

## **Beyond Digital**

While we are currently clearly in the digital age, and are still progressing, most of this progress is merely incremental. However, if one looks into the future, then one can see several technological problems that we are likely to bump into and which necessitate us to investigate other ways of computing.

Considering that the current digital technology was originally developed with the purpose of performing arithmetic and logic functionality, we have managed to get this technology to do much more, but that does not mean that it does all these tasks efficiently. The current approaches obviously work nicely for automation needs which are of an on/off nature, but there is a growing need to deal with more complicated tasks that we humans can achieve easily, but are much more challenging for digital systems. This lies partly in the fact that biological systems (like the human brain) are far from digital, and not even deterministic. Hence, in order to achieve similar functionality, we will need to design similar types of systems. This will require us to deal with uncertainty, and not from the perspective of “correcting to cover up”, like we currently do, but truly embrace it while still developing reliable systems. Being able to embrace this will also allow us to deal with some technological challenges, which are due to our desire for deterministic systems using materials, which have physical and biological characteristics that are not necessarily deterministic. For example, silicon manufacturing starts to suffer more and more from reliability issues, but most these are only relevant in the context of deterministic circuits.

Biology is the best example of none deterministic systems and the fact that they work. Considering that digital technology is merely an “abstraction”, which was initially implemented using electro-mechanical switches, and then moved over to transistors, the question lies into developing an abstraction for none deterministic systems, which can then be used and implemented using different technologies.