

Section RTI (Computing and Information Engineering )

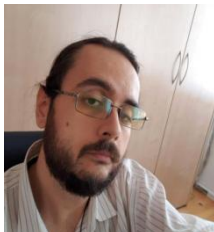
INVITED PAPER:

## Accidental Centralization: Pitfalls of Blockchain-Based Project Architectures

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**Abstract:** Blockchain systems are entering the phase of their development where it is increasingly expected of them to be a robust, effective solution to complex projects, and doing so, furthermore, in a way that keeps costs down and scales with increasing demand. Making use of blockchain in complex projects in ways that scale and keep costs down can lead to very complex architectural patterns. This is particularly the case when the chain must make high-value decisions based on off-chain data or otherwise interact with data, systems, and mechanisms that do not share the underlying logic of the blockchain. The problem with such patterns is that it is very easy to set up a system that only seems decentralized but, in fact, operates under a degraded trust model or is even centralized in practice. Using a blockchain to implement a centralized system represents a grotesque waste of computational resources for no benefit at all. This paper analyzes several cases of such architectural malfunction, introduces a trust model approach to detecting their true level of decentralization, and shows how degraded trust can occur, how to detect it, and how to best address this issue in practice. The paper finds that it is very easy to accidentally create architectural patterns that design away nearly all of the benefits of a decentralized public permissionless blockchain. It shows furthermore that, while sometimes careful design praxis is enough to control this risk, at other times it is the tool, the blockchain itself that is deficient and it needs to be replaced by an approach that trades some decentralization for flexibility with techniques such as private permissioned chains and hybrid chain approaches.

### Short Bio:



**Veljko B. Petrović** received his MSc and PhD degrees in Electrical Engineering and Computing, from the University of Novi Sad, Faculty of Technical Sciences, Serbia, in 2010 and 2018, respectively. He is an Assistant Professor at the Faculty of Technical Sciences of the University of Novi Sad. He has authored or co-authored more than 30 papers published in scientific monographs, and peer-reviewed journals and presented at scientific conferences. He is also an active peer reviewer in several journals.

His professional interests include machine learning, statistical software applications, computer vision, data visualization, AR/VR software, cryptography, and computer security.