Torsten Grawunder: Open Source Hardware and the Industry

Torsten Grawunder is an employee of Swissbit Germany AG, Berlin. The paper is based on comments he made at the „WebTalk Freie und Open Source Hardware" (WebTalk Free and Open Source Hardware) of the German Informatics Society (Gesellschaft für Informatik; March 31, 2022, https://www.youtube.com/watch?v=RmUJWmC1KGc)

Nikolas Becker, Gesellschaft für Informatik: How do you assess the productive usability of the open source toolchain?

Grawunder: From an industry perspective, we are very skeptical. We are historically influenced by the classic, commercial design tools and have grown with them over the decades in terms of the complexity of the tools and the products. We still miss many aspects in the open source tools (e.g., power analysis tools).

But, and this is the point, we also see this as an opportunity to get qualified employees who are familiar with these open source tools and can continue to maintain them, but who also have the skills to be able to describe hardware in a programming language that is close to the hardware. This is different from classical processor-based programming languages when I write a software application than when I describe a hardware. The major difference is actually that I can debug a normal application and, if I discover an error, I can recompile. In hardware design, however, a typical procedure is as follows: I invest a lot of time in design testing and qualification before tapeout to be sure that an IC design works as far as possible with the first silicon. I do this so that I can go to the production-ready state in the second IC design step. This requires a different way of thinking. Open source tools and open source IP cores can provide that on a broader price basis and allow us to find collaborators. And also to find employees who drive innovation.

We are currently spending millions to be able to create and manufacture a chip design. But we cannot hold so many licenses per engineer that all hardware developers can work on a design at the same time. We can't do this for pre-development either, because we can't afford it in terms of licensing costs. That is why we invest in and are committed to open source. In pre-development, to see where we can drive innovation, open source is a way for us to say: This brings us the benefit that we want to see in products in the future.

The other aspect is: we are security-oriented in our storage products for the industry. With each generation, there is more security-on-chip. Our position is that security in particular thrives on being verified, understood and tested by a broad community and on having a common standing about the value of the methods implemented there. How resistant is it to certain methods of attack? Which security level do we achieve for certain applications? Currently, we see that we have to buy crypto algorithms under closed source with very problematic NDAs and partly with testing protocols that are very unsatisfactory in terms of the quality we receive. This concerns, for example, points such as resistance to side-channel attacks and other implementation effects, which we had actually already specified beforehand.

I would also like to add what is currently problematic about the open source tools: our designs have to perform the balancing act between the smallest die area, the lowest power consumption and the highest performance in the smallest installation space. Take a microSD card, for example. It must not consume 10 watts in one application. This is where the open source tools still have their weaknesses, but they will develop.

As a Swissbit in-house manufacturing service provider, we can process up to 300mm wafers as well as separate, bond and package dies. We have the entire semiconductor-backend production, as one of the few in Europe. We do this classically for our memory products. But we also want to open this up for the open source movement and to bring open source components into our production. We manufacture hundreds of thousands of products a month, in Europe, in Germany, highly automated and highly qualified. For this environment, we need dedicated employees who bring this team spirit, this hardware spirit and this commitment. Open source, in relation to security, is one way to establish this more strongly. That is the reason for our engagement in this field.

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