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Voja Antonić

Vojislav “Voja” Antonić is famous for his design of the Yugoslavian DIY computer the Galaksija. I have chosen to write about him as I find him to be a fascinating character, building a computer for everyone nearly by himself with little desire for renumeration. If Open Source software is currently popular, his Galaksija was maybe an example of early Open Source hardware, you don’t need to buy a computer when you could make it yourself.

Born in 1952 in the Socialist Federal Republic of Yugoslavia (in what would currently be Šabac in western Serbia) grew up with a passion for technology. As a young schoolboy he broadcasted through HAM radios until he grew bored of them and moved on to different technologies. His first use of a microprocessor was to create a machine to display “Conway’s Game of Life” on a 16x16 LED display. The Game of Life was an automaton that would mimic cellular division. The evolution of the display depends solely on the initial state of the machine, and through various rules cells die and are born.

Antonić’s first use of a computer was the TRS-80 Model 1, a computer he received in parts from a friend in the United States. As the computer was not available in Yugoslavia, he received it in a bag labelled “technical junk” and reassembled it at home. He continued to work on and research computers and microprocessors like the Z80 but found them to be prohibitively expensive. He was building computer systems capable of rendering animation, and even built computers for the Skiing Federation of Serbia to use for timing, having previously only been using regular stopwatches and hand signals.

This prohibitive cost was the seed for the invention of the Galaksija. If ZX Spectrums or Commodore 64s were too expensive to buy, that is if you could even manage to import them into Yugoslavia he could build his own. When on holiday in Risan, Montenegro in 1983 he had the idea for a new machine accessible to more of his countrymen and women at a fraction of the cost. On return from Montenegro he had sketched out a conceptual design for this machine that would use the same Zilog Z80 microprocessor the ZX Spectrum used.

This Galaksija would instead of having specific video circuitry for video generation use only the regular CPU. Antonić had learned this trick from reading the handbook for the RCA CDP1802 CPU. While this emphasis on using software over hardware would reduce the performance of the computer it also would significantly reduce the cost of the machine, perhaps a more important concern. The Galaksija used a modified version of TRS-80 BASIC, but was really only using some flow-control and floating point code from the original.

"It had a 32x16 text mode and very rough 64x48 block graphics, the arithmetic routines were previously 'stolen' from TRS Level 1 Basic and the rest was originally written. Later I added my own arithmetic routines with many more functions, as well as the Z80 assembler and disassembler.” - Voja Antonić

One of the most charming aspects of the Galaksija was its ‘friendly’ OS. Error messages included “WHAT?” if there was a syntax error, “HOW?” if the input would be impossible to use, or

“SORRY” if the operation exceeded the Galaksija’s limitations. it was a thrilling time for Antonić who would say about it, “*My friend Dejan Ristanović and I spent a lot of days and nights brainstorming while I was writing Galaksija's operating system. I had to walk outside sometimes just to dissolve the adrenaline rush*”.

With the computer design in place, Antonić wanted the computer to be freely available to all and so when the science magazine Galaksija (where the computer took its name from) was planning a computer publication spin-off, the debut edition would contain plans on how to build a Galaksija computer. The author of this new magazine Dejan Ristanović said that while it would be immodest to say that the Yugoslavian computer revolution began due to the publication of this edition of “Računari u vašoj kući”(Computers in your Home), “*the fact is, however, that the computer revolution began just after the appearance of the first issue of the 'Računari' magazine”*.

The magazine and computer became a great success, and created many computer hobbyists out of Yugoslavians. It even used an early form of wireless communication when radio station Ventilator 202 on Radio Belgrade played sounds that when recorded onto a tape could be loaded onto the Galaksija as a computer program. The station broadcasted 150 programs over 3 years.

In 1991 Yugoslavia was amidst war. Taken from his home in a military Jeep, Antonić was brought to the quarters outside of town. When asked what he did for a living he told the officer that he worked with computers. The officer gave him a broken Apple II and told him it hasn’t worked for over a year. Antonić was permitted to take the computer back to his workshop at home to try and fix it, which he did with relative ease. On returning the computer to the officer, the officer returned his ID and sent him home saying, “*Take care of yourself, I need you alive. Who knows when this piece of shit might get broken again.”* Antonić would join several anti-war and anti-Milosevic groups during this period.

He is still working in computers today, going to hacker conventions to show off his lates experiment, and has given one of his own Galaksija’s to the Museum of Science and Technology in Belgrade.

I chose to write about Antonić for a few reasons. Firstly I admire his dedication to sharing computing as a tool or hobby for everyone, not just those who can afford it. It always surprises me how expensive modern computing devices are for how little time they last. Plenty of people spend over a thousand euro a year on a new phone, which is not only a huge amount of money to spend, it is quite wasteful. The Galaksija on the other hand was created for anyone to be able build themselves at a time and place where personal computers could be illegal to import, and then if you were able to import would set you back quite a bit.

Another reason I decided to write about him was that while there are plenty of famous software engineers and computer scientists in the places we most associate with computers, Silicon Valley, Japan etc. other parts of the world had their own experiments and designs on computers. Yugoslavia is something of an interest for me, as it seems to me to be an example of a very different world to the one most people in western Europe or the United States lived in. It was a totally different way of living. Still in this time and part of the world people were experimenting with computers and able to build a mass interest computer.

I also found it admirable that Antonić never wished to profit from the computer himself. He was simply a hobbyist with a passion for computers and wanted to share it with the rest of his country. Maybe he would've been better off if he had, but there would be a lot less people who were able to use a computer in their own home.