Blockchain Technology

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Since its conception by Satoshi Nakamoto in 2008 and first implementation in Bitcoin, the popularity and interest in Blockchain is rapidly accelerating. Blockchain is the underlying technology on top of which Bitcoin and other applications are implemented. Blockchain is designed as a decentralized network of peers that collectively share and manage a distributed ledger. The ledger is structured as a series of ordered and cryptographically connected blocks, each containing a list of transactions. New transactions are created by a smart-contracts that embody an applicating specific logic (e.g. transfer of money between accounts or creation of a shipping record). Before inclusion in the ledger, new transactions and blocks must be approved by the network participants with the use of a consensus mechanism. Once included in the distributed ledger, the transactions are immutable, time-stamped and retrospectively verifiable by any participant of the network. With the use of these mechanisms, Blockchain provides data availability, transparency and digital trust unparalleled by other systems.

The initial Bitcoin network inspired many new Blockchain applications with extended capabilities and uses in a wide range of areas. However, despite the advancements in recent years, many fundamental challenges remain unresolved and are subject to intense scientific research and technology development. Additionally, the trust Blockchain provides opens new opportunities for applications in the areas of governance, economy, social, healthcare and other sectors which are being actively investigated.

In this session, Elaine Shi (Cornell) will introduce the history and key concepts of Blockchain and provide an overview of the major platforms and applications including Bitcoin, Ethereum, Hyperledger, and others. Next, Hong Wan (North Carolina State University) will discuss the domain of private and permissioned Blockchain platforms such as Hyperledger Fabric and Corda designed as building blocks of networks between consortiums of enterprises, as well as the advantages, threads, and weakness of these platforms. This talk will be followed by Jacob Leshno (University of Chicago) who will discuss the domain of economic and social research that leverages Blockchain technologies.