Integrating Blockchain Technology with IoT

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Abstract: Internet of Things (IoT) are the first-class citizen of the 4th industrial revolution often called Industry 4.0. Security is of utmost concern when deploying IoT infrastructures. A majority of such deployments are centralized in nature and are much prone to several attacks such as DoS or DDoS, insider threats, etc. and are also vulnerable to a single point of failure. Such deployments rely on centralized cloud servers for identification, authentication, and storage of data generated by the IoT devices. Centralized architectures are in use for a long time with small to medium size IoT networks however, it may not be able to handle the requirements of the large-scale networks with billions of devices of tomorrow. Also, such systems lack transparency as users or organizations need to trust the way the cloud services store and use their data. Distributed technologies such as Blockchain along with Smart Contracts with the power of secure cryptography can help to solve a number of such challenges for better auditing, increased fault tolerance, and improve the overall security of such deployments. Integration of Blockchains with IoT based systems is still in its early phases and knowledge about them will give a researcher, or an industry practitioner an edge over others.

1. Audience

This tutorial is open to researchers, academicians, students and practitioners working in the area of IoT and blockchain technology, and anyone with interest in the topic. Participants can be from different backgrounds such as Security Analyst, people from audit and compliance sections, academic researchers, and so on. All of them need not be experts in the concerned Computer Science and Communications domain. From that point of view, the tutorial will begin with the very basics of the theories of cryptography and networks, and will subsequently move forward.

2. Description

In this tutorial we will elaborate and emphasize the key aspects of the use of blockchain for IoT applications and will provide a platform to share the latest research on emerging use cases on blockchain for IoT. Blockchain is a decentralized and distributed ledger where the data is organized in blocks and are stored across the nodes in the network. With its features of immutability, transparency, high fault-tolerance and high availability blockchain has emerged as a strong contender for assuring security and privacy. The tutorial will provide both theoretical as well as the practical aspects of the blockchain and its integrations with the IoT. We aim to provide them much detailed knowledge of blockchains such as its inception and working insights. Much emphasis will be given to provide and enhance their knowledge of writing secure smart contracts.

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3. Organisers

Roshan Singh received his Diploma in Computer Engineering from Central Institute of Technology, Kokrajhar, India in 2016, and a B.Tech degree in Computer Science and Engineering in the year 2019. He is an Assistant Project Engineer in Open Source Intelligence Lab at the Indian Institute of Technology, Guwahati, India. He is a certified elite in "Blockchain Architecture and Design" by NPTEL, India. His research interests are in the domains of Blockchain Technology, Internet of Things, and Social Network Analytics. Over the years he has made several contributions to his areas of interest at various conferences and journals.

Pranav Kumar Singh is working as an Assistant Professor in the Department of Computer Science and Engineering, Central Institute of Technology Kokrajhar, India. He is having more than 12 years of Teaching Experience. He has also served as Nodal officer NKN and IPv6 Road Map of CITK, an initiative by the Government of India. He received the B.Tech and M.Tech Degree in Computer Science and Engineering. He is pursuing his Ph.D. in the Department of Computer Science and Engineering, Indian Institute of Technology Guwahati, India. His research interests include Vehicular Communications, Security and Privacy, Software-Defined Vehicular Networking, QoS and QoE in Wireless Communication, Intelligent Transportation System, Blockchain, and IoT.