Automatic Vehicle Transaction Network based on Decentralized Blockchain

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Abstract—**Block chain is used in vehicular network for security and integrity of data because its non-modifiable and decentralized property. Internet vehicular manger (IVM) is linked with blockchain to provide ranking and truth worthiness of multiple vehicles. IOT E-business transaction is used which is decentralized and its responsible for selling and purchasing of commodities. Peer to peer decentralized transaction occurs between two parties. Transaction record is updated in blockchain with the help of consensus mechanism which is proof of work (POW). Simulation results show the vehicles with higher rank and more points will be passed to buyer. IOT is used to purchase smart property and commodities.**

Index Terms—**Intelligent Vehicle, Trust Value, Ethereum. LPSP .**

I. INTRODUCTION

Blockchain has progressed into all facets of ICT in recent years its use has grown massively.This growth was primarily inspired by the massive increase in the valuation of cryptocurrencies in Blockchain start-ups and significant venture capital investments. The demand for blockchain is expected to rise until 2021[1].Satoshi Nakamoto,explained how blockchain technology,Satoshi Nakamoto,explained how blockchain technology, can be used to deal with the problem of the transaction ordering and avoid with a dual-spending issues[2]Blockchains presented meaningful disruptions to traditional enterprise applications since applications and transactions that required centralized architectures or third - party companies to verify them can now operate with the same degree of certainty in a decentralized manner.The selling and purchase of used vehicles is a common business across the globe. Some 60 million cars have been reported approximately 71.1of these were bought in the USA cars or second-hand cars[3] Customers have many queries about the car to purchase a used motor vehicle, how it was used is it good enough, why the owner sells it ?It is difficult to trust its without answering these questions to clients.In 1984,to tackle this problem used vehicle history reporting company has been established[4].CarFax[5]said in 2015 that its database numbered over 20 billions of used car records. These information and data have up to 100k sources were collected.Services for second hand motor vehicles have proliferated worldwide.These services however require a massive amount of data recovery, updating, and storage.The previous information should not modify after data is inserted into the repositories[6]. Blockchain solves the problem of high cost data storage, an inefficiency that exists in a centralized system[7]. But vehicles interact decentrally with each other. IVM classify ranking and rating level of vehicles. Cloud server stores vehicles data and trust rate based on centralized IVM [8][9],that isn't really cheap for information storage for long time because of low processing speed .Along with new registered intelligent vehicles some characteristics of used vehicles are changed and they communicate via radar, Wireless Access Vehicular Environment (WAVE) and GPS.Their past records , data on communication, and rate of trust is stored in IVM[10].Which is data protection assurance though? The vehicle data protection system is not up to date nor in compliance with IT requirements and researchers are working on it to make data protected in ITS[11].

II. LITERATURE REVIEW

Its history, data about communications and the rate of trust are stored in IVM. A seller-generated ranking is not trustworthy or reliable, so it is a big challenge to rank the vehicles according to their specifications in limited time[12] .The third party is involved in the conventional e-business model to share objects that is a major problem due to lack of trust[13].In IOT business model,to exchange data or money via Person to Person without including third party ,bitcoin is used and rating is created via IVM in a decentralized system and the entire transaction and records are stored in blockchain[14][15][16]

A. Blockchain in Vehicles

Our traffic system will use IVs in future and there will be no requirement of any type of human interference. They may use blockchain for their protection. To share weather information or traffic details it can be helpful.By applying blockchain principle ,details can be stored in public ledger. This technology may also use by a car to sell this information to other cars and receive any crypto-currency in return. Tracking data, traffic enforcement data can also be stored in the blockchain. Nowadays, most businesses concentrate on block chain technology that can be used for smart vehicles.[17]Yuan et al. proposed blockchain plateform for indefindent,stable and centrally controlled system. Ecology, and a conceptual seven-layer blockchain model. Additionally, Benjamin et al.[18] proposed blockchain technology for the ad-hoc Vehicle

network(VANET).They established the Ethereum blockchain-based smart contracting system with the adhoc vehicle network and proposed a combination of two applications — mandatory applications needed(traffic regulations, vehicle taxes, vehicle insurance) and optional applications (applications providing traffic jam information and updates and weather forecasts) for automobiles.They were trying to connect the blockchain with VANET 's services. The blockchain can use many other features such as vehicle communication, security provision, peer-to - peer connectivity without personal information sharing, etc..Dorri et al.[19] proposed mechanism for blockchain technology without disclosing any private information about it.Vehicle users should make wireless remote applications accessible and and other emerging automobile services.[20] described by Rowen et al.bockchain technology to secure IV interaction by side channels of visible light and acoustics. They used a new session cryptographic key to validate their proposed mechanism,sing respectively side-channels and public key infrastructure blockchain. Until now, everybody has concentrated on the services.Yet none of them talk about their business model protected, safe, and comfortable IV communication environment.In [21] Centralized system is discussed in which data security and management is the big issue of today's era. Data is transferred from vesicles to vehicles but the data is not secured its editable and changeable [22]. Blockchain is decentralized and it is used for security and availability of data. Vehicle data is processed inside nodes. Road side unit (RSU) is connected to blockchain, and RSU is connected to multiple vehicles. So all the information about temperature, history, velocity etc are stored in RSU. Blockchain is linked with RSU to provide it extra storage and data security which is not possible in centralized system [23]. Multiple nodes are present in blockchain. First is controller node which gathers all the information relevant to vehicles and transfer it to larger scale. However, miner nodes receive request of all vehicles and after verification respond to those requests. In [24] a new network IVS is used which rank the vehicles for selling and buying purpose. It is responsible to detect malicious vehicles and wrong information provided by those vehicles. Blockchain is linked with RSU to make to provide trustworthiness and make a complete decentralized system. Work proof and stake proof are used for performing consensus mechanism and inserting new block in blockchain to preserve data privacy and accessibility. Once the information is added in blockchain it is not editable and it cannot be deleted. Proof of Event (POE) consensuses mechanism is performed for verification of events entered by vehicles. It is responsible to detect fake fata entered by malicious vehicles. In future to maintain security, work is required on POE which divide data in local and global blockchain and on lightweight scalable blockchain [25]. In [26] people want to a safer method to exchange money and different products. E-business model is used for exchange purpose but it has a drawback that it is centralized and third party involvement occurs in it. IOT coins based of decentralized block chain known as cryptocurrency is used as exchange of money, commodities and smart properties [27].

It reduces transaction stages and converts it to pre-transaction and post-transaction. Ownership of smart properties, vehicles and other products are shifted using NFC module.

In contribution of paper Selling and purchasing of commodities and smart properties take place. A Block chain is decentralized and distributed ledger linked with Internet vehicle manager (IVM) for reliability and security of data. IVM will rank Vehicles based on their trust points. Once the transaction occurs between seller and purchaser consensuses mechanism of Proof of Work occurs, to keep the Money transfer records new block will add in the block chain . IOT coins and car cons will be exchanged to get the ownership of purchased vehicle by a buyer.

III. PROPOSED MODEL

Vehicular Model in Fig. 1 is motivated from [28][29].Trust value, history and all important related information to history is kept in the Internet vehicle manager which is used in the model. Multiple vehicles have multiple trust values so ratio will be generated for all the vehicles and these vehicles will be ranked according to that trust ratio. Agreement is generated between seller and purchaser which will be saved in vehicular manager (VM). Some fraud vehicles need to identified which enters to the network and their performance is also not reliable. E.g. Seller Company showing a vehicle which meets all the requirements of the buyer but in actual it's opposite to buyers expectations or some vehicles which are not verified enters to the network. This is the reason IVM is used because it stores all the previous record of a vehicle and it's not possible to alter any data in it. So chances of fraud vehicles to enter in the network are very less.car coins and bitcoin are traded for selling and buying purposes by both buyers and sellers. IOT E-business is involved in it which is secure due to involvement of P2P transactions and third party is not involved in it. IVM and blockchain are linked with each other for the security of data. In IOT E-business model.transfer of commodities and smart properties occur. Due to P2P transaction encrypted method is used for security and transferring of vehicles and money is transferred as encrypted digit. Seller will use Bitcoin as IOT coin which is decentralized currency and it will be used for selling and purchasing purpose. Smart Contract is used in this model on which all the agreements and requirements of seller and buyer will be mentioned in detail. After signing smart contract vehicle and IOT coins will be exchanged between seller and purchaser.Selling company contains multiple vehicles for selling purpose. Multiple vehicles will be chosen by buyer from selling company and it will be passed to Vehicle manager

(VM). After passing it to IVM ranking will be checked by IVM and ranking ratio will be passed to buyer. Blockchain is linked with IVM for scalability and reliability of data. In blockchain there will be a chain of blocks and history and important information relevant to vehicle will be stored in the blocks and copy of each block is available to all the members so there will be no chance to alter the previous record of vehicles. In block chain each block is connected
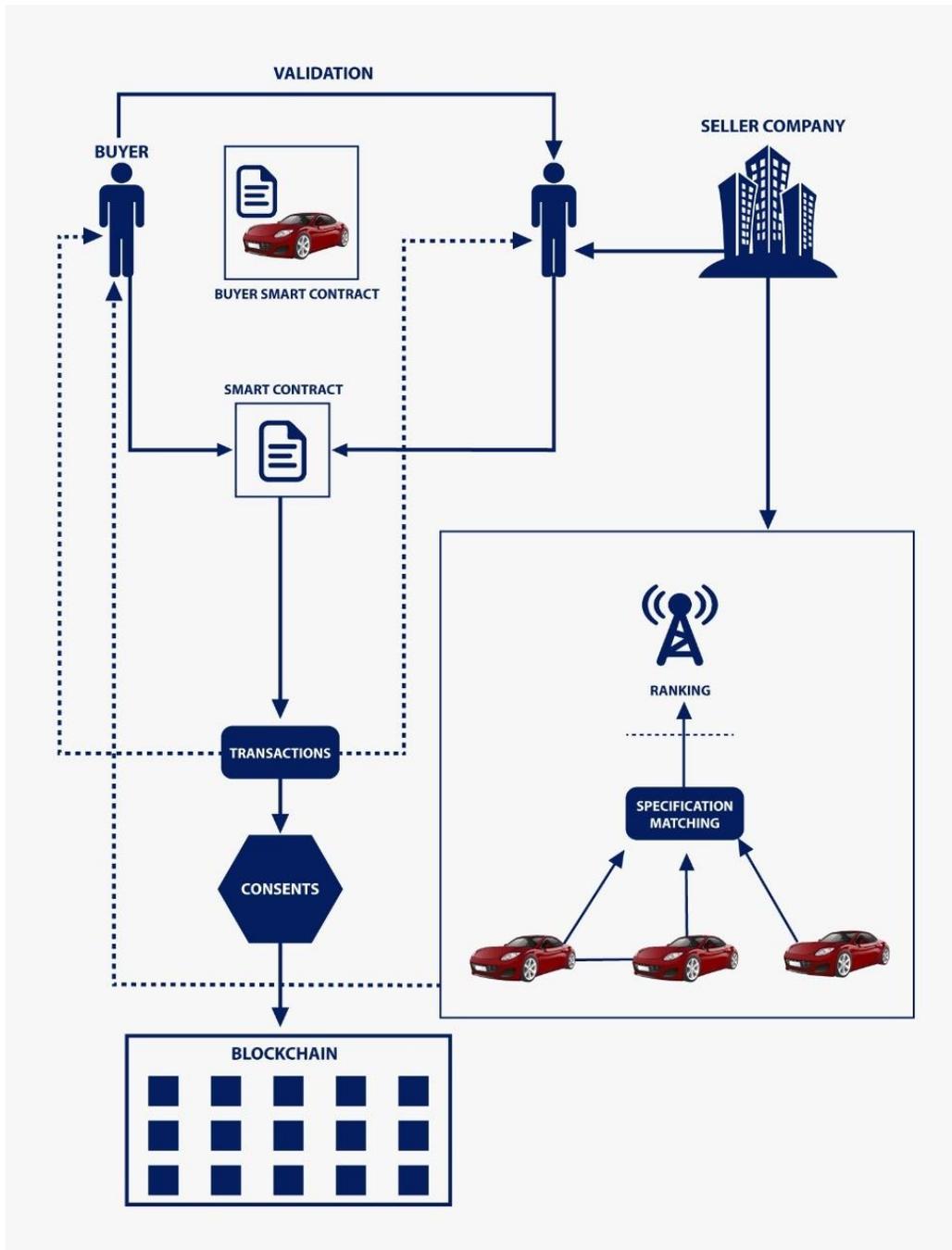
Fig. 1: Using blockchain System Selling and Purchasing Vehicles Model

with another block and forms a chain as a whole. A block contains the ash of previous block. So a change in one block will notify to other blocks. To change the information in a single block is impossible because doing so it will affect the integrity of blockchain. Buyer will check the history of vehicles from IVM. They can request IVM to check the data of vehicle. A complete verification of buyer will be done and data will be shared to him. Customer will be notified with one of the most rated vehicles. After negotiation the smart contract will be signed between Purchaser and retailer and they will interchange car coin with bitcoin. Once the transaction is confirmed a consensuses mechanism occur thus in the block chain new block will be added.

IV. RESULTS AND DISCUSSION

Python is used to check performance parameters of proposed model.Three different parameter forms are checked that are mentioned below.
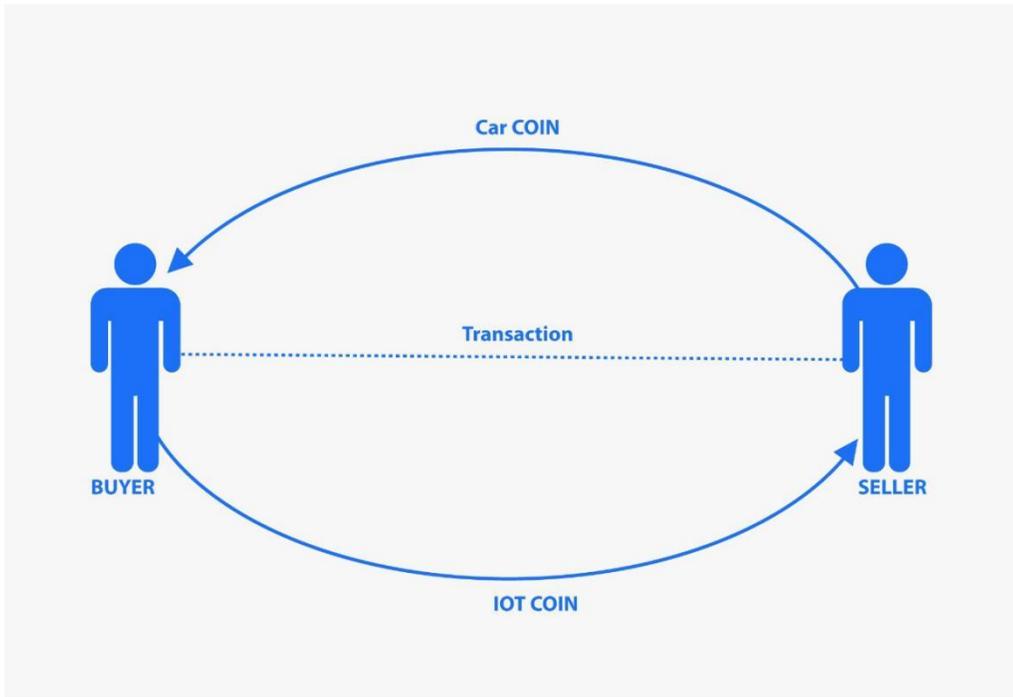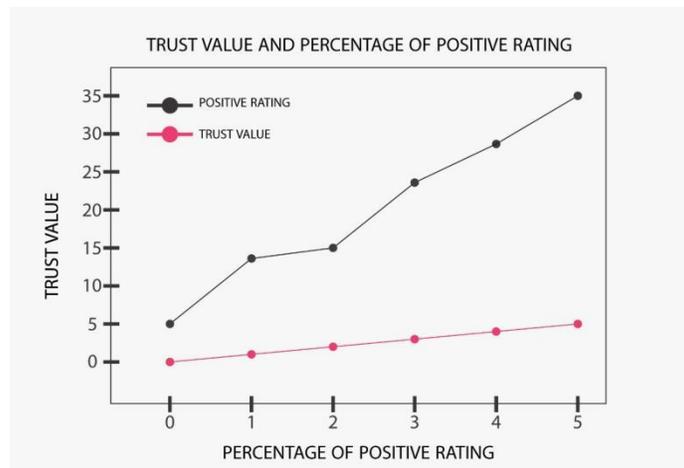
Fig. 2: Buyer and Seller Transaction Cycle

Fig. 3: Difference between Trust Value and Percentage of Positive Rating

[1] Difference between Percentage of Positive Rating and Trust Value

If a customer wishes to purchase a car, IVM. must check its rankings in fig. 3. trust values on ranking percentage. If positive rating percentage for a vehicle is less than that, then the trust values generated will also be lower. The ranking depends on a vehicle's history, and full vehicle-relevant data is saved in internet vehicular manger . If rating percentage is higher for a specific vehicle than it has more trust value. So a customer should purchase a vehicle with high trust values.

[2] Cost of Transaction with respect to No. of vehicles and requests.

Vehicle costs are dependent on transactional cost in fig.4. Transactional costs are based upon Ethereum gas. If a single vehicle's request is in the queue so it'll cost less. Nevertheless, if a number of vehicles are fewer and there are more demands for these vehicles than the transactional cost to support to these simultaneous request increase Consensus process of proof of work (POW) is used to do mining and to add a new block in blockchain until a deal is signed between buyer and seller and the exchange of bitcoin and car coin takes place. Within the blockchain a new block will be inserted after the consensus process.
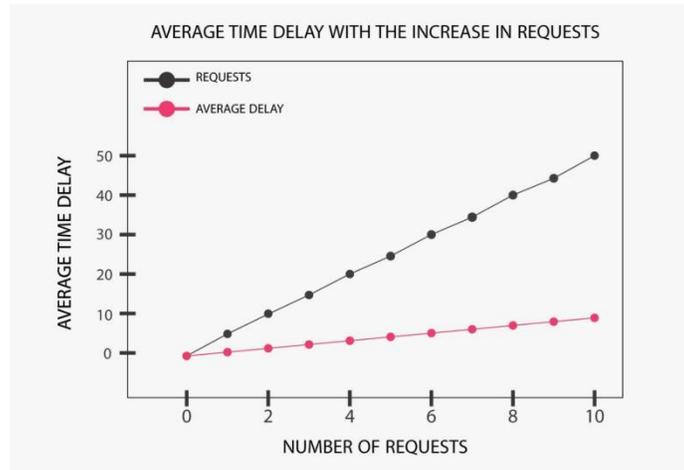
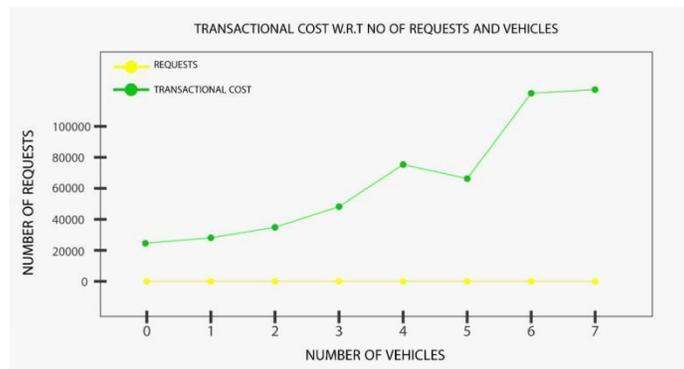Fig. 4: Time Latency Average With Increase in Requests

Fig. 5: Average Time Gap

[3] Average time gap for a larger number of requests for car purchases.

As shown in fig.5 when a customer demands a vehicle from the dealer that would be less than the average delay time provided by IVM is less.Delayed time to respond will increase as number of request increases.

V. CONCLUSION AND FUTURE WORK

Trust management system is design using decentralized blockchain. IVM model is introduced in it which is linked with blockchain which contain all the data and history of vehicles. smart contract is generated by buyer on which all the specifications of vehicles are provide and IVM provide best highly ranked vehicle to buyer which fulfill specifications provided by buyer. IVM generate ranking ratio of all the vehicles according to their past records stored in it. Third party is not involved in it because of decentralized blockchain. Traditional E-business model is modified by removing centralized system. Record of a new data is added in the new block of blockchain using consensus mechanism. Trust management and privacy of data to design a secure transport network is required to discuss in future in detail and more work is required on it. Distributed file system will be integrated with blockchain to increase security. NFC module will be linked with devices which help to show the ownership of smart property or vehicles after transaction occur

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