Designing Trustless Identity: A Multi-Layered Framework for Decentralized Verification in Web3 Ecosystems

Venkata Baladari
Sr. Software Developer, Newark, Delaware, USA
vrssp.baladari@gmail.com

Abstract*: As digital interactions continue to shift toward decentralized platforms, the limitations of centralized identity systems such as data silos, lack of user control, and reliance on intermediaries have become increasingly apparent. This research introduces a structured, multi-layered framework to support the design and implementation of trustless digital identity systems aligned with the principles of Web3. The proposed model integrates five core components: standardized identity protocols, regulatory alignment, user-centric design, trusted institutional participation, and enterprise integration through middleware. Each layer addresses critical challenges such as legal recognition, interoperability, usability, and system scalability. By combining decentralized technologies with practical governance and user experience strategies, the framework aims to enable secure, verifiable, and portable identities that function across jurisdictions and platforms. This paper offers a foundational approach to advancing digital identity infrastructure in a way that is technically robust and socially inclusive.*

Keywords: Decentralized Identity; Self-Sovereign Identity; Trustless Systems; Verifiable Credentials; Web3