Technical Document

1. State of the Art

With the increase in population, the number of vehicles travelling on road is increasing constantly. To manage the safe and convenient movement of vehicles on road, a live monitoring of road segments is required. During this live monitoring any kind of unusual activity like traffic jam or accidents should be reported to other vehicles on road. Lot of research is already done in this field identifying the mechanisms for giving real time information about road issues to the vehicles. Major issues faced by the existing work are its efficiency and insecure transmission of information from one vehicle to another or to road side units.

Following are the gaps identified from the literature survey carried out:

- The existing road data collection methods are inefficient in terms of speed, security and reliably.
- The existing data collection methods lack the consistency among the different vehicles and road side units on the road.
- Real time decision making at RSU is still lacking in existing methods that makes it difficult to inform same information to other vehicles.
- Moreover, the effectiveness of existing methods can be still improved in trems of throughput, security, packet delivery ratio.

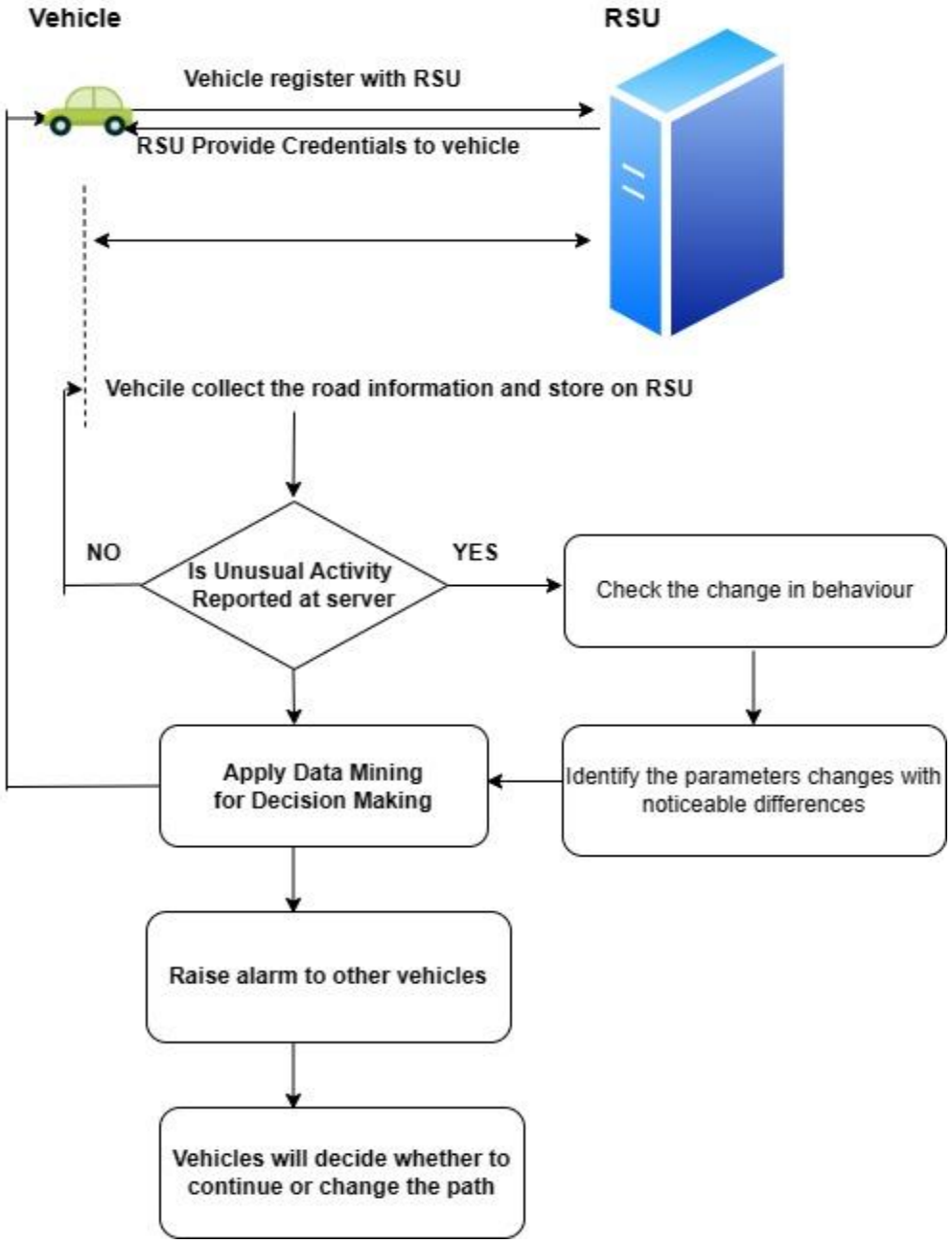
2. Origin of the Proposal

While going to Delhi, the investigator got late due to some accident of other vehicle on the road. So, he thought that prior information regarding any kind of accident or miss happening on the road can be provided so that an alternate path can be followed. Moreover, in daily routine everyone is in hurry so information regarding the correct path that can be followed at a particular time of day should be available like in morning busy hours. Investigator thought of getting this information from the other vehicles on the road or from the road side units attached by the road side. The main challenge faced here is whether to trust the other vehicles or not and whether they will provide accurate and real time information. Although GPS provides information related to heavy traffic, but still an efficient and secure mechanism is required. Investigator though of creating a secure and reliable mechanism for sharing the road condition information among the vehicles and road side unit as well for faster dissemination of any usual event detected.

3. Research Plan

The proposed research plan is divided into following steps:

1. Vehicles and RSUs will be deployed.
2. Before initiating communication among vehicles or among vehicles and RSUs, vehicles must authenticate themselves to prove their identity.
3. Once vehicle is authenticated, secure data collection is performed.
4. Data can be collected by vehicles travelling on rod or the fixed RSUs.
5. Any unusual event detected will be reported to RSU and RSU will involve in decision making whether to notify the alarm to other vehicles or not.



4. Key publications of the Investigator during the last 5 years

- "CIAS: A Comprehensive Identity Authentication Scheme for Providing Security in VANET." *International Journal of Information Security and Privacy (IJISP)* 12, no. 1 (2018): 29-41.
- "Security Analysis of Discrete Event Based Threat Driven Authentication Approach in VANET using Petri Nets". *International Journal of Network Security(IJNS) 20,(2018).*
- "Secure model to generate path map for vehicles in unusual road incidents using association rule based mining in VANET." Journal of Electronic Science and Technology.
- "An Efficient and Reliable Routing Protocol using bio-inspired techniques for congestion control in WSN." 4th International Conference on Computing Sciences (ICCS), 2018.
- "Current research on congestion control schemes in VANET: a practical interpretation", International Journal of Recent Technology Engineering, 2019.
- "A Review on the Role and Importance of Congestion Control for Traffic Optimization in Vehicular Ad-Hoc Networks." IoT and Cloud Computing Advancements in Vehicular Ad-Hoc Networks, 2020.
- "Hybrid logical security framework for privacy preservation in the green internet of things". Sustainability, 2020.
- "LLSFIoT: Lightweight Logical Security Framework for Internet of Things". Wireless Communications and Mobile Computing, 2021.
- "Gene expression-assisted cancer prediction techniques". Journal of Healthcare Engineering, 2021.
- "Design and evaluation of a hybrid technique for detecting sunflower leaf disease using deep learning approach". Journal of Food Quality, 2022.
- "Intrusion Detection Systems in Cloud Computing Paradigm: Analysis and Overview". Complexity, 2022.
- "Seed: secure and energy efficient data-collection method for IoT network". Multimedia Tools and Applications, 2022.
- "Predicting Trends and Research Patterns of Smart Cities: A Semi-Automatic Review Using Latent Dirichlet Allocation (LDA)". IEEE Access
- "Digital society social interactions and trust analysis model". PeerJ Computer Science

5. Bibliography

- Dr. Arun Malik received his B.Tech. Degree from Kurukshetra University, Kurukshetra in 2008, M.Tech. degree from Maharishi Markandeshwar University, Mullana in 2011 and Ph.D. degree from Lovely Professional University in 2018. He has more than 12 years of teaching experience and published more than 45 papers in journals and conference proceedings. His research interests include wireless networks, Artificial

Intelligence, IOT and cloud computing.

- Dr. Rahul Sharma is working as Associate Professor in Mechanical Engineering, Lovely Professional University, Phagwara, Punjab, India. He has received his Ph.D. degree from Lovely Professional University, Phagwara, Punjab, India in 2021. His research areas include Design, Fabrication, Machining, Manufacturing, Simulation etc. He has published more than 20 research articles from which 7 are SCI. He has got Best Teacher Award in the year of 2018 from education minister Mrs. Samriti Irani. He has attended 2 international conferences. Currently Two Ph.D. students are working under his supervision.
- Dr. Aman Deep Acharya is working as Associate Professor in Physics, School of Chemical engineering and Physical sciences, Lovely Professional University, Phagwara, Punjab, India. He has received his Ph.D. degree from Vikram University, Ujjain, India in 2012. His research areas include Material Science, Polymer (Preparation of Nano composites and characterization for their applicability as Renewable energy sources like supercapacitor, solar cells, Interfacial layers, electrode as well as for waste management). He has won Research Appreciation Award in the year of 2019. He has received Reviewer Award by revered Journals of Elsevier in 2014, 2015, 2016, 2017, 2018. He has 33 publications in reputed Journals of Elsevier, and participated in 28 National and International conferences. He guided 10 PG/UG students for project/dissertation. Currently Two Ph.D. students are working under his supervision.
- Dr. Isha Batra received her B.Tech. Degree from Kurukshetra University, Kurukshetra in 2008, M.E. Degree from PEC University of Technology, Chandigarh in 2010 and Ph.D. degree from Lovely Professional University in 2019. She has more than 11 years of teaching experience and published more than 35 papers in journals and conference proceedings. Her research interests include wireless networks, Network Security, Artificial Intelligence, IOT and cloud computing.
- Dr. Alok Jain received his M.Sc degree from Guru Nanak Dev University, Amritsar in 2005, M.Tech. degree from Thapar University, Patiala in 2008 and a Ph.D. degree from Lovely Professional University in 2019. He has more than 14 years of teaching experience and published more than 6 papers in journals and many in the pipeline. His research interests include Material Science, Physics, Supercapacitors, and batteries.

6. Equipment available with the Institute/ Group/ Department/Other Institutes for the project

Equipment available	Generic Name of Equipment	Model, Make & year of purchase	Remarks including accessories available and current usage of equipment
PI & his group	Simulator	Latest version	-
PI's department	NA	NA	-
Other Institute(s) in the region	NA	NA	-