A CREDIT COIN: A PRIVACY PRESERVING BLOCKCHAIN BASED INCENTIVESANNOUNCEMENT NETWORK FOR COMMUNICATION OF SMART VEHICLES

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ABSTRACT : The vehicular announcement network is one of the most promising utilities in the communications of smart vehicles and in the smart transportation systems. Ingeneral, there are two major issues in building an effective vehicular announcement network. First, it is difficult to forward reliable announcements without revealing users' identities. Second, users usually lack the motivation to forward announcements. In this paper, we endeavor to resolve these two issues through proposing an effective announcement network called Credit Coin, a novel privacy-preserving incentive announcement network based on Blockchain via an efficient anonymous vehicular announcement aggregation protocol. On the one hand, Credit Coin allows nondeterministic different signers (i.e., users) to generate the signatures and to send announcements anonymously in the non fully trusted environment. On the other hand, with Blockchain, Credit Coin motivates users with incentives to share traffic information. In addition, transactions and account information in Credit Coin are tamper-resistant. Credit Coin also achieves conditional privacy since Trace manager in Credit Coin traces malicious users' identities in anonymous announcements with related transactions. Credit Coin thus is able to motivate users to forward announcements anonymously and reliably. Extensive experimental results show that Credit Coin is efficient and practical in simulations of smart transportation.

KEYWORDS: Blockchain, Smart contracts, Peer-to-peer computing, Access control, Distributed databases, Organizations, Credit Coin

I.INTRODUCTION

Smart cities have drawn much attention due to the rapid growth of urbanization and the resulting pollution from traffic, in both academia and industry. Vehicular announcement networks in VANETs (Vehicular ad hoc networks) have become one of the most promising vehicular communication applications, as it leads to a much safer vehicle-driving experience. Additionally, it is also eco-friendly while decreasing the expenditure of many public resourcesby reducing the frequency of traffic jams and accidents. Blockchain is a novel decentralized ledger-based storage method. Satoshi firstly applied Blockchain into Bitcoin [3], which is a peer to peer e-cash system. Later, Blockchain gets more and more attention in e-commerce. Particularly, it has become a hot topic since Blockchain-based Bitcoin became popular.Moreover, in Blockchain-based networks, each node

manages a copy of the whole or part of a database from the system. Thus, Blockchain-based networks are promising in recording creditdata with the good properties of tamperresistance and decentralization, which is useful in VANETs. With the increasing privacy concerns of data [4]–[7], there exist two major issues inbuilding an effective vehicular announcement network. First, ideally, all messages must be forwarded anonymously in VANETs since they usually contain sensitive information of users,such as vehicle numbers, driving preferences and customer identities. However, forwarding messages anonymously does not assure the reliability of the messages, thus decreasing the
credit of vehicular announcements. Second, users usually lack enthusiasm to forward any messages in VANETs if there is a risk that their privacy will be breached. In addition, users donot benefit from forwarding announcements, which also makes them lack motivation to respond to messages.

II. RELATED WORK

The domain of vehicular announcement networks within VANETs has seen significant attention due to the pressing need to address urbanization-related challenges such as traffic congestion and pollution. Anonymity in message forwarding is crucial to protect sensitive user information, but it also poses challenges regarding message reliability and trustworthiness. To incentivize active participation in message forwarding, researchers have explored novel approaches such as blockchain-based credit management systems and privacy-preserving incentive mechanisms. These initiatives aim to strike a balance between ensuring privacy protection for users while also fostering a sense of trust and accountability within the vehicular communication ecosystem. Through these efforts, researchers striveto create efficient and resilient vehicular announcement networks that contribute to safer, more eco- friendly urban environments.

III. EXISTING METHOD

Vehicle announcement can help people avoid traffic jams and give them advance notice of anyaccident or event that may occur along a route before they choose that route, but it has some drawbacks, including user privacy leakage because their current location and vehicle ID will be made public and they could use this information to kidnap people, as well as a lack of usermotivation to participate in the announcement.

DISADVANTAGES OF EXISTING SYSTEM:

1. User privacy leakage
2. Lack of user motivation to participate in the announcement

IV. PROPOSED METHOD

In this paper introduces a concept called Blockchain and incentive-based privacy-preserving announcement in vehicular networks to address the aforementioned issue. Here we adds another concept to avoid incentive lock where user incentives will expire at the end of the dayso they may use this incentive to post their new data to new users. The proposed paper encourages users to announce their location, event, or others received data by providing INCENTIVES and to earn incentive all peoples will get involved in announcement.

3.2.1 Advantages of proposed system:

1. User privacy leakage will be avoided

2. Provide security to data

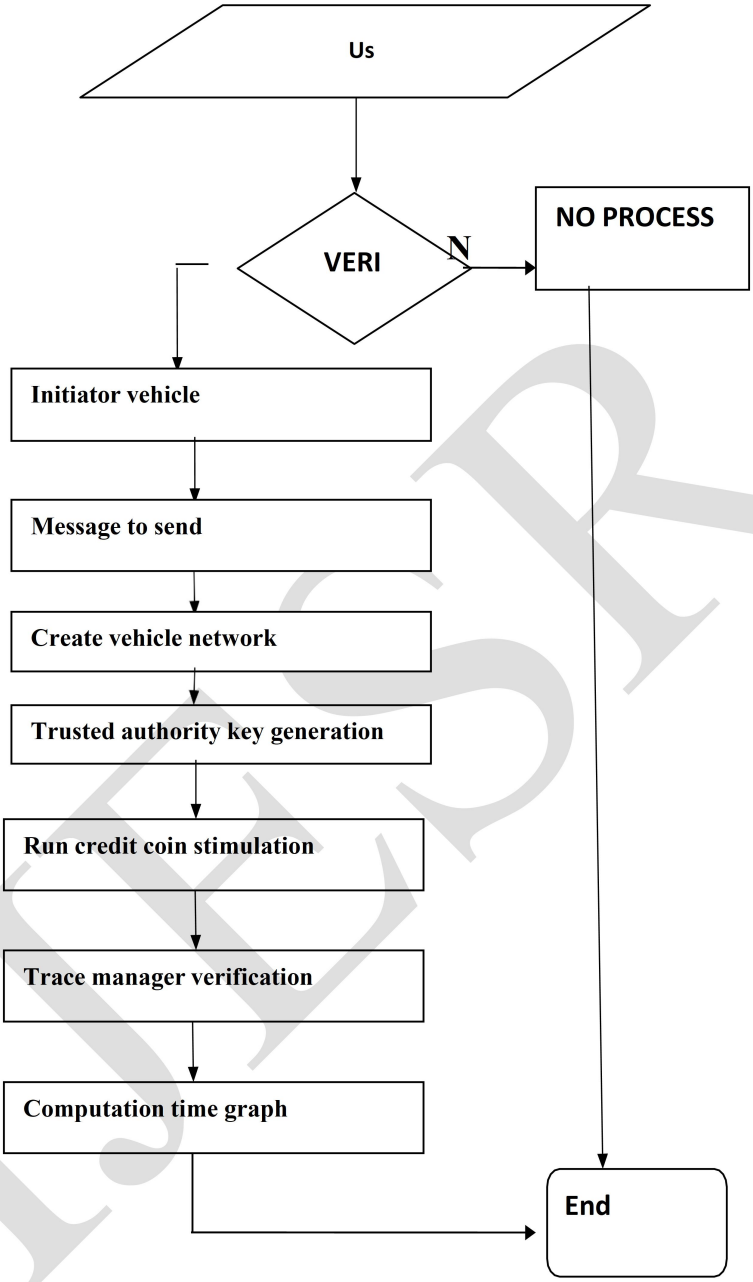

Fig : Flow Chart

V. SIMULATION RESULTS

To run project double click on 'run.bat' file to get below screen

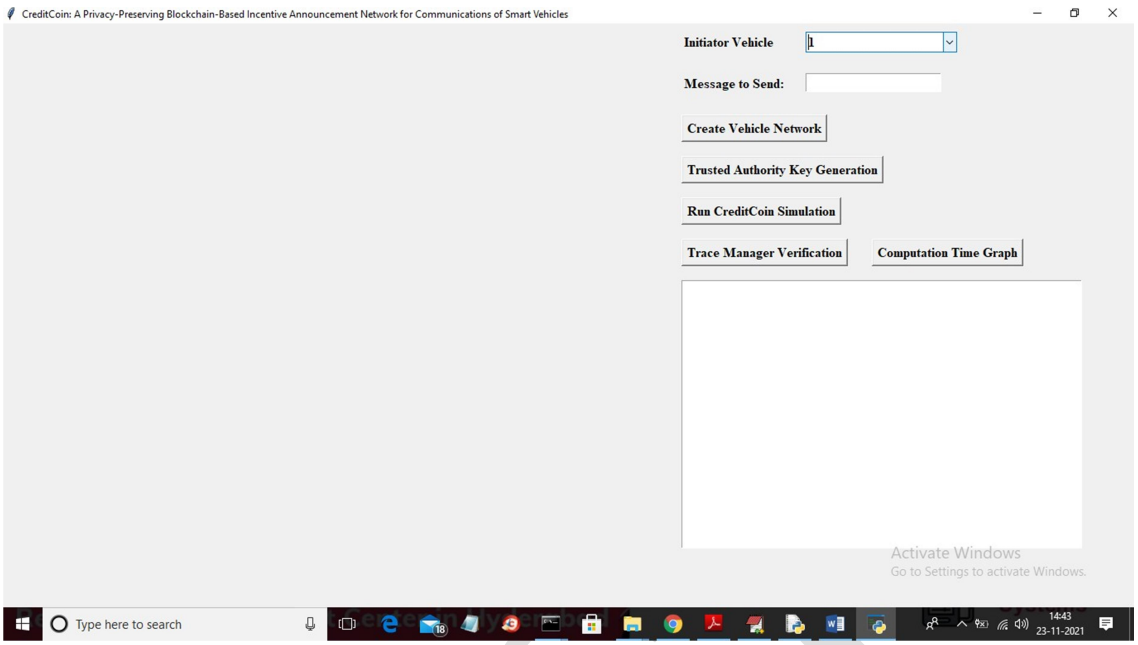

Fig. Initiator Vehicle

In above screen first drop down box contains all vehicles ID's and then you can enter messageto send to other vehicle

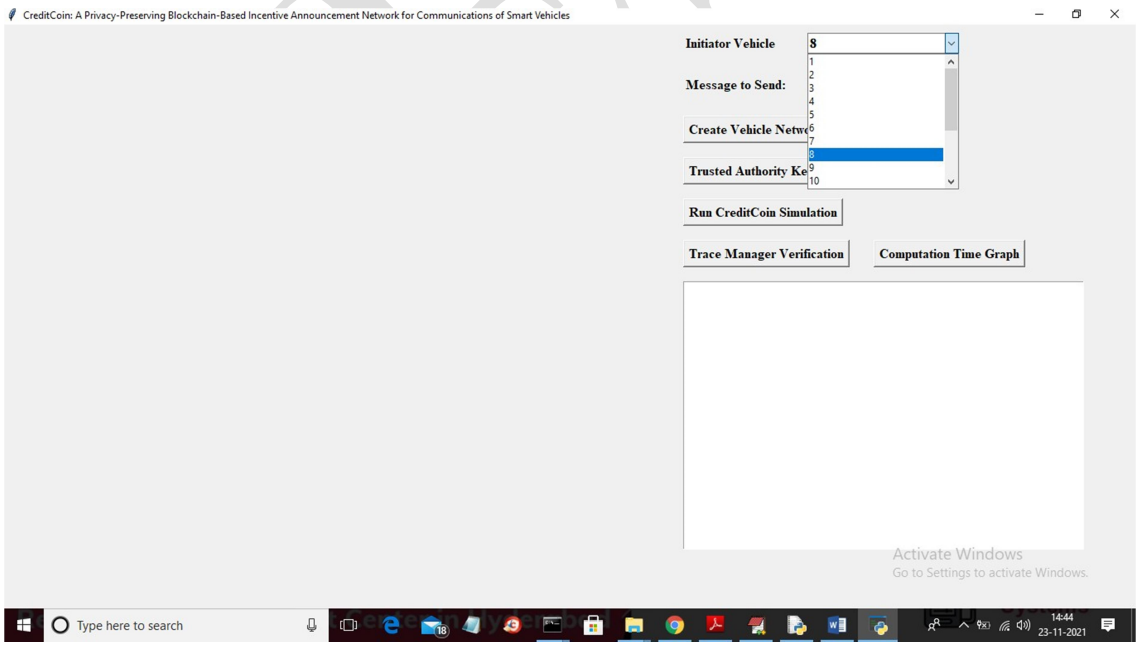

Fig. Initiator vehicle Number

In above screen from drop down list I selected INITIATOR vehicle id as 8 and then enter somemessage to send

to other vehicle

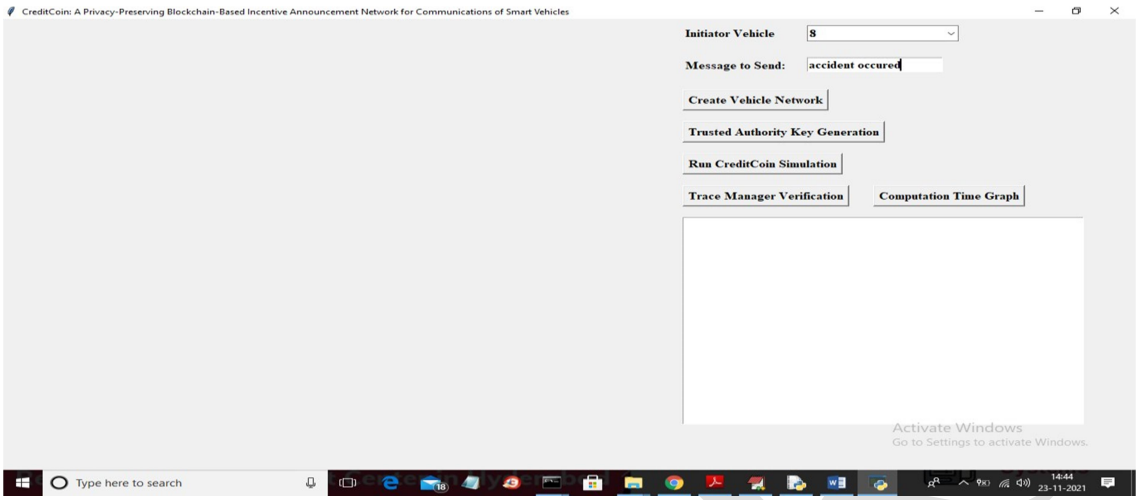

Fig. Sending Message

In above screen I entered some message and now click on 'Create Vehicle Network' button tocreate simulation screen

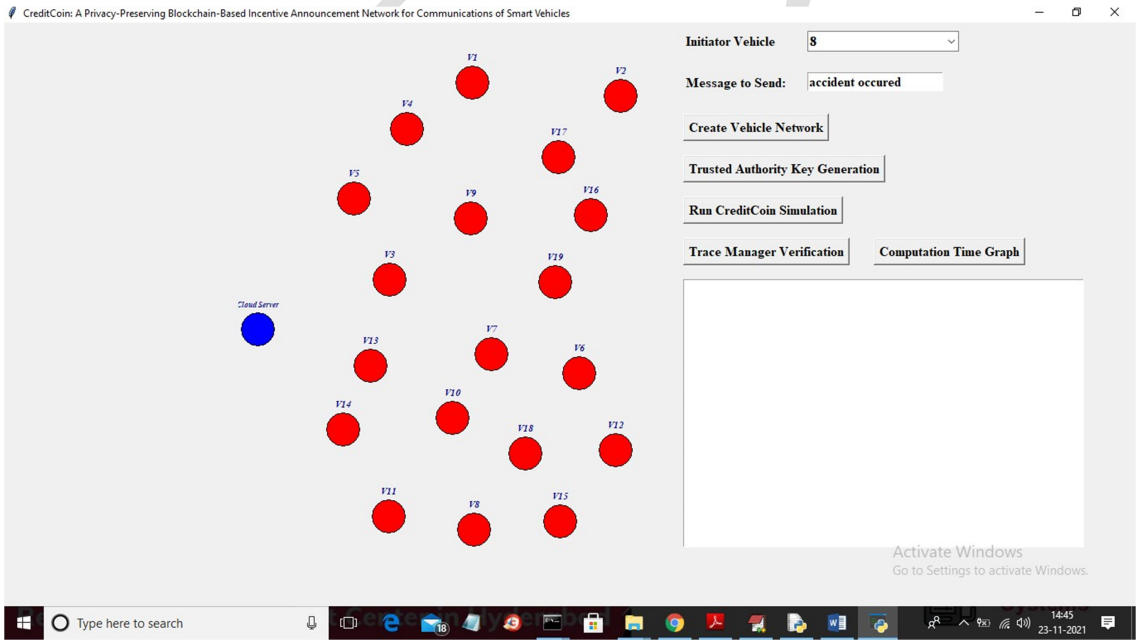

Fig. Creation Of Vehicular Network

In above screen all red colour circles are vehicles and blue color circle is the Cloud Server andnow click on 'Trusted Authority Key Generation' button to generate keys for encryption

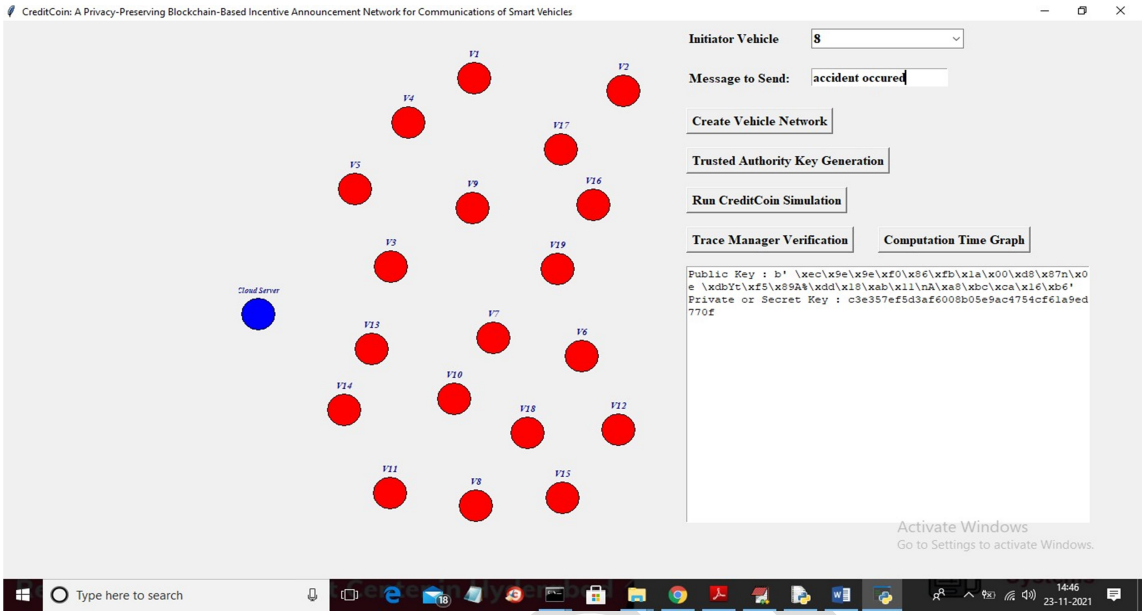

Fig.Key Generation

In above screen in text area we can see keys are generated and now click on 'Run Credit Coin Simulation' button to allow selected Initiator to send request to nearer vehicle and get reply. All this data will be stored in Blockchain so it may take few seconds time to show below output

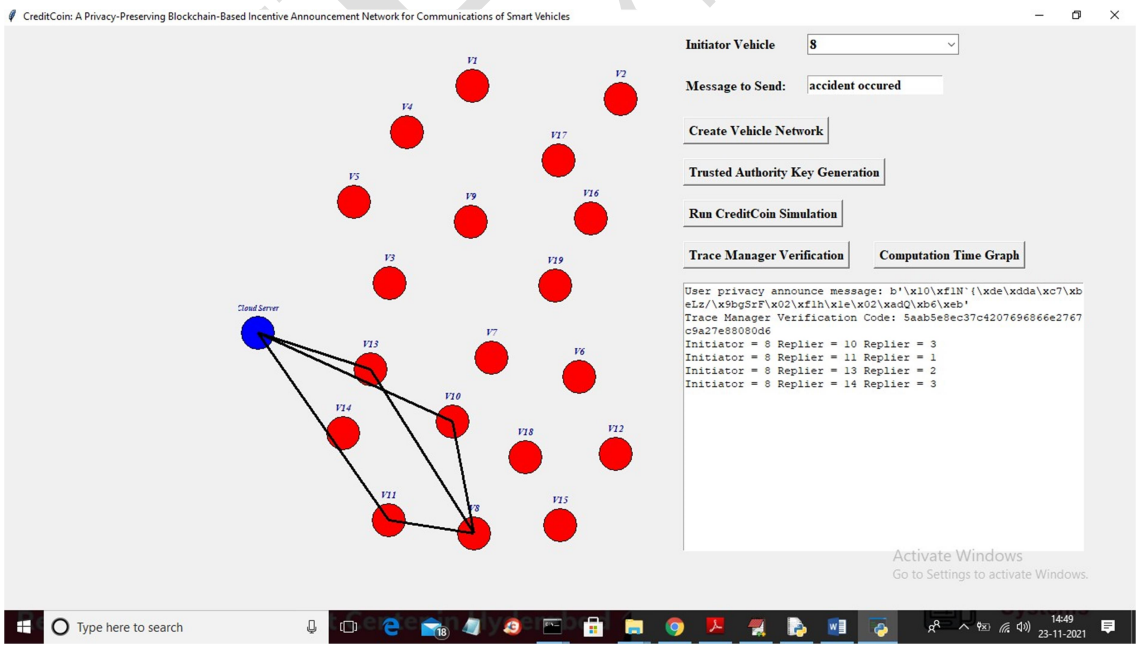

Fig. Credit Coin Simulation

In above screen we can see INITIATOR and repliers are exchanging announcement between each other and cloud server and in text area we can see which initiator sending request to whichreplier and all this data will saved in Blockchain and to read or verify data click on 'Trace Manager Verification' button to get below output

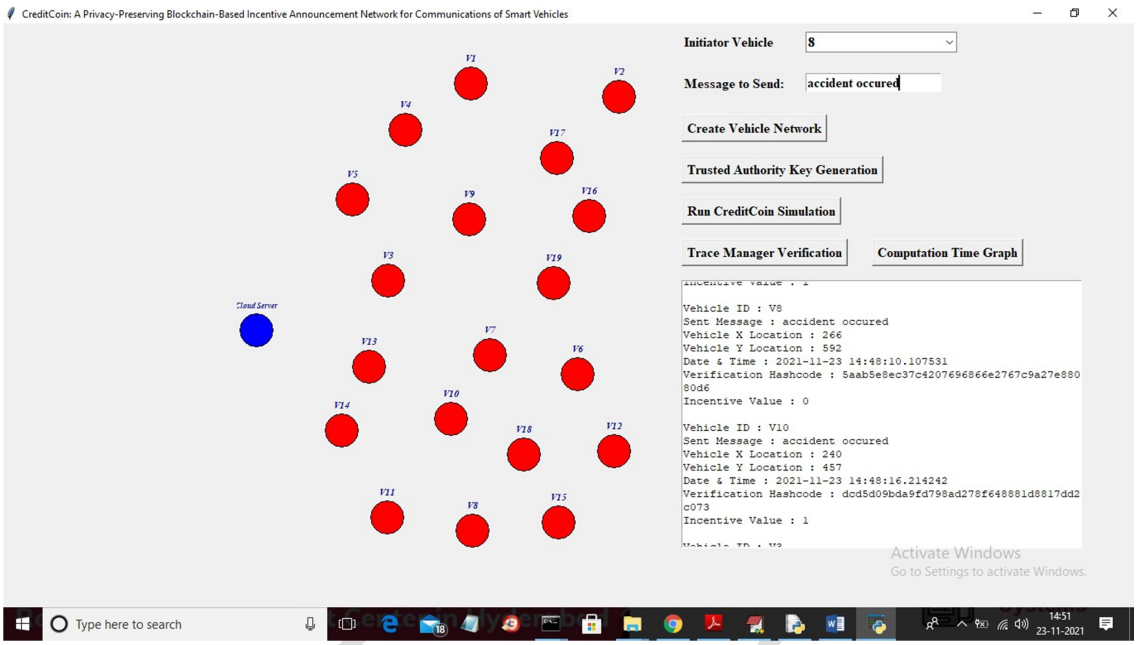

Fig. Trace manager

In above screen in text area we can see decrypted vehicle ID involved in announcement with their X and Y

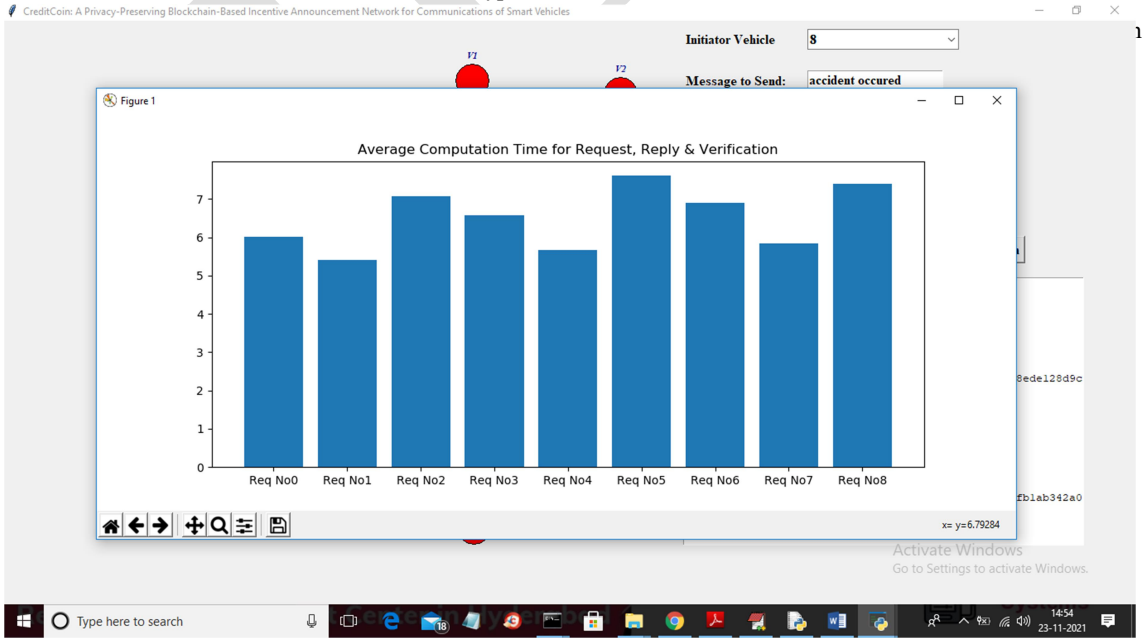

Fig. Computation Graph

In above screen click on 'Computation Time Graph' button to get below graph for each vehicle request, reply sending and verification time.In above screen x-axis represents request no and y-axis represents computation time require for sending request, reply and verification.

VI. CONCLUSION AND FUTURE WORK

In this paper, we have proposed CreditCoin, a novel privacy-preserving Blockchain-based incentive announcement network with our vehicular announcement protocol Echo- Announcement in VANETs. Our announcement protocol maintains the reliability of announcements without revealing users' privacy and is reliable and efficient in the non-fully- trusted environment in VANETs. Through our simulations, the total time of announcements for a user only is 174ms in our assumptions, which is much more efficient than other protocols. Furthermore, the designed incentive mechanism encourages users to be active in responding. With Blockchain, the security is also enhanced since announcements and transactions are traced only by Trace manager in CreditCoin. Through our simulations, the total time of transaction part for users is around 130ms per transaction, and the total time of consensus part for RSUs is around 92.4ms per 100 transactions. To conclude, CreditCoin is practical in the scenario of smart vehicles and smart transportation. In future work, we plan to improve the key management and the coin balance in CreditCoin. Designing more effective trading propositionsis also being investigated.

In the future, the enhancement of the proposed Vehicular Announcement Network (VANET) project can focus on addressing the challenges related to anonymous message forwarding and user motivation. To ensure the reliability of messages while maintaining anonymity, advanced cryptographic techniques and privacy-preserving protocols can be integrated into the VANET system. This may involve the use of homomorphic encryption, zero-knowledge proofs, or other privacy-enhancing technologies to authenticate and verify messages without revealing sensitive user information. By implementing robust privacy measures, the project aims to strikea balance between maintaining the confidentiality of user data and ensuring the trustworthinessof vehicular announcements in the network.

Furthermore, to incentivize active participation and message forwarding among users, agamification approach can be introduced. By incorporating elements of competition, rewards, and recognition into the VANET system, users can be encouraged to actively engage in forwarding announcements, contributing to the overall efficiency and reliability of the network

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