**Decentralizing Agriculture Industry using Blockchain**

(Mini Project Report)

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**INTRODUCTION**

A blockchain is, in the simplest of terms, a time-stamped series of immutable record of data that is managed by cluster of computers not owned by any single entity. Each of these blocks of data (i.e. block) are secured and bound to each other using cryptographic principles (i.e. chain). The blockchain network has no central authority — it is the very definition of a democratized system. Since it is a shared and immutable ledger, the information in it is open for anyone and everyone to see. Hence, anything that is built on the blockchain is by its very nature transparent and everyone involved is accountable for their actions.

A blockchain carries no transaction cost. (An infrastructure cost yes, but no transaction cost.) The blockchain is a simple yet ingenious way of passing information from A to B in a fully automated and safe manner. One party to a transaction initiates the process by creating a block. This block is verified by thousands, perhaps millions of computers distributed around the net. The verified block is added to a chain, which is stored across the net, creating not just a unique record, but a unique record with a unique history. Falsifying a single record would mean falsifying the entire chain in millions of instances. That is virtually impossible. Bitcoin uses this model for monetary transactions, but it can be deployed in many other ways.

**MOTIVATION**

Buyers and sellers along Agri-supply chains cannot operate with confidence, knowing that they will be paid and can access the finance necessary for business stability and growth. This finance is often limited to highly reputable borrowers with bricks and mortar security and is often only accessible for commodities where the risk price can be hedged. This results in settlement latency, with title transferring months before payment is made. This introduces enormous counterparty risk that most often falls on the producer at the start of the supply chain.

1. Farmers are not paid for the commodities they produce when they deliver them.
2. Buyers don’t have access to flexible supply chain finance to pay farmers, as financiers lack visibility and control when financing commodities.
3. Consumers don’t really know where their food and fibres come from thus restricting their ability to make informed purchasing abilities.

**LITERATURE SURVEY**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.NO.** | **AUTHOR & PAPER** | **PUBLICATIONS** | **FINDING** | **RELEVANCE TO THE PROJECT** |
| 1. | RON D., SHAMIR A., “QUANTITATIVE ANALYSIS OF THE FULL BITCOIN TRANSACTION GRAPH” | “International Association for Cryptologic Research 2013” | Behavior of users, acquiring and spending bitcoins, and how bitcoins move | Understand the behavior of bitcoins. |
| 2. | TROMP J., “CUCKOO CYCLE: A MEMORY BOUND GRAPH THEORETIC PROOF-OF-WORK | “Financial Cryptography and Data Security 2015”, Nineteenth International Conference January 26–30th | Algorithms that allow for a memory tradeoff for decreased memory usage, by a factor k, coupled with increased runtime, by a constant factor. | Realizing the amount of computational effort. |
| 3. | DONET DONET JA, PEREZ-SOLA C, HERRERA-JOANCOMART J., “THE BITCOIN P2P NETWORK” | “Financial Cryptography and Data Security 2014”, Eighteenth International Conference March 3– 7th | Identifying more than 872000 different bitcoin nodes. This data allows them to present information on Bitcoin. | It shows the analysis of collected data of decentralized P2P network. |

**OBJECTIVE**

The main objective of this project is to bridge the gap between agricultural researchers, extension agents and farmers, thereby enhancing agricultural production.

**PROBLEM STATEMENT**

The main problems we want to address are as follows :–

Farmers are not paid for the commodities they produce when they deliver them, Buyers don’t have access to flexible supply chain finance to pay farmers, as financiers lack visibility and control when financing commodities and consumers don’t really know where their food and fiber come from thus restricting their ability to make informed purchasing abilities.

Agricultural insurance systems in the Asia-Pacific region range from major public sector programmes of India and the Philippines through to public private partnerships in China and the Republic of Korea and finally to purely private markets encountered in Australia and New Zealand and non-formal private mutual and community-based crop and livestock initiatives in Bangladesh, India and Nepal. Low-cost agricultural insurance schemes are increasingly viewed as mechanisms for providing social protection to the increasing numbers of people affected by floods or droughts and in helping to lessen the impacts they suffer as a result of such events. However, despite the multiple benefits, the rate of adoption of insurance products by the rural poor remains relatively low. The mechanisms that are in place to validate claims and to effect payouts are still time consuming and this is one of the reasons for index based insurance not being chosen as the first risk mitigation strategy by smallholder farmers. Index insurance based on smart contracts can automate and greatly simplify the process thereby facilitating instant payouts to the insured in the case of adverse weather incidents.

**PROPOSED SOLUTION**

We intend to use blockchain to help achieve a solution for our problem statement as it provides end to end real time tracking, complete and immutable data for reporting, auditing and compliance trails. It helps provide a digital identity that ensures a secure and immutable network. It creates a lifetime learning record with verifiable, tamperproof documentation and certifications.

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**DESIGN & IMPLEMENTATION**

The participating people in the system are: ‘Farmers’ , ‘WholeSalers’, ‘Retailers’ and ‘Consumers’.

**FARMERS:**

Each farmer will use a mobile interface to register himself in the system. He or She will upload his details like Name, Farm Location etc. so that anyone placing an order can filter by a location closest to him or her.

Each farmer can add a listing for his or her crops and should include all the details of his crop like quantity, price per Kg, Grade(A - Highest, D-Lowest)

Each farmer will be able to view the corresponding orders placed for his or her crop listed and can respond accordingly

**WHOLESALERS:**

Each wholesaler will be able to view the crops listed by all the farmers and filter it by crop type, location and price per kg and buy them accordingly.

Each wholesaler will be a part of the blockchain network and after every transaction, the transaction details will be added to the blockchain network along with the Transaction ID of the 3rd party application used (BHIM UPI, GooglePay etc.) for payment .

Each wholesaler can view his current stock of crops bought and sold and view his current orders (Completed, Pending etc.)

**RETAILERS:**

Each retailer will be able to view the crops listed by all the wholesalers and filter it by crop type, location and price per kg and buy them accordingly.

Each retailers will also be a part of the blockchain network and after every transaction, the transaction details will be added to the blockchain network along with the Transaction ID of the 3rd party application used (BHIM UPI, GooglePay etc.) for payment .

Each retailer can view his current stock of crops bought and sold and view his current orders (Completed, Pending etc.)

Each retailer can track any purchase of crops using the blockchain network to the origin.

**CONSUMERS:**

Each consumer will be able to view the crops listed by all the retailers and filter it by crop type, location and price per kg and buy them accordingly.

Each consumer can buy crops using a simple mobile interface and pay using a 3rd party application like BHIM UPI, GooglePay and on a successful purchase can track it to the origin

**GANTT CHART**

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| **ACTIVITY** | **APRIL** | **MAY** | **JUNE** | **JULY** | **AUGUST** | **SEPTEMBER** | **OCTOBER** | **NOVEMBER** |
| **LITERATURE SURVEY** |  |  |  |  |  |  |  |  |
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| **PROBLEM IDENTIFICATION** |  |  |  |  |  |  |  |  |
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| **ANALYSIS** |  |  |  |  |  |  |  |  |
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| **DESIGN** |  |  |  |  |  |  |  |  |
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| **IMPLEMENTATION** |  |  |  |  |  |  |  |  |
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| **DOCUMENTATION** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |



ACHIEVED



ONGOING



PROPOSED

**EXPECTED OUTCOME**

We intend to use blockchain architecture to provide a base for the solution to the proposed problem and develop a system which allows smooth flow of transactions with proof for future references in a tamper proof environment.

**REFERENCES**

1. "Quantitative Analysis of the Full Bitcoin Transaction Graph"

2. "The Bitcoin P2P Network."

3. “Cuckoo Cycle: A memory bound graph-theoretic proof-of-work”

4. E-AGRICULTURE IN ACTION: BLOCKCHAIN FOR AGRICULTURE Opportunities and Challenges by Gerard Sylvester

5. https://github.com/decrypto-org/blockchain-papers

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