has been our specialization. The majority of our programmers are engaged in low-level design or in system-level design, and that is reflected in the services that we offer. These services cover development and support of board support packages (BSPs) for existing hardware platforms, and for hardware platforms developed by us; Linux kernel adaptations; system level programming; and, implementation of real-time extensions for Linux. Additionally, for "turn-key" products that Promwad produces, we design middleware and application-level software, including HMI development on the basis of various GUIs.

Q5 -- What other embedded operating systems do you work with?

A5 -- We work with FreeRTOS, eCOS, OSEK, and custom kernels for some microcontroller projects. When developing low-performance devices on microcontrollers, we often use various micro operating systems and schedulers. In particular, for many ARM microcontrollers, we apply FreeRTOS. In addition to that, in our projects we also apply eCOS and ThreadX operating systems.

Among the operating systems Promwad applies, I should call out OSEK separately. We use it regularly, in applications on the PowerPC architecture, for board electronics.

Q6 -- Which Promwad accomplishments are you most proud of?

A6 -- In 2008 our company was nominated for the "New Electronics of Russia" Award, as the most fast-growing company in the sphere of electronics development. In the five years of our existence, we have managed to become a



leading independent design center for consumer electronics in Eastern Europe. We achieved this by providing "full cycle" product development services that encompass embedded hardware development, embedded software development, and industrial design.

But really, our major accomplishment is that we help our clients to open new product markets. The latest example is a unique audio streaming device we developed for a client marketing it in North America. That device has the right balance between modern technologies and affordability, and it opened a new market of devices, and became a successful, mass-produced product.

Q7 -- Name one challenge that Promwad has faced.

A7 -- The very first challenge that Promwad faced was consolidating the best specialists from the whole region of CIS countries. And even more difficult was to bring back those specialists who had gone abroad to work for leading electronics companies.

Our second challenge is to enable our employees to specialize and work in certain spheres, and at the same time provide a constant work load for them by selling our projects.

We have overcome both of these challenges, largely thanks to the high qualification level of our specialists, who strive to make each device developed by us a successful, mass-produced product.

Q8 -- What areas of technology do you personally find to be exciting?

A8 -- We find exciting everything connected with modern multimedia devices. That includes a whole world of technology, built atop three pillars:

How to provide mobility

How to make a device wireless (WiFi, Bluetooth, GSM etc.)

How to provide quality audio/video streaming (Mp3, WMA, OGG, AVI etc.)

To achieve great multimedia devices, we apply a number of technologies, standards (JPEG2000, H.264), and interfaces (HDMI, DVI, S/PDIF, AC97, USB, Ethernet, PCI-Express etc.).

Q9 -- Do you have any predictions about the future of Linux in devices?

A9 -- It is obvious that the number of Linux implementations in electronics will continue to grow in the near future. That growth will occur because Linux is the leader among operating systems, in terms of supporting majority of hardware platforms (Blackfin, ARM, x86, MIPS, PowerPC, etc.). Moreover, Linux dominates in network devices, and has practically become the de facto standard. Nowadays,



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Linux is experiencing the fastest growth in mobile devices like phones, navigators, netbooks, and other personal mobile gadgets.

We also believe that Linux will soon dominate in those spheres where RTOS dominated before. This has to do with the fact that the performance of hardware platforms is becoming higher and higher.

In general, it seems that Linux has every chance to become number one in the market for multimedia-enabled electronics, because the costs for developing applications and integrating them in these systems are constantly decreasing.

We believe in Linux, and we put the main emphasis in our work exactly on this operating system.



About the CEO -- Roman Pakholkov was born on Nov. 21, 1976. He graduated in 1999 from Belarusian State University of Informatics and Radio Electronics (Minsk, Belarus) with a diploma in Computer Systems and Networks. In 2003, he graduated from European Humanities University (Minsk, Belarus) with a diploma in Management in Production Industry. Roman has more than 10 years of management experience in electronic systems development, and is an expert in mobile measurement equipment and mobile embedded systems development.