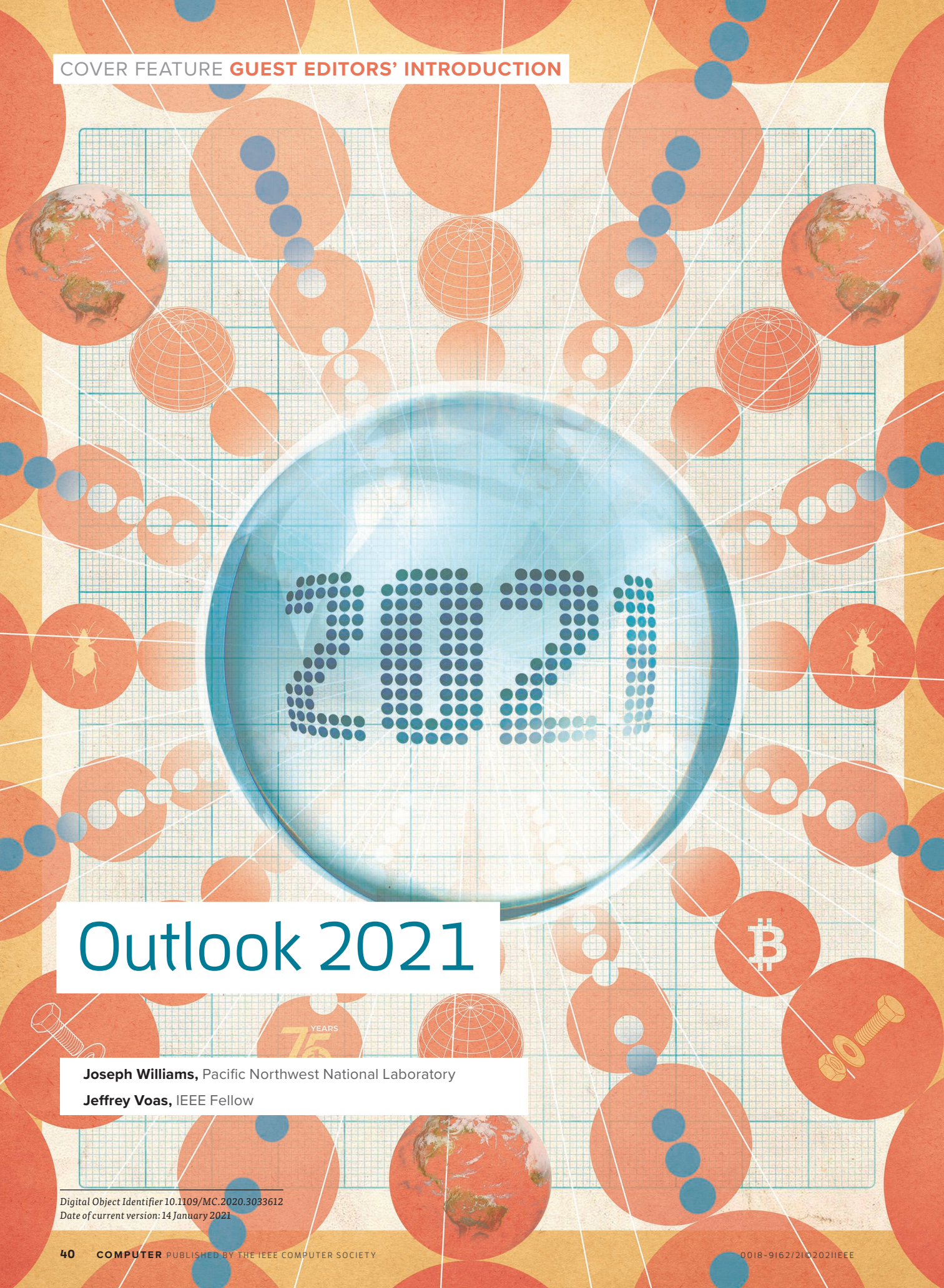

Outlook 2021

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Welcome to the January Outlook 2021 issue of Computer. The authors of this issue examine emerging technologies and applications in the computer field.

In 2021, we are going to see another tsunami of new technologies that will again push the boundaries of possibilities in scientific and enterprise computing. In ways that are undoubtedly familiar to most of you, the wave of advances has overwhelmed the ability or capacity most organizations have to deploy what has been rushing at them. Our crystal ball tells us that 2021 will be a year in which tech leaders will try to channel the opportunities that landed in the previous decade. Consequently, for this theme issue, we've chosen a selection of articles that try to bring real-world insights into four of the many currents moving people in the computer profession today.

Vard Antinyan's article takes on the standard practice of predicting software defects by counting lines of code (LOC). Antinyan argues that there is no meaningful value in this practice, concluding that size doesn't matter as a predictor. Yet, new research continues to use LOC as a contributing variable in defect-prediction models. Moreover, the continued use of LOC defect-prediction models is stifling the improvement of more meaningful prediction methods.

The team behind the article "Understanding and Fixing Complex Faults in Embedded Cyberphysical Systems" takes the other approach, arguing that a better understanding of fault types can lead to improved approaches to debugging and runtime verification for embedded systems. Their observation is that embedded systems are becoming more prolific and the field needs better ways of finding and preventing failures. They illustrate some specific examples where anomalies and bugs were not identified by traditional approaches and thus remained latent in the code for years. The authors call for a better understanding of the nature of complex faults and the application of improved hardware and software to improve the safety of embedded systems.

Vartan Piroumian's article, "Digital Twins: Universal Interoperability for the Digital Age," points out that the digital ecosystem leading to that technology is a swamp of proprietary and incompatible methods, techniques, tools, applications, and data. His argument is that digital twins, by standardizing the digital representation of real-world objects, will lead to the underlying alignment and rationalization of the technologies needed to enable a robust digital twins ecosystem. The payoff would be reduced risk, lower costs, and more efficient design processes across the tech spectrum.

The team that authored "Token Economics in Real Life: Cryptocurrency and Incentives Design for Insolar's Blockchain Network" demystifies some of the design concepts behind a blockchain network, specifically in terms of how system dynamics modeling and simulation have impacted the engineering of economic incentives. In addition to providing an illuminating view into the interactions of system design and economic incentives, the article presents a consumable explanation of the workings of cryptocurrency. The authors try to bridge the academic literature to a real-word case study of a Swiss blockchain start-up, showing how modeling and simulation led to specific design for economic incentives.

We hope you find this 2021 outlook issue of *Computer* interesting. Happy New Year!

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