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Raspberry Pi proven to be stable when submerged in liquid nitrogen

Chips By [Matthew Humphries](#) May. 15, 2013 10:35 am

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The [Raspberry Pi](#) has proven itself to be a rather hard wearing little PC. It ships without a case, is used by children in anger, and has become the brain of many a DIY project, yet you don't hear about many of them failing. But a couple of Raspberry Pi owners decided to find out just how rugged the Pi is by submerging it in a tub of [liquid nitrogen](#).

As the Raspberry Pi is such a cheap bit of kit, submerging it in liquid nitrogen at worst ends in you having a \$35 piece of unusable electronics. But [Slava and Innokenty Maslennikov](#) were pleased to find the Pi coped quite well with the extremely cold temperatures. In fact, their bigger concern was the plastic parts, such as the SD card, bugging out.

The Raspberry Pi they used was the original 256MB model. Power was supplied through USB and the Pi was accessed through SSH over Ethernet. It wasn't submerged directly in the liquid nitrogen, instead it was placed in a plastic tub, which then got submerged in a foam box of the super cold liquid.

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Once the tub was submerged, the temperature of the board initially dropped down to -78°C before it stopped responding. However, removing the board and replacing it after 30 seconds saw the temperature drop to -82°C and then -87°C before the Pi stopped working again. At its limit the Raspberry Pi continued to function right up to -110°C , and then started working again once it had warmed back up.

That wasn't the end of the experiment, though. The Raspberry Pi was dried out (due to the condensation build up) and then placed inside a plastic bag before being resubmerged inside the tub. This time the temperature went down much more slowly, but the Pi remained stable. In fact, the Pi remained stable right up until it reached 107°C , at which point it shutdown.

The main takeaway from this experiment is that the Raspberry Pi has no problem dealing with very low temperatures and can happily function at a steady -100°C .

Slava and Innokenty intend to repeat the experiment with a 512MB version of the Raspberry Pi in the near future. But this time they are going to prepare a number of scripts to run to get a better idea of how the board is performing as it gets colder. They also want to connect to it via HDMI rather than over Ethernet as they suspect that was one of the limiting factors—the Ethernet port couldn't cope and failed first.

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